B.E. (Computer Science and Engineering)

2015 Regulations, Curriculum & Syllabi

BANNARI AMMAN INSTITUTE OF TECHNOLOGY

(An Autonomous Institution Affiliated to Anna University, Chennai
Approved by AICTE - Accredited by NBA New Delhi, NAAC with 'A' Grade and ISO 9001:2008 Certified)
SATHYAMANGALAM – 638 401 Erode District Tamil Nadu
Phone : 04295 226000 Fax : 04295 226666
Web:www.bitsathy.ac.in E-mail : stayahead@bitsathy.ac.in

CONTENTS

REGULATIONS 2015

(CHOICE BASED CREDIT SYSTEM)

(Common to all B.E./B.Tech. Degree Programmes)

Regulation 2015 has been prepared in accordance with the guidelines given by the University Grants Commission, All India Council for Technical Education and affiliating University incorporating the features of the Choice Based Credit System (CBCS). The Regulation 2015 is applicable to the candidates admitted to the Bachelor of Engineering (B.E.) / Bachelor of Technology (B.Tech.) Degree Programmes of the Institution in the academic year 2015-2016 for Regular admission (Academic year 2016-2017 for Lateral Entry) and subsequently.

The regulations hereunder are subjected to amendments as may be decided by the Academic Council of the Institution from time to time. Any or all such amendments will be effective from such date and to such batches of students (including those already in the middle of the programme) as may be decided by the Academic Council.

1. ADMISSION

Candidate, seeking admission to the B.E./B.Tech. Programme, shall satisfy the conditions of admission prescribed by the Directorate of Technical Education and Anna University, Chennai as given below.

1.1 Regular Admission

Candidates, for admission to the first semester of the eight semesters B.E./B.Tech. Degree Programmes, shall be required to have passed:

- Higher Secondary Examination (10 +2) of Curriculum (Regular Academic Stream) prescribed by the Government of Tamil Nadu with Mathematics, Physics, and Chemistry as three of the four subjects of the study prescribed under Part-III or any other examinations of any Board or University or authority accepted by the Syndicate of the University / Directorate of Technical Education (DoTE), Chennai as equivalent thereto.

(or)

- Should have passed Higher Secondary Examination of Vocational Stream (Engineering/Technology), prescribed by the Government of Tamil Nadu.

1.2 Lateral Entry Admission

1.2.1 The candidates who possess Diploma in Engineering / Technology awarded by the State Board of Technical Education and Training, Tamil Nadu or its equivalent are eligible to apply for Lateral Entry admission to the third semester of B.E. / B.Tech. Programmes in the branch of study as per the eligibility criteria prescribed by the Directorate of Technical Education from time to time.

(or)

1.2.2 The candidates who possess the Bachelor Degree in Science (B.Sc.) (10+2+3 stream) with Mathematics as a subject in B.Sc. is eligible to apply for Lateral Entry admission to the third semester of B.E./B.Tech. Programmes, as per the eligibility criteria prescribed by the Directorate of Technical Education from time to time. Such candidates shall undergo two additional Engineering subject(s) one each in third and fourth semesters, as bridge courses.

2. PROGRAMMES OFFERED

A candidate may be offered admission to any one of the programmes offered by the Institution for the candidates specified in Clause 1.1 and as per the eligibility criteria of DoTE for the candidates under Clause 1.2 from the list given below:

B. E. Programmes

i. Aeronautical Engineering
ii. Agricultural Engineering
iii. Automobile Engineering
iv. Civil Engineering
v. Computer Science and Engineering
vi. Electrical and Electronics Engineering
vii. Electronics and Communication Engineering
viii. Electronics and Instrumentation Engineering
ix. Mechanical Engineering
x. Mechatronics

B. Tech. Programmes

i. Biotechnology
ii. Fashion Technology
iii. Information Technology
iv. Textile Technology
v. Food Technology

3. STRUCTURE OF THE PROGRAMME

3.1 Every programme shall have a distinct curriculum with syllabi consisting of theory, laboratory, mini-project, life-skills and personality development courses, as prescribed by the respective Boards of Studies, broadly categorized under:

(i) **Basic Science** courses including Mathematics, Physics, Chemistry and further specialization in these subjects

(ii) **Basic Engineering c**ourses including Engineering Graphics, Workshop Practices, Basics of Electrical, Electronics, Civil, Mechanical Engineering, Engineering Mechanics and Computer Programming.

(iii) **Humanities and Social Science c**ourses including Language Courses, Management Courses, Life Skills and Professional Ethics.

(iv) **Professional Courses** include Discipline Core Courses, Professional Electives, Core Electives and Open Electives.

(v) **Employability Enhancement Courses (EEC)** include Project Work and /or Internship, Seminar, Industrial /Practical Training, Value Added and Certificate Courses.

The assortment of different courses shall be designed that the student, at the end of the programme, would be able to be trained not only in his / her relevant professional field but also as a socially mindful human being.

The medium of instruction is English for all the Courses, Examinations, Seminar Presentation, Projects and any other courses that a student registers for.

3.2 Each course is normally assigned a certain number of credits, with 1 credit per lecture period per week, 1 credit for 2 periods of tutorial, 1 credit for 2 periods of laboratory courses, and 1 credit for 2 periods of seminar/project work per week.

3.3 A Diagnostic Test will be administered to all the B.E. / B.Tech. students after the admission to assess the proficiency in English and based on the score they will be brought under two streams namely, Stream A and Stream B. Students under Stream A will study **Communicative English I** and Stream B will study **Basic English I** under Language Elective I in the First Semester. In the Second Semester, Stream A will be further divided into two categories based on their English language proficiency assessed in the Continuous Assessment, while the upper segment can

enroll and study **German / Japanese / French / Chinese / Hindi** and the remaining students of that Stream will study **Communicative English II**. The students under Stream B will study **Basic English II** or may opt for **Communicative English II** based on the assessment carried out at the end of the semester I.

3.4 Every student shall be required to opt for **Nine** electives from the list of electives. Students can opt for the electives (Core / Professional / Open Elective) from any branch of B.E/B.Tech. Programmes, besides his / her own discipline courses, during V to VIII Semesters, if he/she satisfies the prerequisite for that particular course.

3.5 However, out of nine electives, every student shall be required to opt for, a minimum of three electives as open electives from the list of open electives of the branch / branches other than his / her branch of specialisation. There shall be no pre-requisite course(s) for such open electives.

3.6 Students can also opt for **one-credit courses** of 15 to 20 hour duration, which will be offered by the experts from the industry on specialised topics. Students can opt for such **one-credit courses** during the semesters I to VII as and when these courses are offered. A student will also be permitted to register the **one-credit courses** offered by other Departments, provided the student has fulfilled the necessary pre-requisites or the courses that may not require any pre-requisites. Under no circumstances, the same one credit course shall be repeated in subsequent semesters in any Department / Centre and a maximum batch size for a given course shall not exceed 40. In the case of disciplines with multiple divisions (intake more than 60) different course(s) shall be offered to other batch(es) of students.

On successful completion of one credit courses, Credits will be indicated in the Grade Sheet, but will not be considered for computing the Cumulative Grade Point Average (CGPA). However, if a student wishes to avail the exemption from any one of the Electives (other than open elective) of the Semester VIII, he / she can do so by exercising his / her option in writing to the respective Head of the Department during the beginning of the VIII Semester, following the equivalence norm, that **one regular elective (**in the **VIII Semester)** is equivalent to **three one-credit courses** completed by the student during the previous semesters, IV to VII. Details of the one credit courses offered by the department shall be forwarded to the Office

of the Controller of Examinations. However one credit courses completed during I to III semesters shall be maintained in the Grade sheet as "Additional credits earned" (not considered for the computation of GPA/CGPA).

3.7 Fast Track System shall enable students to undergo a semester-long Internship or Special Training during Semester VIII. A student who secures a minimum CGPA of 8.50 in Semester IV with no current arrears, as on that date and maintains the CGPA of 8.50 till VI Semester without any arrears shall be eligible to opt for Fast Track System and such student is required to complete three elective courses satisfactorily, while completion of Semester VII, as additional Credits during the semesters V to VII.

3.8 Every student shall be required to carry out a Project Work in the Department / Industry or by exercising Fast track during VIII Semester in consultation with the Faculty Guide and submit the project report, in the prescribed format, at the end of the VIII Semester for the valuation.

3.9 A student can register for Self-Study Elective(s) over and above the electives from any branch of Engineering / Technology at the rate of one per semester starting from V semester onwards provided he/she maintains a Cumulative Grade Point Average (CGPA) of 8.50 or above till the previous semesters with no current arrears. Credits will be indicated for such courses in the grade sheets (additional credits) but will not be considered for computing the CGPA.

3.10 A Student may be permitted to credit online courses with the approval of the Departmental Consultative Committee constituted by the Head of the Department, subject to a maximum of three credits. Such students may be exempted from attending the classes, if such course(s) are offered in the semester. Summary of such on-line courses, taken by the students, along with the offering agency shall be presented to the Academic Council for information and further suggestions. However, those students need to obtain certification from the agency / agencies offering the course, to become eligible for writing or seeking exemption (core elective course) from the End Semester Examination. In case of credits earned through online mode, from the other Institute / University, the credits may also be transferred directly after due approval from the Departmental Consultative

Committee and the Office of the Controller of Examinations. A student can get exemption for a maximum of 3 credits during the entire programme (in lieu of Discipline elective or Open elective).

4. VALUE ADDED COURSES / ADD-ON COURSES

A Student can opt for the Value Added Courses / Add-on Courses offered by the various Department / Centres for which the batch size will not exceed 40 per course from Semester II to VII. Head of the Department / Centre shall submit the list of such courses, duly approved / ratified by the Academic Council, to the Controller of Examinations to administer the examination process. A separate Certificate will be issued on successful completion of the course by the Office of the Controller of Examinations.

5. DURATION OF THE PROGRAMME

5.1 A regular student (admitted after 10+2) or equivalent is normally expected to satisfactorily fulfil the requirements for award of the degree B.E. / B.Tech. within four academic years (8 semesters) from the date of admission but in any case not more than 7 years (14 Semesters); lateral entry students shall fulfil such requirements within three academic years (6 semesters) from the date of admission but in any case not more than six years (12 Semesters) leading to the award of Degree of Bachelor of Engineering (B.E.) / Bachelor of Technology (B.Tech.) of Anna University, Chennai.

5.2 The total period for completion of the programme from the commencement of the semester, to which the student was admitted, shall not exceed the maximum period (Clause 5.1), regardless to the break-of-study (vide Clause 15) or period of prevention in order.

5.3 Each semester shall consist of minimum 90 working days or 450 periods of 60 minutes each or equivalent. Head of the Department shall ensure that every faculty member teaches the subject / course as prescribed in the approved curriculum and syllabi.

5.4 Special Theory / Practical Sessions may be conducted for students who require additional inputs over and above the number of periods normally specified

(Remedial Classes), as decided by the Head of the Department, within the specified duration of the Semester / Programme.

6. COURSE ENROLLMENT AND REGISTRATION

6.1 Each student, on admission shall be assigned to a Faculty Advisor (vide Clause 8) who shall advise / counsel the student about the details of the academic programme and the choice of course(s) considering the student's academic background and career objectives.

6.2 Every student shall enroll for the courses of the succeeding semester, in the current semester. However, the student shall confirm the enrollment by registering for the courses within the first five working days after the commencement of the semester concerned.

6.3 After registering for a course, a student shall attend the classes, satisfy the attendance requirements, earn Continuous Assessment marks and appear for the End Semester Examinations.

6.3.1 Each student, on admission to the programme, shall register for **all the courses prescribed in the curriculum in** the **first Semester of study (III Semester** for students admitted under **lateral entry stream).**

6.3.2 The enrollment for all the courses of the Semester II will commence 10 working days prior to the last working day of Semester I. The student shall confirm the enrollment by registering for the courses within the first five working days after the commencement of the Semester II. In the case, if a student fails to register in the course(s), he/ she may be permitted to register the same, as specified in the Clause 6.5, in the subsequent semesters or when it is offered.

6.3.3 The enrollment for the courses of the Semesters III to VIII will commence 10 working days prior to the last working day of the preceding semester. The student shall enroll for the courses with the guidance of the student's Faculty Advisor. If a student wishes, the student may drop or add courses (vide Clause 6.4) within **five** working days after the commencement of the semester concerned and complete the registration process duly authorized by the Faculty Advisor.

6.4 Flexibility to Add or Drop courses

6.4.1 A student has to earn the total number of credits specified in the Curriculum of the respective Programme of study in order to be eligible to obtain the degree. However, if a student wishes, the student is permitted to earn more than the total number of credits prescribed in the curriculum by opting for one- credit courses, self study electives or additional courses.

6.4.2 From the III to VIII semesters (from IV to VIII Semesters in case of lateral entry students), the student has the option of registering for additional courses or dropping existing courses. Total number of credits of such courses cannot exceed 6 in a given Semester. However the maximum number of credits that a student can register in a particular semester shall not exceed 30 credits (regardless to the reappearance credits). In such cases, the attendance requirement as stated Clause 7 is mandatory.

6.4.3 The minimum number of credits that a student can register in a particular semester shall not be less than 18 credits (except VII / VIII semester).

6.4.4 The student shall register for the project work in the VIII semester only.

6.5 Reappearance Registration

6.5.1 If a student fails in a theory course, the student shall do reappearance registration (Examination) for that course in the subsequent semesters or when it is offered next.

6.5.2 On registration, a student may attend the classes for the reappearance registration courses, if the student wishes, and the attendance requirement (vide Clause 7) is not compulsory for such courses.

6.5.3 However, if a student wishes to improve his/ her continuous assessment, in the second attempt during reappearance, shall satisfy the Clause 6.5.5 and appear for continuous assessment as given for that particular course.

6.5.4 If the theory course, in which the student has failed, is either a professional elective or an open elective, the student may register for the same or any other professional elective or open elective course, respectively in the subsequent semesters. However, the change of elective courses is permitted only once.

6.5.5 In this case (Clause 6.5.4), the student shall attend the classes, satisfy the attendance requirements (vide Clause 7), earn Continuous Assessment marks and appear for the End Semester Examination.

6.5.6 The student who fails in any Laboratory Course/ Project work / Seminar or any other EEC courses (Specified in Clause 3.1) shall register for the same in the subsequent semesters or when offered next, and **repeat** the course as per Clause 6.5.5.

6.5.7 If a student is prevented from writing the end semester examination of a course or several courses due to lack of attendance, the student has to register for that / those course(s) again, when offered next, attend the classes and fulfill the requirements as per Clause 6.5.5 & 6.5.6. If the course, in which the student has 'lack of attendance', is a Core Elective or an Open Elective, the student may register for the same or any other Core Elective or Open Elective course(s) respectively in the subsequent semesters and appear in the examination as per Clause 6.5.5.

7. REQUIREMENTS FOR APPEARING FOR THE END SEMESTER EXAMINATION OF A COURSE

A student who has fulfilled the following conditions (vide Clause 7.1 and 7.2) shall be deemed to have satisfied the attendance requirements for appearing for End Semester Examination of a particular course.

7.1 Every student is expected to attend all the periods and earn 100% attendance. However, a student shall secure not less than 80% attendance (Physical presence) course wise taking into account the number of periods required for that course as specified in the curriculum.

7.2 If a student, secures attendance between 70% and 79% in any course(s) in the current semester due to medical reasons (prolonged hospitalization / accident / specific illness) or participation in Institution/ University/ State/ National/ International level extra and co-curricular activities, with prior permission from the Head of the Department, shall be permitted to appear for the current semester examinations subject to the condition that the student shall submit the medical certificate / participation certificate attested by the Head of the Department (along

with Condonation form). Such certificates along with the condonation forms shall be forwarded to the Controller of Examinations for verification and permission to attend the examinations. However during the entire programme of study, a student can avail such Condonation in any two semesters only (regardless the number of courses).

7.3 A student shall normally be permitted to appear for End Semester Examination of the course(s) if the student has satisfied the attendance requirements (vide Clause 7.1 – 7.2) and has registered for examination in those courses of that semester by paying the prescribed fee.

7.4 Students who do not satisfy Clause 7.1 and 7.2 and who secure less than 70% attendance in a course will not be permitted to write the End-Semester Examination of that course. The student has to register and repeat this course in the subsequent semesters or when it is offered next (vide Clause 6.5).

7.5 In the case of reappearance registration for a course (vide Clause 6.5), the student has to register for examination in that course by paying the prescribed fee.

7.6 A student who has already appeared for a course in a semester and passed the examination is not entitled to reappear in the same course for improvement of grades.

8. FACULTY ADVISOR

To help the students in planning their courses of study and for general advice on the academic programme, the Head of the Department will attach a certain number of students to a Faculty member of the Department who shall function as Faculty Advisor for those students. The Faculty Advisor shall advise and guide the students in registering of courses, reappearance of courses, monitor their attendance and progress and counsel them periodically. If necessary, the Faculty Advisor may also discuss with or inform the parents about the progress / performance of the students concerned.

9. COMMITTEES

9.1 Common Course Committee

9.1.1 A theory course handled by more than one faculty including the discipline with multiple divisions (greater than or equal to 2) shall have a “Common Course Committee” comprising of all members of faculty teaching that course with one

of the members as the Course Coordinator, nominated by the Head of the Institution (Head of the Department in the case of multiple divisions of a discipline) and student representatives (one per specialization or division) registered for that course in the current semester.

First meeting of the Common Course Committee shall be held within fifteen days from the date of commencement of the semester. Two subsequent meetings in a semester may be held at suitable intervals. During these meetings, the student members shall meaningfully interact and express their opinions and suggestions of all the students to improve the effectiveness of the teaching-learning process. It is the responsibility of the student representatives to convey the proceedings of these meetings to all the students.

9.1.2 In addition, Common Course Committee (without the student representatives) shall meet to ensure uniform evaluation through the common question papers during Continuous Assessment and End Semester Examinations.

9.2 Class Committee Meeting

For all the courses taught, prescribed in the curriculum, Class Committee meeting shall be convened thrice in a semester (first meeting within 15 days from the commencement of the semester and other two meetings at equal interval after the first meeting) comprising members of the faculty handling all the courses and two student representatives from the class.

One of the members of the faculty (preferably not handling any courses to that class), nominated by the Head of the Department, shall coordinate the activities of the Committee. During these meetings, the student members shall meaningfully interact and express their opinions and suggestions of all the students to improve the effectiveness of the teaching-learning process. It is the responsibility of the student representatives to convey the proceedings of these meetings to all other students.

10. SYSTEM OF EXAMINATION

10.1 Performance in each course of study shall be evaluated based on (i) Continuous Assessment throughout the semester and (ii) End Semester examination at the end of the semester for the regular courses or as given in the Clause 16. However, the

final examination in the case of one credit courses / certificate / value added courses may be conducted, as and when the course is completed, through the office of the Controller of Examinations.

10.2 Each course, both theory and practical including project work, shall be evaluated as per the Scheme of Assessment given in Clause 16.

10.3 The End Semester Examinations shall normally be conducted after satisfying the Clause 5.2. Supplementary Examinations may also be conducted, at such times, for the benefit of the students as decided by the Controller of Examinations.

10.4 For the End Semester examinations, both theory and practical courses including project work, the internal and external examiners (from Academia or Industry) shall be appointed by the Controller of Examinations as per the guidelines given by the Examination and Evaluation Board of the Institute.

11. PASSING REQUIREMENTS AND PROVISIONS

11.1 A student who secures not less than 50% of total marks prescribed for a course, vide Clause 16, comprising a minimum of 50% of the marks prescribed for the End Semester Examination, shall be declared to have passed the course successfully and earned the prescribed credits for that course, applicable for all registered courses.

11.1.1 If a student fails to secure a pass in a particular course, i.e., failing to obtain minimum marks, as stated above, it is mandatory that he/she shall register and reappear for the examination in that course in the subsequent semester(s) whenever the examinations are conducted for that course, till he / she secures a 'Pass'.

11.1.2 Continuous Assessment (CA) marks obtained by the student in the first appearance shall be retained and considered valid for one subsequent attempt, except Clause 6.5.4, 6.5.5, 6.5.6 and 6.5.7. However, from the third attempt onwards, the student shall be declared to have passed the course if he/she secures a minimum of 6 Grade Points (B Grade) in the course prescribed during the End Semester Examinations.

11.2 The minimum number of total credits to be earned by a student to qualify for the award of Degree in the various branches of study as prescribed by the respective Boards of Studies is given below:

Branch of Study	Minimum Credits	
	Regular Admission	Lateral Entry
B.E. Programmes		
Aeronautical Engineering	178	134
Agricultural Engineering	177	133
Automobile Engineering	179	134
Civil Engineering	176	131
Computer Science and Engineering	176	131
Electrical and Electronics Engineering	176	132
Electronics and Communication Engineering	177	132
Electronics and Instrumentation Engineering	177	133
Mechanical Engineering	179	135
Mechatronics	177	133
B.Tech. Programmes		
Biotechnology	175	131
Fashion Technology	176	132
Information Technology	176	131
Textile Technology	175	131
Food Technology	175	131

11.2.1 Student Migration and Credit Transfer: Normalization of the Credits will be carried out in consultation with the Board of Studies of the programme concerned and approved by the Head of Institution, if a student migrates from other institutions to Bannari Amman Institution of Technology or rejoins from previous regulation to this regulation.

11.3 A student shall be declared to have qualified for award of B.E/B.Tech. Degree if he/she successfully completes the course requirements (vide Clause 7, 10 and 11) and passed all the prescribed courses of study of the respective programme (listed in Clause 2), within the duration specified in Clause 5.1.

12. ASSESSMENT AND AWARD OF LETTER GRADES

12.1 The assessment shall be based on the performance in the End Semester Examinations and / or Continuous Assessment, carrying marks as specified in Clause 16. Letter Grades (based on Credit Point and Grade Point) are awarded to the students based on the performance in the evaluation process.

12.2 Credit Point is the product of Grade Point and number credits for a course and Grade Point is a numerical weight allotted to each letter grade on a 10-point scale (as specified in the Clause 12.3), while the Letter Grade is an index of the performance of a student in a said course.

12.3 The performance of a student will be reported using Letter Grades, each carrying certain points as detailed below:

Range of Total Marks (as specified in Clause 16) / Specific Reason	Grade Points	Letter Grade
91 to 100	10	O (Outstanding)
81 to 90	9	A + (Excellent)
71 to 80	8	A (Very Good)
61 to 70	7	B + (Good)
50 to 60	6	B (Above average)
0 to 49	0	RA (Reappearance Registration)
Incomplete	0	I
Withdrawal	0	W
Absent	0	AB
Shortage of Attendance	0	SA

'RA' ---Reappearance registration is required for that particular course

'I' --- Continuous evaluation is required for that particular course in the subsequent examinations.

'SA' --- shortage of attendance (Clause 7) and hence prevented from writing end semester examination.

12.4 After completion of the evaluation process, Grade Point Average (GPA), and the Cumulative Grade Point Average (CGPA) is calculated using the formula:

$$GPA/CGPA = \frac{\sum_1^n C_i * g_i}{\sum_1^n C_i}$$

where

C_i : Credit allotted to the course.

g_i : Grade Point secured corresponding to the course.

n : number of courses successfully cleared during the particular semester in the case of GPA and all the semesters, under consideration, in the case CGPA.

12.5 A student who does not appear for the End Semester Examinations in a course, after registering for the same, shall be deemed to have appeared for that examination for the purpose of classification (Subject to Clause 14 and 15).

12.6 For the non credit courses Grades shall be indicated as given in the Clause 16 and shall not be counted for the computation of GPA/CGPA.

12.7 **Photocopy / Revaluation:** A student, who seeks the re-valuation of the answer script is directed to apply for the photocopy of his/her semester examination answer paper(s) in the theory course(s), within 2 working days from the declaration of results in the prescribed format to the Controller of Examinations through the Head of the Department. On receiving the photocopy, the student can consult with a competent member of faculty and seek the opinion for revaluation. Based on the recommendations, the student can register for the revaluation through proper application to the Controller of Examinations. The Controller of Examinations shall arrange for the revaluation and declare the results. Revaluation is not permitted to the courses other than theory courses. In the case of theory courses with laboratory component, a student can seek revaluation for the theory component only, following the procedure stated above.

13. CLASSIFICATION OF THE DEGREE AWARDED

For the purpose of the 'Award of Degree', the duration of completion of the programme shall be the total duration taken by a student for completing first time registration of all the required courses and satisfying Clause 11, regardless to the period of Break-of-study as per Clause 15 and satisfy any one of the conditions required as given below.

13.1 **First Class with Distinction**: A student who qualifies for the award of the Degree having passed all the courses of study of all the Eight Semesters (six semesters for lateral entry students) at the first opportunity, after the commencement of his / her study and securing a CGPA not less than 8.50 (vide clause 12.3) shall be declared to have passed with **First Class with Distinction**.

13.2 **First Class**: A student who qualifies for the award of the Degree having passed all the courses of study of all the eight semesters (six semesters for lateral entry students) after the commencement of his / her study and securing a CGPA not less than 6.50 shall be declared to have passed with **First Class** (not exceeded the total duration as specified in the Clause 5).

13.3 **Second Class**: All other students who qualify for the award of the Degree shall be declared to have passed in **Second Class.**

13.4 Course Completion Certificate shall be given to a student, provided he / she should have registered all the courses and also registered for the examinations in those courses (subject to Clause 6.0 and 7.0).

14. WITHDRAWAL FROM THE EXAMINATION

14.1 A student may, for valid reasons, be granted permission by the Head of the Department to withdraw from appearing in the examination in any course(s) only once during the entire duration of the degree programme.

14.2 Withdrawal application shall be valid only, if the student is eligible to write the examination as per Clause 7 and, if such request for withdrawal is made prior to the submission of the Continuous Assessment marks of the course(s) with the recommendations from the Head of the Department.

14.3 Withdrawal shall not be considered as an appearance in the examination for the eligibility of a student for First Class with Distinction or First Class.

15. AUTHORIZED BREAK OF STUDY FROM A PROGRAMME

15.1 A student is permitted to go on break of study for a maximum period of one year either as two breaks of one semester each or a single break of one year.

15.2 A student is normally not permitted to break the period of study temporarily. However, if a student happens to discontinue the programme temporarily during the

middle of programme of study, for reasons such as personal accident or hospitalization due to ill health or in need of health care, he/she shall apply to the Head of the Institution in advance, in any case, not later than the last date for registering for the semester examination, through the Head of the Department stating the reasons for the break-of-study (for one academic semester or 6 months, whichever is earlier). However, a student detained for want of minimum attendance requirement as per Clause 7 shall not be considered as permitted 'Break of Study' and Clause 15.3 is not applicable for such case.

15.3 The student is permitted to rejoin the programme after the break shall be governed by the rules and regulations of DoTE and the Curriculum and Regulations in force at the time of rejoining, subject to the Clause 11.2.1.

15.4 Authorized break of study will be counted towards the duration specified for passing all the courses (vide Clause 5.1 and 5.2) and for the purpose of classification of Degree (vide Clause 13).

15.5 The total period for completion of the programme reckoned from the commencement of the first semester to which the student is admitted shall not exceed the maximum period specified in Clause 5.1, irrespective of the period of break of study in order that he / she may be eligible, for the award of the degree (vide Clause 13).

15.6 In case of valid reasons (as stated in Clause 15.2) extended break-of-study may be granted by the Head of the Institution for a period not more than one year (total duration or two semesters whichever is earlier) in addition to the earlier authorized break of study.

15.7 If a student does not report back to the Institute, even after the extended Break of Study, the name of the student shall be deleted permanently from the college enrollment. Such students are not entitled to seek readmission under any circumstances.

16. SCHEME OF ASSESSMENT

Courses offered under B.E. / B.Tech. Programmes are assessed as given below:

I	**THEORY COURSES**	**Marks**
	Continuous Assessment	**50**
	Distribution of marks for Continuous Assessment:	
	Test I (15)	
	Test II (15)	
	Open book test (10)	
	Library - Seminars / Assignments (Two) (10)	
	End Semester Examination	**50**
	Total Marks	**100**

II	**THEORY COURSES WITH LAB COMPONENT**	**Marks**
	Continuous Assessment	**50**
	Distribution of marks for Continuous Assessment:	
	Test I (10)	
	Test II (10)	
	Conduct of Experiment	
	Preparation(5)	
	Experiment and Results (5)	
	Record Note[#]	
	Final Lab Examination (20)	
	End Semester Examination (QP pattern as per (I))	**50**
	Total Marks	**100**

III	**LABORATORY COURSES**	**Marks**
	Continuous Assessment	**50**
	Distribution of marks for Continuous Assessment:	
	Conduct of Experiment	
	i. Preparation (5)	
	ii. Experiment and Results (10)	
	iii. Record / Observation[#] *(5)*	
	Test – Cycle I (15)	
	Test – Cycle II (15)	
	End Semester Examination	
	Experiments & Results (40)	**50**
	Viva Voce – (10)	
	Total Marks	**100**

[#] *Reports / Record Note / Integrated Lab Manual to be retained for 1 year for Academic Audit, by respective Department*

IV	**TECHNICAL SEMINAR**	**Marks**
	Continuous Assessment	**50**
	Distribution of marks for Continuous Assessment:	
	Presentation I (25)	
	Presentation II (25)	
	End Semester Examination	
	Report[#] (20)	**50**
	Presentation (20)	
	Viva voce (10)	
	Total Marks	**100**

V	**PROJECT**	**Marks**
	Continuous Assessment	**50**
	Distribution of marks for Continuous Assessment:	
	Review I	
	Literature survey (10)	
	Problem Identification (5)	
	Methodology (10)	
	Review II	
	Continuation in Methodology (10)	
	Results / Progress (15)	
	End Semester Examination	
	Report[#] (20)	**50**
	Presentation (20)	
	Viva voce (10)	
	Total Marks	**100**

VI	**LANGUAGE ELECTIVE**	**Marks**
	(CONTINUOUS ASSESSMENT ONLY)	
	Test 1	
	Listening (10)	
	Speaking (5)	**25**
	Reading (5)	
	Writing (5)	
	Test 2	
	Listening (10)	
	Speaking (5)	**25**
	Reading (5)	
	Writing (5)	
	Oral Exam	**50**
	Total Marks	**100**

[#] *Reports / Record Note / Integrated Lab Manual to be retained for 1 year for Academic Audit, by respective Department*

VII	ONE-CREDIT COURSE	Marks
	Test	**30**
	Quiz	**20**
	Final Examination	**50**
	Total Marks	**100**

VIII	MINI-PROJECT	Marks
	(CONTINUOUS ASSESSMENT ONLY)	
	Review I	**25**
	Review II	**25**
	Project Evaluation	
	Report (25)[#]	**50**
	Presentation&Viva Voce (25)	
	Total Marks	**100**

IX	LIFE SKILLS	Marks
	(CONTINUOUS ASSESSMENT ONLY)	
	Test I	**25**
	Test II	**25**
	Final Examination	**50**
	Total Marks	**100**
	Grades (Excellent / Good / Satisfactory/Not Satisfactory)	

X	VALUE ADDED / CERTIFICATE COURSES	Marks
	(CONTINUOUS ASSESSMENT ONLY)	
	Test I	**25**
	Test II	**25**
	Final Evaluation / Test	**50**
	Total Marks	**100**
	Grades (Excellent / Good / Satisfactory / Not Satisfactory)	

XI	ENGINEERING GRAPHICS	Marks
	Continuous Assessment	**50**
	Distribution of marks for Continuous Assessment:	
	Class work (based on attendance) (5)	
	Assignments (Minimum 8 Assignments) (20)	
	Model Examination (25)	
	End Semester Examination	**50**
	Total Marks	**100**

[#] *Reports / Record Note / Integrated Lab Manual to be retained for 1 year for Academic Audit, by respective Department*

Optional Test: *A student becomes eligible to appear for the one optional test conducted after the Periodical Test II, only under the following circumstances: (i) absent for Test I or Test II or both on account of medical reasons (hospitalization / accident / specific illness), or (ii) participation in the College / University / State / National / International level Sports events with prior permission from the Head of the Institution and (iii) on satisfying the conditions (i) or (ii), the student should have registered for the Optional Test, through the concerned member of faculty who handles the course or through the respective Head of the Department, submitted to the Controller of Examinations. Such Optional Tests are not conducted for the courses under the categories III, IV, V, VI, VII, VIII, IX, X and XI listed above.*

17. FIELD / INDUSTRIAL VISIT / INTERNSHIP

Heads of Departments, in order to provide the experiential learning to the students, shall take efforts to arrange at least two industrial visits / field visits in a semester. The students may also undergo in-plant training / internship during summer / winter vacation between III and VII semesters.

18. PERSONALITY AND CHARACTER DEVELOPMENT

Every student shall be required to undergo a minimum of 40 hours of Personality Development Programmes viz, NSS / NCC / YRC / YOGA / Sports and Games / Technical and Non-technical Club activities during the first year, failing which he/she shall not be permitted to appear for the End Semester examinations of semester II and there onwards. Such students are permitted to appear for the End Semester examinations of semester II and there onwards only after completing satisfactorily the requirements.

The attendance of the personality and character development courses / events shall be maintained on the regular basis by the concerned First Year Co-ordinators and made available in the Office of the Controller of Examinations before the commencement of Semester examinations of Semester I or Semester II.

19. DISCIPLINE

A student is expected to follow the rules and regulations laid down by the Institute and the affiliating University, as published from time to time. Any violations, if any, shall be treated as per the procedures stated thereof.

If a student indulges in malpractice in any of the End Semester / Continuous Assessments, he / she shall be liable for punitive action as prescribed by the Institution / University from time to time.

20. REVISION OF REGULATIONS, CURRICULUM AND SYLLABI

The Institution reserves the right to revise/amend/change the Regulations, Curriculum, Syllabi, Scheme of Examinations and date of implementation and to introduce Additional Electives, Open Electives, One Credit Courses and Value Added Courses through the Academic Council.

The Question Paper pattern (Theory Examination) for UG Programme is given below:

PART A

Objective Type Questions: 20	**(20X1 = 20 Marks)**	**20**

PART B

Short Answer Questions: 10	**(10X2 = 20 Marks)**	**20**

PART C

Long Answer Questions: 5	**(5X12 = 60 Marks)**	**60**

	Total	**100**

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

I. To excel in professional career by acquiring knowledge in the domain of Computer Science and Engineering.

II. To exhibit competence, communication skills, ethical attitude, and team work in their profession.

III. To adapt with the continuously evolving technology to solve real time problems.

PROGRAMME OUTCOMES (POs)

Engineering Graduates will be able to:

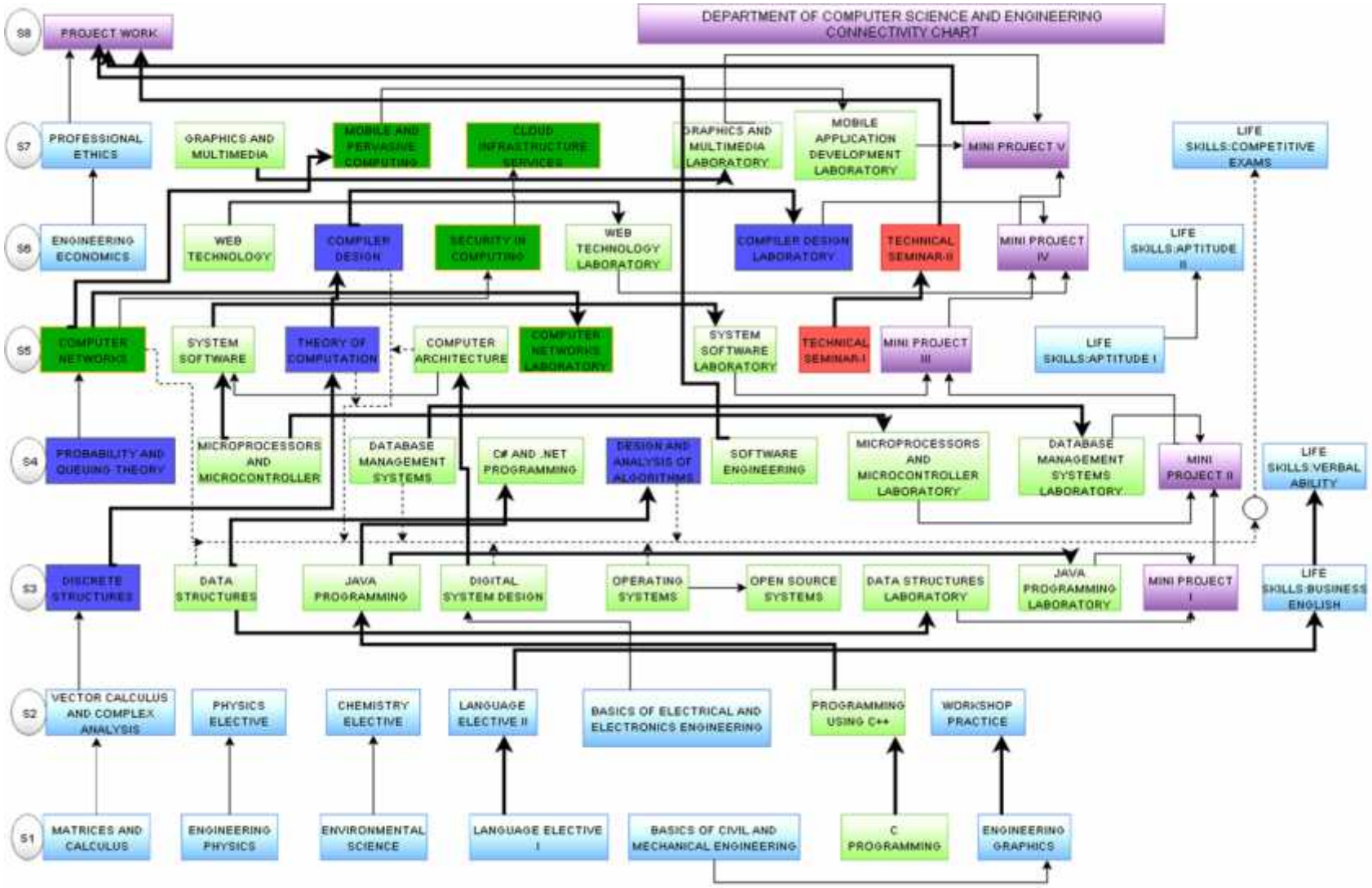
1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem Analysis**: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/ Development of Solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct Investigations of Complex Problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The Engineer and Society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and Team Work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and Finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long Learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

MAPPING OF PEOs AND POs

POs	a	b	c	d	e	f	g	h	i	j	k	l
PEO1	X	X	X	X	X	X	X					
PEO2								X	X	X	X	
PEO3												X

CONNECTIVITY CHART



B.E. COMPUTER SCIENCE AND ENGINEERING
Minimum Credits to be Earned : 176

First Semester

Code No.	Course	Objectives & Outcomes		L	T	P	C	Maximum marks			Category
		PEOs	POs					CA	ES	Total	
15MA101	MATRICES AND CALCULUS*	I	a,b	3	2	0	4	50	50	100	BS
15PH102	ENGINEERING PHYSICS*	I	a	2	0	2	3	50	50	100	BS
15CH103	ENVIRONMENTAL SCIENCE*	II	g	2	0	2	3	50	50	100	HSS
	LANGUAGE ELECTIVE I#	-	-	-	-	-	3	100	-	100	HSS
15GE205	BASICS OF CIVIL AND MECHANICAL ENGINEERING⊕	I	a	3	0	0	3	50	50	100	ES
15GE106	C PROGRAMMING±	I	a,b,d	3	0	2	4	50	50	100	ES
15GE207	ENGINEERING GRAPHICSλ	I	a, b, d, e	0	0	4	2	50	50	100	ES
			Total	**13**	**2**	**10**	**22**	**400**	**300**	**700**	**-**

Second Semester

Code No.	Course	Objectives & Outcomes		L	T	P	C	Maximum marks			Category
		PEOs	POs					CA	ES	Total	
15MA201	VECTOR CALCULUS AND COMPLEX ANALYSIS*	I	a,b	3	2	0	4	50	50	100	BS
	PHYSICS ELECTIVE*	-	-	-	-	-	4	50	50	100	BS
	CHEMISTRY ELECTIVE*	-	-	-	-	-	4	50	50	100	BS
	LANGUAGE ELECTIVE II#	-	-	-	-	-	3	100	-	100	HSS
15GE105	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERINGΔ	I	a	2	0	2	3	50	50	100	ES
15CS206	PROGRAMMING USING C++®	I	c,d,e	3	0	2	4	50	50	100	ES
15GE107	WORKSHOP PRACTICEΩ	I,III	a,e	0	0	2	1	50	50	100	ES
			Total	**8**	**2**	**6**	**23**	**400**	**300**	**700**	**-**

* Common to all branches of B.E./B.Tech
# Common to all branches of B.E./B.Tech (Continuous Assessment)
⊕ Common to CSE,ECE,EEE,EIE,FT,IT (I Semester) and to MTRS, BT,TT, FD (II Semester)
± Common to CSE,ECE,EEE,EIE,IT
λ Common to CE,CSE,ECE,EEE,EIE,IT (I Semester) and to AE, AG,AU,ME,MTRS, BT,FT,TT ,FD (II Semester)
Δ Common to AE,AG,AU,CE,ME,MTRS, BT,TT ,FD (I Semester) and to CSE,FT,IT (II Semester)
Ω Common to AE, AG,AU,ME,MTRS, BT,FT,TT,FD (I Semester) and to CE,CSE,ECE,EEE,EIE,IT (II Semester)

Third Semester

Code No.	Course	Objectives & Outcomes		L	T	P	C	Maximum marks			Category
		PEOs	POs					CA	ES	Total	
15MA302	DISCRETE STRUCTURES	I	a,b	3	2	0	4	50	50	100	BS
15CS302	DATA STRUCTURES	I,III	b,e,l	3	0	0	3	50	50	100	ES
15CS303	JAVA PROGRAMMING	I	a,b,c,d,e	3	0	0	3	50	50	100	PC
15CS304	DIGITAL SYSTEM DESIGN	I	a,b,c	3	0	2	4	50	50	100	ES
15CS305	OPERATING SYSTEMS	I	a,b,c,e	3	2	0	4	50	50	100	PC
15CS306	OPEN SOURCE SYSTEMS	I,II	a,d,g	3	0	0	3	50	50	100	PC
15CS307	DATA STRUCTURES LABORATORY	I	b,c	0	0	2	1	50	50	100	ES
15CS308	JAVA PROGRAMMING LABORATORY	I	a,b,c,d,e	0	0	2	1	50	50	100	PC
15CS309	MINI PROJECT I	I	a-l	0	0	2	1	100	-	100	EEC
15GE310	LIFE SKILLS: BUSINESS ENGLISH[Φ]	I	j	0	0	2	-	100	-	100	EEC
			Total	**18**	**4**	**10**	**24**	**600**	**400**	**1000**	**-**

Fourth Semester

Code No.	Course	Objectives & Outcomes		L	T	P	C	Maximum marks			Category
		PEOs	POs					CA	ES	Total	
15MA403	PROBABILITY AND QUEUING THEORY	I	a,b	2	2	0	3	50	50	100	BS
15CS402	MICROPROCESSORS AND MICROCONTROLLER	I	a,c,e	3	0	0	3	50	50	100	ES
15CS403	DATABASE MANAGEMENT SYSTEMS	I	a,c	3	2	0	4	50	50	100	PC
15CS404	C# AND .NET PROGRAMMING	I	b,c,d,e	3	0	2	4	50	50	100	PC
15CS405	DESIGN AND ANALYSIS OF ALGORITHMS	I	a,b,c,e	3	2	0	4	50	50	100	PC
15CS406	SOFTWARE ENGINEERING	I,II	c,d,e,g,i	3	0	0	3	50	50	100	PC
15CS407	MICROPROCESSORS AND MICROCONTROLLER LABORATORY	I,II	a,b,c,e,g	0	0	2	1	50	50	100	ES
15CS408	DATABASE MANAGEMENT SYSTEMS LABORATORY	I	c,e	0	0	2	1	50	50	100	PC
15CS409	MINI PROJECT II	I,II	a-l	0	0	2	1	100	-	100	EEC
15GE410	LIFE SKILLS: VERBAL ABILITY[Φ]	I	j	0	0	2	-	100	-	100	EEC
			Total	**17**	**6**	**10**	**24**	**600**	**400**	**1000**	**-**

[Φ] Common to all branches of B.E./B.Tech (Non-Credit Course)

Fifth Semester												
Code No.	**Course**	**Objectives & Outcomes**		**L**	**T**	**P**	**C**	**Maximum marks**			**Category**
		PEOs	**POs**					**CA**	**ES**	**Total**	
15CS501	COMPUTER NETWORKS	I	a,b,c,e	3	0	0	3	50	50	100	PC
15CS502	SYSTEM SOFTWARE	I,II	a,d,g	3	0	0	3	50	50	100	PC
15CS503	THEORY OF COMPUTATION	I	a,b,e	3	2	0	4	50	50	100	PC
15CS504	COMPUTER ARCHITECTURE	I	a,b,d	3	0	0	3	50	50	100	PC
	ELECTIVE I	-	-	-	-	-	3	50	50	100	PE
	ELECTIVE II	-	-	-	-	-	3	50	50	100	PE
15CS507	COMPUTER NETWORKS LABORATORY	I	a,c,e	0	0	2	1	50	50	100	PC
15CS508	SYSTEM SOFTWARE LABORATORY	I	a,b	0	0	2	1	50	50	100	PC
15CS509	TECHNICAL SEMINAR I	II	i,j	0	0	2	1	50	50	100	EEC
15CS510	MINI PROJECT III	I	a-l	0	0	2	1	100	-	100	EEC
15GE511	LIFE SKILLS: APTITUDE I[Φ]	I	a,b	0	0	2	-	100	-	100	EEC
			Total	**12**	**2**	**10**	**23**	**550**	**450**	**1100**	**-**
Sixth Semester												
Code No.	**Course**	**Objectives & Outcomes**		**L**	**T**	**P**	**C**	**Maximum marks**			**Category**
		PEOs	**POs**					**CA**	**ES**	**Total**	
15GE701	ENGINEERING ECONOMICS[$]	II	a,f,g,k,l	3	0	0	3	50	50	100	HSS
15CS602	WEB TECHNOLOGY	I,II	a,c,e,f	3	0	0	3	50	50	100	PC
15CS603	COMPILER DESIGN	I	a,b,e	3	0	0	3	50	50	100	PC
15CS604	SECURITY IN COMPUTING	I,II	a,b,d,g,h	3	0	0	3	50	50	100	PC
	ELECTIVE III	-	-	-	-	-	3	50	50	100	PE
	ELECTIVE IV	-	-	-	-	-	3	50	50	100	PE
15CS607	WEB TECHNOLOGY LABORATORY	I	a,c,e	0	0	2	1	50	50	100	PC
15CS608	COMPILER DESIGN LABORATORY	I	a,b,c,e	0	0	2	1	50	50	100	PC
15CS609	TECHNICAL SEMINAR II	II	i,j	0	0	2	1	50	50	100	EEC
15CS610	MINI PROJECT IV	I	a-l	0	0	2	1	100	-	100	EEC
15GE611	LIFE SKILLS: APTITUDE II[Φ]	I	a,b	0	0	2	-	100	-	100	EEC
	Total			**12**	**0**	**10**	**22**	**650**	**450**	**1100**	**-**

[Φ] Common to all branches of B.E./B.Tech (Non-Credit Course)
[$] Common to CSE,ECE,EEE,EIE,IT (VI Semester) and to AE, AG,AU,CE,ME,MTRS,BT,FT,TT, FD (VII Semester)

Seventh Semester

Code No.	Course	Objectives & Outcomes		L	T	P	C	Maximum marks			Category
		PEOs	POs					CA	ES	Total	
15GE601	PROFESSIONAL ETHICS[+]	II	f,g,h	2	0	0	2	50	50	100	HSS
15CS702	GRAPHICS AND MULTIMEDIA	I	a,e	3	0	0	3	50	50	100	PC
15CS703	MOBILE AND PERVASIVE COMPUTING	I	c,d	3	0	0	3	50	50	100	PC
15CS704	CLOUD INFRASTRUCTURE SERVICES	I,II	e,i,j	3	0	0	3	50	50	100	PC
	ELECTIVE V	-	-	-	-	-	3	50	50	100	PE
	ELECTIVE VI	-	-	-	-	-	3	50	50	100	PE
15CS707	GRAPHICS AND MULTIMEDIA LABORATORY	I	a,c,e	0	0	2	1	50	50	100	PC
15CS708	MOBILE APPLICATION DEVELOPMENT LABORATORY	I	d	0	0	2	1	50	50	100	PC
15CS709	MINI PROJECT V	I	a-l	0	0	2	1	100	-	100	EEC
15GE710	LIFE SKILLS : COMPETITIVE EXAMS[Φ]	I	a,b,l	0	0	2	-	100	-	100	EEC
			Total	**11**	**0**	**8**	**20**	**600**	**400**	**1000**	**-**

Eight Semester

Code No.	Course	Objectives & Outcomes		L	T	P	C	Maximum marks			Category
		PEOs	POs					CA	ES	Total	
	ELECTIVE VII	-	-	-	-	-	3	50	50	100	PE
	ELECTIVE VIII	-	-	-	-	-	3	50	50	100	PE
	ELECTIVE IX	-	-	-	-	-	3	50	50	100	PE
15CS804	PROJECT WORK	I,II,III	a-l	-	-	-	9	50	50	100	EEC
			Total	**-**	**-**	**-**	**18**	**200**	**200**	**400**	**-**

[+] Common to AE,AU,CE, ME,MTRS, BT,FT,TT, FD (VI Semester) and to CSE,ECE,EEE,EIE,IT (VII Semester)

[Φ] Common to all branches of B.E./B.Tech (Non-Credit Course)

Electives							
Code No.	**Course**	**Objectives & Outcomes**		**L**	**T**	**P**	**C**
		PEOs	**POs**				
LANGUAGE ELECTIVES							
15LE101	BASIC ENGLISH I	II	j	3	0	0	3
15LE102	COMMUNICATIVE ENGLISH I	II	j	3	0	0	3
15LE201	BASIC ENGLISH II	II	j	3	0	0	3
15LE202	COMMUNICATIVE ENGLISH II	II	j	3	0	0	3
15LC203	CHINESE	II	j	3	0	0	3
15LF203	FRENCH	II	j	3	0	0	3
15LG203	GERMAN	II	j	3	0	0	3
15LH203	HINDI	II	j	3	0	0	3
15LJ203	JAPANESE	II	j	3	0	0	3
PHYSICS ELECTIVES							
15PH201	PHYSICS OF MATERIALS	I	a	3	0	2	4
15PH202	APPLIED PHYSICS	I	a	3	0	2	4
15PH203	MATERIALS SCIENCE	I	a	3	0	2	4
15PH204	PHYSICS OF ENGINEERING MATERIALS	I	a	3	0	2	4
15PH205	SOLID STATE PHYSICS	I	a	3	0	2	4
CHEMISTRY ELECTIVES							
15CH201	ENGINEERING CHEMISTRY	I	a	3	0	2	4
15CH202	APPLIED CHEMISTRY	I	a	3	0	2	4
15CH203	APPLIED ELECTROCHEMISTRY	I	a	3	0	2	4
15CH204	INDUSTRIAL CHEMISTRY	I	a	3	0	2	4
15CH205	WATER TECHNOLOGY AND GREEN CHEMISTRY	I	a	3	0	2	4
DISCIPLINE ELECTIVES							
15CS001	DISTRIBUTED COMPUTING	I	a,c,e	3	0	0	3
15CS002	DATA WAREHOUSING AND DATA MINING	I,II	b,d,e,f	3	0	0	3
15CS003	BIG DATA ANALYTICS	I	a,b,c,d,e	3	0	0	3
15CS004	ADVANCED C PROGRAMMING	I	a,b,d	3	0	0	3
15CS005	INFORMATION STORAGE MANAGEMENT	I,II	d,i,j	3	0	0	3
15CS006	TCP/IP	I,II	a,b,d,e,g	3	0	0	3
15CS007	EMBEDDED SYSTEMS	I	a,c,d	3	0	0	3
15CS008	WIRELESS NETWORK TECHNOLOGIES	I	a,d,e	3	0	0	3
15CS009	ADVANCED JAVA PROGRAMMING	I	a,c,e	3	0	0	3

15CS010	ENTERPRISE COMPUTING	I,II	e,f,g,h	3	0	0	3
15CS011	SOFTWARE QUALITY ASSURANCE	I,II	e,f,k	3	0	0	3
15CS012	SOFTWARE TESTING	I	a,c,e	3	0	0	3
15CS013	XML AND WEB SERVICES	I	a,b,c,e	3	0	0	3
15CS014	SOCIAL NETWORK ANALYSIS	I,II,III	a,b,c,d,e,f,g,i,j,l	3	0	0	3
15CS015	INTERNET OF THINGS	I	b,c,d	3	0	0	3
15CS016	E-COMMERCE	I,II,III	a,c,f,k,l	3	0	0	3
15CS017	R PROGRAMMING	I,III	a,b,c,e	3	0	0	3
15CS018	MANAGEMENT INFORMATION SYSTEMS	I,II	a,c,e,f,g,h,i,j,k	3	0	0	3
15CS019	TOTAL QUALITY MANAGEMENT	I,II,III	d,h,l	3	0	0	3
15CS020	ARTIFICIAL INTELLIGENCE	I	a,b,d	3	0	0	3
15CS021	NETWORK AND ROUTING PROTOCOLS	I	a,b,c,e	2	0	2	3
15CS022	SCALING AND CONNECTING NETWORKS	I	a,b,c,e	2	0	2	3
ENTREPRENEURSHIP ELECTIVES							
15GE001	ENTREPRENEURSHIP DEVELOPMENT I	II	b,c,d, e, f & k	3	0	0	3
15GE002	ENTREPRENEURSHIP DEVELOPMENT II	II	b,c, h, i, j & k	3	0	0	3
PHYSICAL SCIENCE ELECTIVES							
15GE0P1	NANOMATERIALS SCIENCE	I,II	a	3	0	0	3
15GE0P2	SEMICONDUCTOR PHYSICS AND DEVICES	I,II	a	3	0	0	3
15GE0P3	APPLIED LASER SCIENCE	I,II	a	3	0	0	3
15GE0C1	CORROSION SCIENCE	I,II	a	3	0	0	3
15GE0C2	ENERGY STORING DEVICES AND FUEL CELLS	I,II	a	3	0	0	3
15GE0C3	POLYMER CHEMISTRY AND PROCESSING	I,II	a	3	0	0	3
OPEN ELECTIVES							
15CS0YA	E-LEARNING TECHNIQUES	I	a,b	3	0	0	3
15CS0YB	SOFTWARE TESTING AND QUALITY ASSURANCE	I	a,b,c,e	3	0	0	3
15CS0YC	SOFT COMPUTING	I	b,c	3	0	0	3
15CS0YD	FREE OPEN SOURCE SOFTWARE	I	c,d,e	3	0	0	3
15CS0YE	AGENT BASED INTELLIGENT SYSTEMS	I	a,b,d	3	0	0	3
15CS0YF	NETWORK ENGINEERING AND MANAGEMENT	I	a,c,d,e	3	0	0	3
15CS0YG	DIGITAL IMAGE PROCESSING	I	a,b,c,d	3	0	0	3
15CS0YH	E-BUSINESS	I,II,III	c,f,k,l	3	0	0	3
15CS0YI	KNOWLEDGE DISCOVERY IN DATABASES	I,II	b,d,f	3	0	0	3
15CS0YJ	SOCIAL NETWORK ANALYSIS CONCEPTS	I,II	a,d,e	3	0	0	3
15CS0YK	OPERATING SYSTEM CONCEPTS	I	a,b,c,e	3	0	0	3

15CS0YL	OBJECT ORIENTED PROGRAMMING	I	a,c,e	3	0	0	3
15CS0YM	JAVA FUNDAMENTALS	I	a,b,c	3	0	0	3
ONE CREDIT COURSES							
15CS0XA	3D ANIMATIONS	I,III	b,c,e	-	-	-	1
15CS0XB	QUANTUM COMPUTING	I,III	b,c	-	-	-	1
15CS0XC	AGILE PROGRAMMING	I,III	a,b,e	-	-	-	1
15CS0XD	MOBILE OPERATING SYSTEMS	I,III	b,c	-	-	-	1
15CS0XE	GREEN COMPUTING	I,III	b,c	-	-	-	1
15CS0XF	INTERNET MARKETING	I,III	b,c	-	-	-	1
15CS0XG	GRAPHICAL PROCESSING UNIT PROGRAMMING	I,III	b,c	-	-	-	1
15CS0XH	NOSQL	I,III	b,c,d	-	-	-	1
15CS0XI	SCRIPTING LANGUAGES	I,III	b,e	-	-	-	1
15CS0XJ	PROJECT MANAGEMENT TOOLS AND TECHNIQUES	I,III	b,e	-	-	-	1
15CS0XK	SMART CODING	I,III	b,c	-	-	-	1
15CS0XL	PYTHON PROGRAMMING	I,III	b,c	-	-	-	1
15CS0XM	RASPBERRY PI	I,III	b,c	-	-	-	1
15CS0XN	PROBLEM SOLVING USING PYTHON	I,III	b,c	-	-	-	1
ADDITIONAL ONE CREDIT COURSES (I to III Semesters)							
15GE0XA	HEALTH & FITNESS	-	-	-	1		
15GE0XB	FOUNDATION COURSE IN COMMUNITY RADIO TECHNOLOGY	-	-	-	1		
15GE0XC	VEDIC MATHEMATICS	-	-	-	1		
15GE0XD	INTRODUCTION TO ALGORITHMS	-	-	-	1		
15GE0XE	ETYMOLOGY	-	-	-	1		
15GE0XF	HINDUSTANI MUSIC	-	-	-	1		
15GE0XG	CONCEPT, METHODOLOGY AND APPLICATIONS OF VERMICOMPOSTING	-	-	-	1		
15GE0XH	AGRICULTURE FOR ENGINEERS	-	-	-	1		
15GE0XI	INTRODUCTION TO DATA ANALYSIS USING SOFTWARE	-	-	-	1		
15GE0XJ	ANALYSIS USING PIVOT TABLE	-	-	-	1		
BRIDGE COURSES							
15CSB01	COMPUTER PROGRAMMING						
15CSB02	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING						

VALUE ADDED COURSES	
15CSV01	ADOBE AEM DEVELOPMENT
15CSV02	ANDROID APPLICATION DEVELOPMENT
15CSV03	MULTIMEDIA AND WEB DEVELOPMENT
15CSV04	EMERGING TOOLS IN INTERNET OF THINGS

SUMMARY OF CREDIT DISTRIBUTION

S.No	CATEGORY	CREDITS PER SEMESTER								TOTAL CREDIT	CREDITS in %	Range of Total Credits	
		I	II	III	IV	V	VI	VII	VIII			Min	Max
1	BS	7	12	4	3	-	-	-	-	26	15%	15%	20%
2	ES	9	8	8	4	-	-	-	-	29	17%	15%	20%
3	HSS	6	3	-	-	-	3	2	-	14	8%	5%	10%
4	PC	-	-	11	16	15	11	11	-	64	36%	30%	40%
5	PE	-	-	-	-	6	6	6	9	27	15%	10%	15%
6	EEC	-	-	1	1	2	2	1	9	16	9%	10%	15%
Total		22	23	24	24	23	22	20	18	176	100%	-	-

BS - Basic Sciences
ES - Engineering Sciences
HSS - Humanities and Social Sciences
PC - Professional Core
PE - Professional Elective
EEC - Employability Enhancement Course

CA - Continuous Assessment
ES - End Semester Examination

15MA101 MATRICES AND CALCULUS 3 2 0 4

(Common to all branches)

Course Objectives

- Interpret the introductory concepts of Matrices and Calculus, which will enable them to model and analyze physical phenomena involving continuous changes of variables.
- Summarize and apply the methodologies involved in solving problems related to fundamental principles of Matrices and Calculus.
- Develop enough confidence to identify and model mathematical patterns in real world and offer appropriate solutions, using the skills learned in their interactive and supporting environment.

Course Outcomes (COs)

1. Analyze the characteristics of a linear system with Eigen values and vectors.
2. Identify and model the real time problem using first order linear differential equations.
3. Recognize and solve the higher order ordinary differential equations.
4. Characterize the functions and get the solutions of the same.
5. Integrate the functions for evaluating the surface area and volume.

UNIT I **9 Hours**

MATRICES

Eigen Values and Eigen Vectors of a real matrix - Properties of Eigen Values-Stretching of elastic membranes. Cayley - Hamilton Theorem - Quadratic form: Reduction of a quadratic form to a canonical form.

UNIT II **8 Hours**

ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER

Leibnitz's Equations - Modelling and solutions using Newtons law of cooling of bodies - solutions to R-L and R-C electric circuits.

UNIT III **11 Hours**

ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER

Linear differential equations of second and higher order with constant coefficients. Linear differential equations of higher order with variable coefficients: Cauchys linear differential equation - Method of variation of parameters for second order differential equations.

UNIT IV **9 Hours**

MULTIVARIABLE CALCULUS

Functions of Two Variables and their solutions- Total Differential - Derivative of implicit functions- Jacobians Unconstrained maxima and minima.

UNIT V **8 Hours**

MULTIPLE INTEGRALS

Double integration with constant and variable limits-Region of integration -Change the order of integration -Area as double integral in cartesian coordinates. Triple integral in Cartesian coordinates.

FOR FURTHER READING

Applications of mass spring system in ordinary differential equations of higher order

Total: 45+30= 75 Hours

Reference(s)

1. C. Ray Wylie and C Louis Barrett, Advanced Engineering Mathematics, Sixth Edition, Tata McGraw-Hill Publishing Company Ltd, 2003.
2. Erwin Kreyszig, Advanced Engineering Mathematics, Tenth Edition, Wiley India Private Limited, New Delhi 2015.
3. Peter V. O Neil, Advanced Engineering Mathematics, Seventh Edition, Cengage Learning India Private Limited, 2012.
4. B.S. Grewal, Higher Engineering Mathematics, Forty Third Edition, Khanna Publications, New Delhi 2014.
5. Glyn James, Advanced Engineering Mathematics, Third Edition,Wiley India, 2014.
6. T.Veerarajan, Engineering mathematics for First Year,Tata McGraw-Hill Publishing company Limited, New Delhi, 2014.

Assessment Pattern

UNIT/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2					6					6			6											20
2	2					2				4					4				6						18
3		2			2						6			6					6						22
4		2					6				8				6										22
5	2						4			6									6						18
																								Total	100

Assessment Questions

Remember

1. Define spectral values of a matrix.
2. State Cayley - Hamilton theorem.
3. List out five natures of a quadratic form.
4. Reproduce the solution for the first order linear differential equation $\frac{dy}{dx} + Py = Q$
5. State Newton's Law of cooling in ordinary differential equation.
6. Define Jacobian in three dimensions
7. State Wronskian determinant.
8. List two sufficient conditions for extreme of a function $z = f(x, y)$ *at* (a, b) .
9. Define Jacobian of u *and* v with respect to x *and* y.
10. Recall any two properties of Jacobians.

Understand

1. Identify whether there exist a square matrix without eigenvalues. Give reason
2. Indicate the matrix which has real eigenvalues and real eigenvectors.
3. Identify in which cases can we expect orthogonal eigenvectors.
4. Compare second and higher order ordinary differential equation
5. A condenser of capacity C discharged through an inductance L and resistance R in series and the charge q at the time t satisfies the equation $L\frac{d^2q}{dt^2}+R\frac{dq}{dt}+\frac{q}{c}=0$.given that L=0.25 henries,R=250 ohms,C=2×10^{-6} farads,and that when t=0,charge q is 0.002 coulombs and the current $\frac{dq}{dt}=0$,obtain the value of q in terms of t.
6. Represent the area bounded by the parabolas $y^2=4-x$ and $y^2=4-4x$ as a double integral.
7. Formulate Leibnitz's equation where R=100 ohms L=0.05 henry E=100 Cos300t volts.
8. A condenser of capacity C discharged through an inductance L and resistance R in series and the charge q at the time t satisfies the equation $L\frac{d^2q}{dt^2}+R\frac{dq}{dt}+\frac{q}{c}=0$.the circuit consists of an inductor of 1H,a resistor of 12Ω,capacitor of 0.01 F,and a generator having voltage given by E(t)=24 sin10t.find the charge q and the current I at time t,if q=0 and i=0 at t=0 where $i=\frac{dq}{dt}$.
9. Formulate the area between the curves $y^2=4x$ and $x^2=4y$.
10. Indicate and change the order of integration for $\int_0^1\int_{x^2}^{2-x} xydydx$

Apply

1. Carry-out the three engineering applications of eigen value of a matrix.
2. Find the Eigen values and Eigen vectors of the matrix $A=\begin{pmatrix}11 & -4 & -7\\ 7 & -2 & -5\\ 10 & -4 & -6\end{pmatrix}$ and hence find the Eigen values of A^2, 5A and A^{-1} using properties.
3. Use Cayley Hamilton theorem to find inverse of $A=\begin{pmatrix}1 & 3 & 7\\ 4 & 2 & 3\\ 1 & 2 & 1\end{pmatrix}$.
4. Find the points of the function $f(x,y)=x^2y+xy^2-axy$ where f is a maximum or minimum.
5. A body originally at 80^0C cools down to 60^0C in 20 minutes, the temperature of the air being 40^0C. what will be the temperature of the body after 40 minutes from the original?

6. If the temperature of a cake is 300^0F when it leaves the oven and is 200^0F 10 minutes later, when will it be practically equal to the room temperature of 60^0F, say, when will it be 61^0F? Use Newton's law of cooling.
7. In an L-C-R circuit, the change q on a plate of a condenser is given by L $\frac{d^2q}{dt^2}$ +R $\frac{dq}{dt}$ $\frac{q}{c}$ =Esinpt, where i= $\frac{dq}{dt}$ .the circuit is tuned to resonance so that p^2=1/LC. If initially the current I and the charge q be zero. Showthat, for small values of R/L, the current in the circuit at time t is given by (Et/2L) sinpt.
8. Construct the solution for the equation $(D^3 - D)y = xe^x$
9. Use the method of variation of parameters to solve $(D^2 + 4)y = \cot 2x$.
10. Construct the equation $x^2y'' + xy' = x$ into a linear differential equation with constant coefficients.

Analyze

1. Justify whether the matrix B = $\begin{pmatrix} \cos^- & \sin^- & 0 \\ -\sin^- & \cos^- & 0 \\ 0 & 0 & 1 \end{pmatrix}$ is orthogonal or not?
2. Suppose that in winter the day time temperature in a certain office building is maintained at 70°F, The heating is shut off at 10 P.M. and turned on again at 6 A.M. On a certain day the temperature inside the building at 2 A.M. was found to be 65°F. The outside temperature was 50°F at 10 P.M. and had dropped to 40°F by 6 A.M. Find the temperature inside the building when the heat was turned on at 6 A.M.?
3. Experiment show that the radioactive substance decomposes at a rate proportional to the amount present. Starting with 2grms at time t=0 find the amount available at a later time.
4. Differentiate RL and RC electric circuit.
5. Transform the equation $x^2y'' + xy' = x$ into a linear differential equation with constant coefficients.
6. If the voltage in the RC circuit is E = E_0 cos ωt, find the charge and the current at time t.
7. Solve $(x^2D^2-2xD+2)y = (3x^2-6x+6)e^x$, y(1) = 2 +3e, $y'(1)$ =3e
8. In a circuit the resistance is 12Ω and the inductance is 4 H. The battery gives a constant voltage of 60 V and the switch is closed when t = 0, so the current starts with I(0) = 0. (a) Find I(t) (b) Find what happens to the current after a long time justify the current after 1 s.
9. If $g(x,y) = \cdot (u,v)$ where $u = x^2 - y^2$, $v = 2xy$ prove that $\frac{\partial^2 g}{\partial x^2} + \frac{\partial^2 g}{\partial y^2} = 4(x^2 + y^2)\left(\frac{\partial^2 \cdot}{\partial u^2} + \frac{\partial^2 \cdot}{\partial v^2}\right)$
10. Solve $\int_0^a \int_0^{\sqrt{a^2-x^2}} \int_0^{\sqrt{a^2-x^2-y^2}} xdxdydz$.

Evaluate:

1. Use Cayley-Hamilton theorem to find the value of $A^8-5A^7+7A^6-3A^5+A^4-5A^3+8A^2-2A+I$ if the matrix A $=\begin{pmatrix}2&1&1\\0&1&0\\1&1&2\end{pmatrix}$
2. Determine the nature, index, rank and signature by reducing the quadratic form $2x^2+2y^2+2z^2+2yz$ to canonical form by an orthogonal transformation.
3. Determine the value of y from the equation $\frac{dy}{dx}=\frac{x^2+y^2+1}{2xy}$
4. Determine the solution of y of the equation $\sqrt{1-y^2}dx=(sin^{-1}x-x)dy$.
5. Determine the value of y from the equation $\frac{dy}{dx}-\frac{tan\,y}{1+x}=(1+x)e^x\,sec\,y$.
6. Determine the complete solution for y from the equation $\frac{d^2y}{dx^2}+\frac{1}{x}\frac{dy}{dx}=\frac{12log\,x}{x^2}$.
7. Determine the complete solution for y of $(x^2D^2-xD+4)y=x^2\sin(\log x)$.
8. Determine the solution of the initial value problem $y''+y'-6y=0$ with the initial conditions y(0)=10 and $y'(0)=0$.
9. Evaluate $\iiint(x^2+y^2+z^2)\,dxdydz$ taken over the region of space defined by $x^2+y^2\le 1$ and $0\le x\le 1$.
10. Evaluate $\int_0^a\int_y^a\frac{x}{x^2+y^2}dxdy$ by changing into polar coordinates

15PH102 ENGINEERING PHYSICS 2 0 2 3

(Common to all branches)

Course Objectives

- To impart knowledge in properties of matter, crystallography and ultrasonics.
- To understand the applications of lasers and fiber optics.
- To implement the principles of quantum physics in the respective engineering fields.

Course Outcomes (COs)

1. Realize the concept of properties of matter and apply the same for practical applications.
2. Identify the suitable laser source for fiber optic communication applications.
3. Determine the velocity of ultrasonic waves and apply the same for day today applications.
4. Classify the different types of crystal structures and analyze their properties.
5. Comprehend the efficacy of quantum equations in modern areas.

UNIT I **8 Hours**

PROPERTIES OF MATTER

Elasticity: elastic and plastic materials - Hooke's law - elastic behavior of a material -stress -strain diagram- factors affecting elasticity. Three moduli of elasticity- Poisson's ratio-torsional pendulum-twisting couple on a cylinder. Young's modulus- uniform bending -non- uniform bending. Viscosity: coefficient of viscosity -streamline and turbulent flow -experimental determination of viscosity of a liquid -Poiseuille's method.

UNIT II **6 Hours**

APPLIED OPTICS

Interference: air wedge- theory- uses- testing of flat surfaces- thickness of a thin wire. Laser: introduction-principle of laser- characteristics of laser- types: CO2 laser -semiconductor laser (homo junction). Fiber optics: principle of light transmission through fiber- expression for acceptance angle and numerical aperture- types of optical fibers (refractive index profile and mode)- fiber optic communication system (block diagram only).

UNIT III **5 Hours**

ULTRASONICS

Ultrasonics: introduction- properties of ultrasonic waves-generation of ultrasonic waves-magnetostriction- piezo electric methods- detection of ultrasonic waves. Determination of velocity of ultrasonic waves (acoustic grating). Applications of ultrasonic waves: SONAR- measurement of velocity of blood flow -study of movement of internal organs.

UNIT IV **5 Hours**

SOLID STATE PHYSICS

Crystal Physics: lattice -unit cell -crystal systems- Bravais lattices- Miller indices- 'd' spacing in cubic lattice- calculation of number of atoms per unit cell, atomic radius, coordination number and packing density for SC, BCC, FCC and HCP structures- X-ray diffraction: Laue's method - powder crystal method.

UNIT V **6 Hours**

QUANTUM MECHANICS

Quantum Physics: development of quantum theory- de Broglie wavelength -Schrodinger's wave equation-time dependent and time independent wave equations- physical significance. Application: particle in a box (1d) - degenerate and non-degenerate states. Photoelectric effect: quantum theory of light work function- problems.

FOR FURTHER READING

Neutrions - expanding universe

2 Hours

INTRODUCTION

Exposure to Engineering Physics Laboratory and precautionary measures

4 Hours

EXPERIMENT 1

Determine the moment of inertia of the disc and calculate the rigidity modulus of a given wire using torsion pendulum (symmetrical masses method).

4 Hours

EXPERIMENT 2

Find the elevation of the given wooden beam at the midpoint by loading at the ends and hence calculate the Youngs modulus of the material.

4 Hours

EXPERIMENT 3

Find the depression at the midpoint of the given wooden beam for 50g, 100 g, 150 g, 200 g and 250 g subjected to non-uniform bending and determine the Youngs modulus of the material of the beam.

4 Hours

EXPERIMENT 4

Determine the coefficient of viscosity of the given liquid by Poiseulles method.

4 Hours

EXPERIMENT 5

Form the interference fringes from the air wedge setup and calculate the thickness of the given wire.

4 Hours

EXPERIMENT 6

By applying the principle of diffraction, determine the wavelength of given laser and the average particle size of lycopodium powder using laser source.

4 Hours

EXPERIMENT 7

Determine the
(i) wavelength of ultrasonics in a liquid medium,
(ii) velocity of ultrasonic waves in the given liquid
(iii) compressibility of the given liquid using ultrasonic interferometer.

Total: 60 Hours

Reference(s)

1. D. S. Mathur, Elements of Properties of Matter, 5th edition, S Chand & Company Ltd., New Delhi, 2012.
2. Charles Kittel, Introduction to Solid State Physics, 8th edition, Wiley India Pvt. Ltd., New Delhi, 2012.
3. Arthur Beiser, Shobhit Mahajan and S Rai Choudhury, Concepts of Modern Physics, 6th Edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2010.
4. B. K. Pandey and S. Chaturvedi, Engineering Physics, 1st edition, Cengage Learning India Pvt. Ltd., New Delhi, 2012.
5. Halliday and Resnick, Fundamentals of Physics, John Wiley and Sons, Inc, 2011.
6. Ian Morison, Introduction to Astronomy and Cosmology, John Wiley and Sons, Ltd., 2013.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	2				4	2				6				4				4						24
2		2				2	6			2	4			4											20
3		4				4	2			4				4											18
4	2	2				4					5			5											18
5	2	2				4	4			4					4										20
																								Total	100

Assessment Questions

Remember

1. Reproduce Hooke's law.
2. Name the three types of moduli of elasticity.
3. List the two applications of air wedge.
4. Recall the two conditions required for achieving total internal reflection.
5. Define magnetostriction effect.
6. Recognize the four applications of ultrasonics in medical field.
7. Write the Bragg's condition necessary for obtaining X-ray diffraction in crystals.
8. Retrieve the seven types of crystal system.
9. Recall four physical significance of wave function.
10. Define photoelectric effect.

Understand

1. Explain the procedure adopted for determining the Young's modulus of the given material by non-uniform bending method.
2. Illustrate the effect of temperature on elasticity of a material.
3. Classify the fiber optics based on refractive index profile.
4. Indicate the role of optical resonators in the production of laser.
5. Compare the merits of magnetostriction and piezo-electric oscillators.
6. Summarize the four applications of ultrasonic waves in day-today life.
7. Identify the closely packed cubic crystal structure with an example.
8. Compare Laue method and powder crystal method used in X-ray diffraction.
9. Infer the significance of photoelectric effect.
10. Represent the two assumptions involved in solving the Schrödinger time dependent wave equation.

Apply

1. Show that when a cylinder is twisted the torsional couple depends on torsional rigidity.
2. Using torsional pendulum, explain the rigidity modulus of the wire.
3. Design an experimental setup used for determining the thickness of a thin material.
4. A silica optical fiber has a core refractive index of 1.50 and a cladding refractive index of 1.47. Find the numerical aperture for the fiber.
5. Construct the piezo electric oscillator circuit and explain the generation of ultrasonic waves.
6. Find the depth of submerged submarine if an ultrasonic wave is received after 0.33 s from the time of transmission.(given v=1400 m/s).
7. Show that the axial ratio for an ideal HCP structure is 1.633.
8. Sketch the planes having Miller indices (100) and (111).
9. Assess the various energy levels of an electron enclosed in a one dimensional potential well of finite width 'a'.
10. Compute the relation between de Broglie wavelength and velocity of a particle.

Analyse

1. Differentiate uniform bending from non-uniform bending.
2. Straight lined fringes are formed only in flat glass plates. Justify.
3. Conclude that the thickness of thin wire is influenced by band width of a material.
4. Outline the merits and demerits of magnetostriction oscillator method.
5. Five fold symmetry is not possible in crystal structures. Justify your answer.
6. Compare the degenerate state with non-degenerate state.

Evaluate

1. Determine the viscosity of a given liquid using Poiseuille's method (Given: water, burette, stop clock, capillary tube, stand and travelling microscope).
2. When ultrasonic waves are passed through liquids, cavitations are produced. Criticize the statement.
3. Check the packing factor for a simple cubic structure is 0.52.
4. Evaluate the expression for time dependent Schroedinger's wave equation.

15CH103 ENVIRONMENTAL SCIENCE 2 0 2 3

(Common to all branches)

Course Objectives

- Realize the interdisciplinary and holistic nature of the environment.
- Understand how natural resources and environment affect the quality of life and stimulate the quest for sustainable development.
- Recognize the socio-economic, political and ethical issues in environmental science.

Course Outcomes (COs)

1. Assess the importance of interdisciplinary nature of environment, its purpose, design and exploitation of natural resources.
2. Analyze the fundamental physical and biological principles that govern natural processes and role of professionals in protecting the environment from degradation.
3. Identify the existing environmental challenges related to pollution and its management.
4. Select suitable strategies and methods for sustainable management of environmental systems.
5. Determine the impact of human activities on environment.

UNIT I **6 Hours**

NATURAL RESOURCES

Forest resources: Use - over exploitation - deforestation - case studies. Water resources: Use - over utilization of surface and ground water - conflicts over water. Mineral resources: Use - exploitation - environmental effects of extracting and using mineral resources - case studies. Food resources: Effects of modern agriculture - fertilizer-pesticide problems (eutrophication, blue baby syndrome, biomagnification) - water logging - salinity - case studies. Energy resources: renewable (solar, wind, tidal, geothermal and hydroelectric power) - non renewable energy sources

UNIT II **6 Hours**

ECOSYSTEMS AND BIODIVERSITY

Concept of an ecosystem: Structure and function of an ecosystem - producers - consumers - decomposers - food chains - food webs and ecological pyramids - Types of ecosystem: Introduction - characteristic features: forest ecosystem - desert ecosystem - ecological succession. Biodiversity - value of biodiversity - threats to biodiversity - endangered and endemic species - Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity - field study

UNIT III **6 Hours**

ENVIRONMENTAL POLLUTION

Pollution: Definition - causes - effects - control measures of air pollution - water pollution: (Sewage water treatment by activated sludge and trickling filter process) - marine pollution - thermal pollution - noise pollution. Disaster management: causes - effects - control measures of floods - earthquake - cyclone – landslides

UNIT IV **7 Hours**

SOCIAL ISSUES AND ENVIRONMENT

Sustainable development: Definition - Unsustainable to sustainable development - urban problems related to energy. Environmental ethics - issues and possible solutions - solid waste management - causes - effects - 3R Principles (landfills, incineration, composting). Water conservation - rain water harvesting - watershed management. Climate change - global warming - acid rain - ozone layer depletion. Environment protection act: Air (Prevention and control of pollution) act - wildlife protection act

UNIT V **5 Hours**

HUMAN POPULATION AND ENVIRONMENT

Human population: Population growth - characteristics - variation among nations - population explosion - women and child welfare programmes - value education - HIV / AIDS. Role of information technology in environment and human health - occupational safety and health administration (OSHA)

FOR FURTHER READING

Human rights: E - waste and biomedical waste -Identification of adulterants in food materials

2 Hours

EXPERIMENT 1

Preparation of N/10 Oxalic acid and M/10 Sodium carbonate solution

4 Hours

EXPERIMENT 2

Estimation of dissolved oxygen in a water sample/sewage by Winklers method

4 Hours

EXPERIMENT 3

Estimation of chloride content in water by argentometric method

4 Hours

EXPERIMENT 4

Estimation of calcium in lime by complexometric method

4 Hours

EXPERIMENT 5

Estimation of chromium in leather tannery effluents

4 Hours

EXPERIMENT 6

Determination of percentage purity of sodium carbonate

4 Hours

EXPERIMENT 7

Estimation of heavy metals in the given solution by EDTA method

4 Hours

EXPERIMENT 8

Determination of concentration of unknown colored solution using spectrophotometer

Total: 60 Hours

Reference(s)

1. Anubha Kaushik, C.P. Kaushik, Environmental Science and Engineering , 4th Multi Colour Edtion, New Age International Publishers, New Delhi, 2014
2. A. Ravikrishnan, Environmental Science and Engineering, 5th revised Edition, Sri Krishna Hitech Publishing company Ltd, Chennai, 2010
3. T. G. Jr. Miller, S. Spoolman, New Environmental Science, 14th Edition, Wadsworth Publishing Co, New Delhi, 2014
4. E. Bharucha, Textbook of Environmental studies, second Edition, Universities Press Pvt. Ltd., New Delhi, 2013
5. A. K. De, Environmental Chemistry, 7th Edition , New age international publishers, New Delhi, 2014

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	3	2			4	5				1			1	3				1							20
2	4	1			4	7							1	2				1							20
3	3				4	6	2		1	1			1	1				1							20
4	1	2			3	8	1			4			2	4											25
5	1	2			2	5				1			1	3											15
																								Total	100

Assessment Questions

Remember

1. Define the term bio-magnification.
2. Name any four major gases responsible for air pollution.
3. Recall four gases responsible for greenhouse effect.
4. State environmental ethics.
5. List any two impacts of water pollution.
6. Mention the two objectives of value education.
7. List any four consequences of air pollution on human health.
8. Recall any two endangered and endemic species of India.
9. List any two disadvantages of nuclear energy production.

Understand

1. Summarize the structural and functional attributes of an ecosystem.
2. With the help of neat flow chart explain waste water treatment process using activated sludge process.

3. Explain the modern method of rain water harvesting technique diagrammatically and discuss the various strategies adopted for water conservation.
4. Summarize the abstracts of Wildlife (protection) Act, 1972.
5. Indicate the three consequences of noise pollution.
6. Classify the ecosystems on the basis of energy sources
7. Infer two types of photochemical reactions involved in formation and destruction of ozone in the stratosphere.
8. Explain how the impacts of natural disasters can be minimized on human communities with on representative example.
9. Summarize four major effects caused on forests and tribal people due to big dam construction.
10. Infer the any two conflicts over water, confining to our nation.
11. Identify three major threats to Indian biodiversity
12. Relate the concept of food chain and food web with tropic level and mention their three significances.

Apply

1. Identify any seven impacts caused if ground water is used enormously.
2. Select the proper disaster management techiques that can be implemented to manage. a) Earthquake b) Floods
3. Summarize the concept age-structure pyramids as a tool to achieve stabilized population in our nation.
4. Predict the significances of child welfare Programmes in India.
5. Implement the 3R approach to manage solid waste.
6. Assess the four adverse effects of solid waste.
7. Assess how climate change affects human health.

Analyse

1. Differentiate between confined and unconfined aquifers.
2. Distinguish between critical and strategic minerals with two examples for each.
3. Outline variations in population growth among nations with necessary diagram.
4. “Day by day our atmosphere gets prone to serious effects” and “deterioration of environment affects human health”. Justify these two statements.
5. Compare the major two advantages and limitations of major greenhouse pollutant CO2.

Evaluate

1. Choose any one suitable method to minimize the impact of acid rain on environment.
2. Determine the doubling time of population, if annual growth rate of a nation is 25 years.

15GE205 BASICS OF CIVIL AND MECHANICAL ENGINEERING

3 0 0 3

Common to CSE, ECE, EEE, EIE, FT, IT (I Semester) and to MTRS, BT, TT, FD (II Semester)

Course Objectives

- To impart basic knowledge in the field of Civil Engineering.
- To guide students to select the good building materials.
- To create awareness on various types of water supply and transportation systems.
- To impart basic knowledge in the various engineering materials and manufacturing Processes.
- To understand the working principles of various Internal Combustion Engines, Refrigeration, Boiler and power plants.

Course Outcomes (COs)

1. Understand the fundamental philosophy of Civil Engineering.
2. Identify the nature of building components, functions, construction practices and material qualities.
3. Understand the fundamental concepts of water supply and transportation systems.
4. Recognize the various engineering materials and understand the working principles and operations of manufacturing processes.
5. Understand the working principles and operations of Internal Combustion Engines, Refrigeration, Boiler and power plants.

UNIT I **7 Hours**

INTRODUCTION TO CIVIL ENGINEERING

History, development and scope of Civil Engineering Functions of Civil Engineers. Construction Materials Characteristics of good building materials such as Stones Bricks -Cement - Aggregates and concrete. Surveying: Definition and purpose Classification Basic principles Measurement of length by chains and tapes.

UNIT II **7 Hours**

GENERAL FEATURES RELATING TO BUILDINGS

Selection of site Basic functions of buildings Major components of buildings. Types of foundation Bearing capacity of soils General Principles of Brick masonry Stone masonry Beams Lintels Columns Doors and windows Introduction to Green Building and Interior Design

UNIT III **7 Hours**

WATER SUPPLY AND TRANSPORTATION SYSTEMS

Sources of water Supply Methods of Rain Water Harvesting Flow Diagram of Water treatment Process Modes of Transportation Systems. Classification of Highways-Components of roads Bituminous and cement concrete roads. Importance of railways - Gauges Components of permanent way Types of bridges.

UNIT IV **8 Hours**

ENGINEERING MATERIALS AND MANUFACTURING PROCESSES

Materials classification, mechanical properties of cast iron, steel and high speed steel Casting process-Introduction to green sand moulding, pattern, melting furnace electric furnace Introduction to metal forming process and types Introduction to arc and gas welding Centre lathe, Drilling and Milling machines principal parts, operations.

UNIT V **8 Hours**

INTERNAL COMBUSTION ENGINES AND REFRIGERATION

Internal Combustion (IC) Classification, main components, working principle of a two and four stroke petrol and diesel engines, differences Refrigeration working principle of vapour compression and absorption system Introduction to Air conditioning.

UNIT VI **8 Hours**

ENERGY, BOILERS, TURBINE AND POWER PLANTS

Energy-Solar, Wind, Tidal, Geothermal, Biomass and Ocean Thermal Energy Conversion (OTEC)Boilers classification, Babcock and Wilcox and La-Mont Boilers, differences between fire tube and water tube boiler Steam turbines- working principle of single stage impulse and reaction turbines Power plant classification, Steam, Hydel, Diesel, and Nuclear power plants.

Total: 45 Hours

Reference(s)

1. N. Arunachalam, Bascis of Civil Engineering, Pratheeba Publishers, 2000
2. M. S. Palanichamy, Basic Civil Engineering, TMH, 2009
3. G. Shanmugamand M. S. Palanichamy, Basic Civil and Mechanical Engineering,Tata McGraw Hill Publishing Co., New Delhi, 2009
4. Pravin Kumar, Basic Mechanical Engineering, Pearson Education India, Pearson,2013.
5. G. Shanmugam and S. Ravindran, Basic Mechanical Engineering, Tata McGraw- Hill Publishing Company Limited, New Delhi, 2013.
6. S. R. J. Shantha Kumar, Basic Mechanical Engineering, Hi-tech Publications, Mayiladuthurai, 2015

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	7					10																			17
2	7					10																			17
3	4					6			4																14
4	7					12																			19
5	5					10																			15
6	6					12																			18
																								Total	100

Assessment Questions

Remember

1. Classify Boiler.
2. What are the uses of high carbon steel?
3. Define welding
4. Define soldering.
5. Define Brazing.
6. What do you mean by milling?
7. Classify IC Engines.
8. List the various components of IC Engines.
9. Define Refrigeration.
10. Classify Boiler.
11. What is turbine?
12. Define water tube boiler.
13. Name the main parts of a turbine.
14. Classify power plants.
15. Writedown the scope of Civil Engineering.
16. Define surveying.
17. List the ingredients of concrete.
18. State the basic principles of survey.
19. What is meant by lintel?
20. Write down the components of buildings.
21. List the functions of foundation.
22. What is meant by bearing capacity of soil?

23. What are the factors to be considered in selection of site?
24. Define gauges.
25. Name the components of permanent way.
26. State the importance of railway.
27. List out the types of bridge.
28. Write down the classification of highway.
29. What do you meant by rain water harvesting
30. What are the factors to be considered in design of green building?

Understand

1. Compare reaction and impulse turbines.
2. What is the difference between renewable and non-renewable sources of energy?
3. What is the function of a hydraulic turbine?
4. What is the function of a surge tank in Hydel power plant?
5. What is the function of a moderator in Nuclear power plant?
6. How to select the boiler?
7. Why air is pre-heated before enter into boiler?
8. How does a fusible plug function in boiler?
9. What is the function of a spark plug in IC engine?
10. What is the function of a fuel injector in diesel engine?
11. Compare and contrast 4 stroke and 2 stroke engine.
12. Describe the characteristics of good building stone.
13. Explain the various functions of Civil Engineer.
14. Discuss in detail about principles of surveying.
15. Describe the characteristics of cement and concrete.
16. Differentiate the English and Flemish bonds brick masonry.
17. What are the points to be observed in the construction of brick masonry?
18. Discuss about any four super structure components.
19. Distinguish between shallow and deep foundation.
20. Distinguish between stone and brick masonry.
21. Differentiate bituminous and cement concrete roads.
22. Elucidate the components of permanent way.
23. Describe the cross section of bituminous pavement.
24. Elucidate different sources of water supply.

Apply

1. Explain in detail about rain water harvesting.
2. Explain the process of water treatment.
3. Enumerate the procedure for construction of water bound macadam road.

15GE106 C PROGRAMMING 3 0 2 4

(Common to CSE, ECE, EEE, EIE, IT)

Course Objectives

- Understand the basics of C primitives, operators and expressions.
- Gain knowledge about the different primitive and user defined data types.
- Impart knowledge about the structural programming concepts.

Course Outcomes (COs)

1. Explore the basic C programming concepts.
2. Develop programs using control statements.
3. Exemplify the concepts of Arrays and strings in C.
4. Implement the concepts of functions and pointers in C.
5. Explore the concepts of structures, unions and files in C.

UNIT I **9 Hours**

INTRODUCTORY CONCEPTS

C Primitives: Introduction to C- planning and writing a C program- Character Set - Keywords and Identifiers - Data Types - Variables and Constants - Compiling and executing the C program Operators and Expressions: Arithmetic - Relational - Logical - Increment and decrement - Conditional - Bitwise - Comma - Sizeof() - Assignment - Shift operator - Precedence and order of evaluation - Type Conversion

Input and Output Operations: Formatted I/O functions - getchar and putchar function - gets and puts functions

UNIT II **7 Hours**

CONTROL STATEMENTS

Decision Making and Branching: simple if statement - if else statement - nesting of if else Statement - Switch Statement.

Decision Making and Looping: while statement - do while statement - for statement - Nested for statement Jump Statements: goto - break - continue - return statement

UNIT III **9 Hours**

ARRAYS AND STRINGS

Arrays: Introduction, one dimensional array, declaration - Initialization of one dimensional array, two-dimensional arrays, initializing two dimensional arrays, multi-dimensional arrays.
Strings: Declaring and initializing string variables- Reading strings from terminal - writing string to screen - String handling functions.

UNIT IV **10 Hours**

FUNCTIONS AND POINTERS

User Defined Functions: Elements of user defined functions - Definition of functions - return values and their types - function calls - function declaration - categories of function - call by value and call by reference -recursion - Pre-processor directives and macros.

Pointers: Understanding Pointers - accessing the address of the variable - declaring pointer variables - Initialization of pointer variables - Accessing a variable through its pointer

UNIT V **10 Hours**

STRUCTURES AND FILES

Storage Class Specifiers: Auto - registers - static - extern - typedef
Structures and Unions: Introduction - defining a structure - declaring structure variables - accessing structure members - structure initialization - Unions - Enumerated data type
File Management in C: Defining and opening a file - closing a file - Input/output operations on files - Command line arguments

FOR FURTHER READING

Problem solving - Logical thinking - logic - symbolic logic - truth tables - Math puzzles - magic triangles - magic squares - alphametic puzzles - Cross number puzzles.

Creating and manipulating document using word - Mail merge - Creating spread sheet with charts and formula using excel - developing power point presentation with Animations.

4 Hours

EXPERIMENT 1

Write a C program to perform arithmetic operations on integers and floating point numbers.

4 Hours

EXPERIMENT 2

Write a C program to implement ternary operator and relational operators.

2 Hours

EXPERIMENT 3

Write a C program to read the values of A, B, C through the keyboard. Add them and after addition check if it is in the range of 100 to 200 or not. Print separate message for each.

2 Hours

EXPERIMENT 4

Write a C program to display the roots of a quadratic equation with their types using switch case.

2 Hours

EXPERIMENT 5

Write a C program to generate the following triangle.

1
1 2 3
1 2 3 4 5
1 2 3 4 5 6 7

4 Hours

EXPERIMENT 6

Write a C program to get a matrix of order 3x3 and display a matrix of order of 4x4, with the fourth row and column as the sum of rows and columns respectively.

2 Hours

EXPERIMENT 7

Write a c program to remove the occurrence of "the" word from entered string.

2 Hours

EXPERIMENT 8

Write a C program to find the factorial of given number.

4 Hours

EXPERIMENT 9

Design a structure to hold the following details of a student. Read the details of a student and display them in the following format Student
details: rollno, name, branch, year, section, cgpa.

****

NAME:
ROLL NO:
BRANCH:
YEAR:
SECTION:
CGPA:

4 Hours

EXPERIMENT 10

Create two files test1.txt and test2.txt and write a C program to read the file text1.txt character by character on the screen and paste it at the end of test2.txt

Total: 45+30= 75 Hours

Reference(s)

1. Herbert Schildt, C -The complete Reference, Tata McGraw-Hill, 2013
2. Byron Gottfried , Programming with C, Schaum's Outlines, Tata Mcgraw-Hill, 2013
3. E.Balagurusamy, Programming in ANSI C, Tata McGraw-Hill, 2012
4. Kernighan B W and Ritchie O M, The C programming Language. Prentice-Hall of India, 2009
5. Kelley A and I. Pohl, A Book on C : Programming in C, Pearson Education, 1998
6. Ashok.N.Kamthane,Programming in C,Pearson education,2013

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	4	4			4	4																			16
2	2				2	4				6				2				2				2			20
3	2				2					6				2	3							6			21
4		2			2					6				2	3							6			21
5		2				2				6				6								6			22
																								Total	100

Assessment Questions

Remember

1. List the rules for defining a variable.
2. State the associativity property of an operator.
3. List the three constructs for performing loop operations.
4. Recall return statement.

5. Define an array.
6. Recognize strings.
7. Define functions.
8. Define pointers.
9. Define a structure.
10. List the functions used for opening and closing a file.

Understand

1. Classify the operators in C.
2. Identify the functions used for formatted I/O in C.
3. Summarize the branching statements in C.
4. Summarize the looping statements in C.
5. Classify the types of arrays in C.
6. Summarize the string handling functions in C.
7. Exemplify call by value and call by reference.
8. Illustrate the pointer concepts in C.
9. Summarize the four storage classes.
10. Explain the concept of files in C.

Apply

1. Compute the greatest of two numbers using ternary operators in C.
2. Demonstrate the concept of type conversion in C.
3. Implement a C program to find the roots of a quadratic equation using Switch case statement.
4. Implement a C program to check whether a number is prime or not.
5. Compute matrix multiplication using two dimensional arrays in C.
6. Execute a C program to check whether a string is a palindrome or not.
7. Implement a C program using functions to find factorial of a number.
8. Implement a C program to use pointers in C.
9. Execute a C program to generate a pay slip for an employee using structures.
10. Implement a C program to copy the content of one file to the other.

Analyse

1. Differentiate getchar and putchar functions.
2. Differentiate while and do while loop in C.
3. Compare strupr and strlwr functions.
4. Differentiate function definition and function call.
5. Compare structure and union.

Evaluate

1. Determine the output of the following code.

```
#include
int main()
{
int var = 010;
printf("%d", var);
}
```

2. Determine the value of the logical expression a>b && a
3. Determine the output of the C code

```
#include
int main()
{
int a[5] = {5, 1, 15, 20, 25};
int i, j, m;
i = ++a[1];
j = a[1]++;
```

```
m = a[i++];
printf("%d, %d, %d", i, j, m);
return 0;
}
```

4. Determine the output of this C code.

```
#include
int main()
{
int a = 10, b = 10;
if (a = 5)
b--;
printf("%d, %d", a, b--);
}
```

5. Evaluate the expression c=(a+b*(c/d)%e) with a=10, b=3, c=5, d=6 and e=1

Create

1. Generate a structure to store the following details: Rollno, Name, Mark1, Mark2, Mark3, Total, Average, Result and Class. Write a program to read Rollno, name and 3 subject marks. Find out the total, result and class as follows:
   a) Total is the addition of 3 subject marks.
   b) Result is "Pass" if all subject marks are greater than or equal to 50 else "Fail".
   c) Class will be awarded for students who have cleared 3 subjects
   i. Class "Distinction" if average >=75
   ii. Class "First" if average lies between 60 to 74 (both inclusive)
   iii. Class "Second" if average lies between 50 & 59 (both inclusive)
   d) Repeat the above program to manipulate 10 students' details and sort the structures as per rank obtained by them.
2. Create a structure that can describe the employees with the fields Eno, Ename. Basic. Write a program to calculate DA = 32% of Basic. HRA = 15% of Basic. CCA = 10% of BASIC, PF = 15% of Basic and print all details with Net pay. All processing should be using pointer notation.
   b) Result is "Pass" if all subject marks are greater than or equal to 50 else "Fail".
   c) Class will be awarded for students who have cleared 3 subjects
   i. Class "Distinction" if average >=75
   ii. Class "First" if average lies between 60 to 74 (both inclusive)
   iii. Class "Second" if average lies between 50 & 59 (both inclusive)
   d) Repeat the above program to manipulate 10 students' details and sort the structures as per rank obtained by them.

15GE207 ENGINEERING GRAPHICS 0 0 4 2

Common to CE,CSE,ECE,EEE,EIE,IT (I Semester) and to AE, AG,AU,ME,MTRS, BT,FT,TT ,FD (II Semester)

Course Objectives

- To learn conventions and use of drawing tools in making engineering drawings.
- To understand the engineering drawing methods and procedures to draw two dimensional drawings from three dimensional model and vice versa.
- To provide the practice for converting simple drawing into the computer aided drawing.

Course Outcomes (COs)

1. Recognize the conventions and apply dimensioning concepts while drafting simple objects.
2. Develop the two dimensional drawings from three dimensional model and vice versa.
3. Utilize the visualization skill to convert simple drawing into the computer aided drawing.

12 Hours

CONVENTIONS AND BASIC DRAWINGS

Importance - conventions - ISO and BIS - drawing tools and drawing sheets - lettering, numbering, dimensioning, lines and symbols-Conic sections-types constructions-ellipse, parabola and hyperbola-eccentricity and parallelogram method.

14 Hours

PROJECTIONS

Principles-first and third angle projections - Points - first angle projection of points Straight lines - parallel, perpendicular and inclined to one reference plane-Solid - cylinders, pyramids, prisms and cones-perspective projections.

12 Hours

ORTHOGRAPHIC PROJECTIONS AND SECTION OF SOLIDS

Orthographic Projections - concepts - front view, top view and side view of simple solids -Section of Solids-simple illustrations.

12 Hours

ISOMETRIC PROJECTIONS AND DEVELOPMENT OF SURFACES

Importance- orthographic to isometric projection- simple and truncated solids. Development of surfaces - cylinders, pyramids, prisms, cones and simple truncated objects.

10 Hours

INTRODUCTION TO AUTOCAD

Basics commands of AutoCAD- two dimensional drawing, editing, layering and dimensioning - coordinate systems-Drawing practice - orthographic views of simple solids using AutoCAD.

Total: 60 Hours

Reference(s)

1. K Venugpoal, Engineering Drawing and Graphics, Third edition, New Age International, 2005.
2. Basant Agrawal, Mechanical drawing, Tata McGraw-Hill Education, 2008.
3. Engineering Drawing Practice for Schools & Colleges, BUREAU OF INDIAN STANDARDS-SP46, 2008.
4. N. D. Bhatt and V. M. Panchal, Engineering Drawing, Charotar Publishing House Pvt. Limited, 2008.
5. K.V.Natarajan, A Text Book of Engineering Graphics, Dhanalakshmi Publishers, 2013.
6. George Omura, Brian C. Benton, Mastering AutoCAD 2015 and AutoCAD LT 2015: Autodesk Official Press, Wiley Publisher, 2015.

15MA201 VECTOR CALCULUS AND COMPLEX ANALYSIS 3 2 0 4

(Common to all branches)

Course Objectives

- Implement the Complex Analysis, an elegant method in the study of heat flow, fluid dynamics and electrostatics.
- Summarize and apply the methodologies involved in solving problems related to fundamental principles of Calculus viz: Differentiation, Integration and Vectors.
- Develop enough confidence to identify and model mathematical patterns in real world and offer appropriate solutions, using the skills learned in their interactive and supporting environment.

Course Outcomes (COs)

1. Characterize the calculus of vectors.
2. Apply the theoretical aspects of vector integral calculus in their core areas.
3. Recognize the differentiation properties of complex functions.
4. Identify the complex functions and their mapping in certain complex planes.
5. Use the concepts of integration to complex functions in certain regions.

UNIT I **10 Hours**

VECTOR CALCULUS

Gradient -Divergence -Curl - Directional derivative- Solenoidal -Irrotational vector fields -Line Integral - Surface integrals.

UNIT II **9 Hours**

INTEGRAL THEOREMS OF VECTOR CALCULUS

Green's theorem in a plane- Stoke's Theorem- Gauss divergence theorem- Applications involving cubes and parallelepiped.

UNIT III **8 Hours**

ANALYTIC FUNCTIONS

Analytic Functions- Necessary and Sufficient conditions of Analytic Function- Properties of Analytic function - Determination of Analytic Function using Milne Thompson method -Applications to the problems of Potential Flow.

UNIT IV **8 Hours**

MAPPING OF COMPLEX FUNCTIONS

Physical interpretation of mapping- Application of transformation: translation, rotation, magnification and inversion of multi valued functions - Linear fractional Transformation (Bilinear transformation).

UNIT V **10 Hours**

INTEGRATION OF COMPLEX FUNCTIONS

Cauchy's Fundamental Theorem - Cauchy's Integral Formula - Taylor's and Laurent's series- Classification of Singularities - Cauchy's Residue Theorem.

FOR FURTHER READING

Applications to Electrostatic and Fluid Flow.

Total: 45+30= 75 Hours

Reference(s)

1. C. Ray Wylie and C. Louis Barrett, Advanced Engineering Mathematics, Tata McGraw-HillPublishing Company Ltd, 2003
2. Erwin Kreyszig , Advanced Engineering Mathematics, Tenth Edition, Wiley India Private Limited,New Delhi 2015
3. J. A. Brown and R. V. Churchill, Complex Variables and Applications , Sixth Edition, McGraw Hill,New Delhi, 2007
4. B. S. Grewal, Higher Engineering Mathematics, Forty third Edition, Khanna Publications , New Delhi 2014
5. Peter V. O. Neil, Advanced Engineering Mathematics, Seventh Edition ,Cengage Learning India Private Limited, 2012
6. Glyn James, Advanced Engineering Mathematics, Third Edition,Wiley India,2007

Assessment Pattern

UNIT/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2					6					8			4			2								22
2	2					4				4					4				6						20
3		2									10								6						18
4	2						4				6				6										18
5	2						4			6				4					6						22
																				Total					100

Assessment Questions

Remember

1. Define gradient of a vector.
2. Define irrotational of a vector.
3. State Green's theorem.
4. State Gauss divergence theorem.
5. Check whether the function is $f(z)=z^3$ analytic.
6. List the necessary condition for a function f(z) to be analytic.
7. Define bilinear transformation.
8. State the condition for the transformation w = f(z) to be conformal at a point.
9. State the formula for finding the residue of a double pole.
10. State Cauchy's integral formula.

Understand

1. If $\vec{F} = x^2\,\vec{i} + xy^2\,\vec{j}$ evaluate the line integral $\int \vec{F}.\vec{dr}$ from (0,0) to (1,1) along the path y=x.
2. Identify the unit normal vector to the surface $x^2 + xy + z^2 = 4$ at the point (1,-1, 2).
3. Identify the value of $\nabla x \nabla \Phi$ (F), using Stoke's theorem.
4. Formulate the area of a circle of radius a using Green's theorem.
5. Illustrate the two properties of analytic function.
6. Represent the analyticity of the function w = sin z.
7. Identify fixed points of the transformation $w = z^2$.
8. Identify the image of the triangular region in the z plane bounded by the lines x= 0, y = 0, and x+ y= 1 under the transformation w = 2z.
9. Infer $\int_c \frac{dz}{(z-3)^2}$ where c is the circle $|z| = 1$.
10. Identify the residues of the function $f(z) = \frac{4}{z^3(z-2)}$ at its simple pole.

Apply

1. Find $\int_c \overline{F}.dr$ where $\overline{F} = (2y+3)i + xzj + (yz - x)k$ along the line joining the points (0,0,0) to(2,1,1).
2. If $\vec{F} = 3xy\,\vec{i} - y^2\,\vec{j}$, find $\int_C \vec{F} \cdot d\vec{r}$ where C is the curve in the xy-plane $y=2x^2$ from (0,0) to (1,0)
3. Apply Green's theorem in the plane to Compute $\int_c (3x^2 - 8y^2)dx + (4y - 6xy)dy$ where C is the boundary of the region defined by x=0, y=0 and x+y=1.
4. Using Gauss divergence theorem,Compute $\iint_s \vec{F} \cdot \hat{n} ds \; where \; \vec{F} = 4xz\vec{i} - y^2\vec{j} + yz\vec{k}$ and S is the surface of the cube bounded by x=0,y=0,z=0,x=1,y=1,z=1.

5. If ω=φ+iψ represent the complex potential for an electric field and $\cdot = x^2 - y^2 + \frac{x}{x^2+y^2}$, find the function φ.
6. If $u = \log(x^2 + y^2)$, find v and f (z) such that f (z) =u+iv is analytic.
7. Find bilinear transformation which maps the points I,-1,I of the z plane into the points 0,1,∞ of the w plane respectively.
8. Find the image of the circle $|z-1| = 1$ in the complex plane under the transformation w = $\frac{1}{z}$.
9. Find Taylor's series f(z) = cos z about z = $\frac{®}{3}$.
10. Find the nature of singularity $z\ e^{\left(\frac{1}{z}\right)^2}$.

Analyze

1. Conclude $div\ grad(r^n) = \nabla^2(r^n) = n(n+1)r^{n-2}$.
2. Demonstrate the irrotational vector and solenoidal vector with an example.
3. Justify stokes's theorem for $\overline{F} = -yi + 2yzj + y^2k$, where S is the upper half of the sphere $x^2+y^2+z^2=1$.
4. Justify Gauss divergence theorem for $\vec{F} = x^2\,\vec{i} + y^2\,\vec{j} + z^2\,\vec{k}$ where S is the surface of the cuboid formed by the planes x= 0, x= a, y = 0, y = b, z = 0 and z = c.
5. The complex potential f(z)=z^2 describes a flow with constant equipotential lines and streamlines ,Determine the velocity vector.
6. Show that the function $u = x^3 + x^2 - 3xy^2 + 2xy - y^2$ is harmonic and find the corresponding analytic function.
7. Find the image of the rectangle whose vertices are (0,0), (1,0), (1,2), (0,2) by means of linear transformation w = (1+i)z+2-i. Also compare the images.
8. Generate $f(z) = \frac{z}{(z-1)(z-3)}$ as Laurent's series valid in the regions: $1 < |z| < 3$ and $0 < |z-1| < 2$
9. Use Cauchy's integral formula Compute $\int_C \frac{e^z\,dz}{(z+2)(z+1)^2}$ where C is the circle $|z| = 3$.
10. Find $\int_C \frac{z+4}{z^2+2z+5}dz$ where C is $|z+1+i| = 2$.

Evaluate

1. Determine $\iint_s (xdydz + 2ydzdx + 3zdxdy)$, where s is the closed surface of the sphere

$x^2 + y^2 + z^2 = a^2$

2. Prove that $curl(curl\vec{F}) = grad(div\vec{F}) - \nabla^2\vec{F}$.

3. Check Stokes theorem for $\vec{F} = \left(x^2 + y^2\right)\vec{i} - 2xy\vec{j}$ taken around the rectangle bounded by x=±a,y=0 y=b.

4. Check Green's theorem in the plane to determine $\int_c \left(3x^2 - 8y^2\right)dx + \left(4y - 6xy\right)dy$ where c is the boundary of the region defined by $(i)\, x = 0, y = 0, x + y = 1 (ii)\, y = \sqrt{x}\ and\ y = x^2$.

5. Determine the analytic function f (z) = P + iQ, if Q = $\frac{\sin x \sinh y}{\cos 2x + \cosh 2y}$, if f(0) = 1.

6. Determine f (z) and the conjugate harmonic v such that w = u + i v is an analytic function of z given that u = $e^{x^2-y^2}\cos 2xy$.

7. Determine the image of the infinite strip $\frac{1}{4} \le y \le \frac{1}{2}$ under the transformation w = $\frac{1}{z}$

8. Determine the Laurent's series expansion $f(z) = \frac{z-1}{(z+2)(z+3)}$ $for\ 2 < |z| < 3$.

9. Determine $\int_C \frac{z+4}{z^2+2z+5}dz$ where C is $|z+1+i| = 2$

10. Using Cauchy's integral formula determine $\int_C \frac{e^z dz}{(z+2)(z+1)^2}$ where C is |Z| =1.

15GE105 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

2 0 2 3

Common to AE,AG, AU,CE,ME,MTRS, BT,TT ,FD (I Semester) and to CSE,FT,IT (II Semester)

Course Objectives

- To understand the basic concepts of electric circuits and magnetic circuits.
- To illustrate the construction and operation of various electrical machines and semiconductor devices.
- To learn the fundamentals of communication systems.

Course Outcomes (COs)

1. Understand the basic concepts of electric and magnetic circuits.
2. Summarize the types of DC machines.
3. Classify the static and dynamic AC machines and explain their operation.
4. Interpret the operation of AC and DC drives
5. Illustrate the characteristics of semiconductor devices and communication systems.

UNIT I **7 Hours**

ELECTRIC CIRCUITS

Definition of Voltage, Current, Electromotive force, Resistance, Power & Energy, Ohms law and Kirchoffs Law & its applications - Series and Parallel circuits - Voltage division and Current division techniques - Generation of alternating emf - RMS value, average value, peak factor and form factor- Definition of real, reactive and apparent power.

UNIT II **5 Hours**

DC MACHINES

Introduction of magnetic circuits - Law of Electromagnetic induction, Flemings Right & Left hand rule- Types of induced emf - Definition of Self and Mutual Inductance - DC Motor- Contruction - Working Principle- Applications.

UNIT III **6 Hours**

AC MACHINES

Single Phase Transformer - Alternator - Three phase induction motor - Single phase induction motor - Contruction - Working Principle - Applications.

UNIT IV **5 Hours**

ELECTRICAL DRIVES

Speed control of dc shunt motor and series motor - Armature voltage control - Flux control - Construction and operation of DC servo motor - Construction and operation of DC servo motor stepper motor.

UNIT V **7 Hours**

ELECTRON DEVICES AND COMMUNICATION

Characteristics of PN Junction diode and Zener diode - Half wave and Full wave Rectifiers - Bipolar Junction Transistor - Operation of NPN and PNP transistors - Logic gates - Introduction to communication systems.

FOR FURTHER READING

Voltage Regulator - Stepper motor - Energy meter - SMPS, Satellite and Optical communication.

4 Hours

EXPERIMENT 1

Analyze the VI characteristics of a fixed resistor and a lamp by varying its temperature.

4 Hours

EXPERIMENT 2

Apply the voltage division and current division techniques for series and parallel connections of lamp loads.

4 Hours

EXPERIMENT 3

Understand the concept of electromagnetic induction using copper coil.

4 Hours

EXPERIMENT 4

Understand the construction and working principle of DC machines.

6 Hours

EXPERIMENT 5

Determine the VI Characteristics of PN Junction diode and plot the input and output wave shapes of a half wave rectifier.

4 Hours

EXPERIMENT 6

Realize the working of transistor as an electronic switch through experiments.

4 Hours

EXPERIMENT 7

Lighting applications using logic gates principle.

Total: 60 Hours

Reference(s)

1. T. K. Nagsarkar and M. S. Sukhija, Basic of Electrical Engineering, Oxford University Press, 2011.
2. Smarjith Ghosh, Fundamentals of Electrical and Electronics Engineering, Prentice Hall (India) Pvt. Ltd., 2010
3. A. Sudhakar, Shyammohan S Palli, Circuits and Networks Analysis and Synthesis, Tata McGraw Hill, 2010
4. R. S. Sedha, A Textbook of Applied Electronics, S.Chand& Company Ltd, 2013

Assessment Pattern

UNIT/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2					2					6				4				6						20
2	4					4				2				6					4						20
3	2				10					4					4										20
4	4					6				4					6										20
5	4					4				6														6	20
																							Total		100

Assessment Questions

Remember

1. State Kirchhoff's current law.
2. State Ohm's law.
3. State Kirchhoff's voltage law.
4. State Faraday's law of electromagnetic induction.
5. Give the properties of flux lines.
6. Define reluctance.
7. Define magnetic flux.
8. State the operating principle of a transformer.
9. State the operating principle of DC generator.
10. What is back emf?
11. State the operating principle of DC Motor.
12. State Fleming's Left hand rule.

13. State Fleming's Right hand rule.
14. Sketch the V-I characteristics of zener diode.
15. What is junction barrier?
16. What is BJT?
17. List the applications of optical fibre communication.
18. Define aspect ratio.

Understand

1. Define average value.
2. Compare series and parallel circuits.
3. Why domestic appliances connected in parallel?
4. Classify the magnetic circuits.
5. Describe the concepts of self and mutually induced emf.
6. What is leakage coefficient?
7. Interpret the laws of electromagnetic induction.
8. Elucidate the working principle of a transformer.
9. What is DC generator?
10. List the applications of DC motors.
11. Illustrate the construction and working principle of three phase induction motor.
12. Outline the applications of DC generators.
13. Demonstrate the action of diode in forward and reverse biasing.
14. Explain the operation of NPN transistor.
15. Draw symbol of diode and zener diode.
16. Illustrate the input and output characteristics of CE configuration.
17. Exemplify the need for modulation.
18. Summarize the advantages of FM over AM.
19. State the need for modulation.
20. Discuss the principle of frequency modulation.

Apply

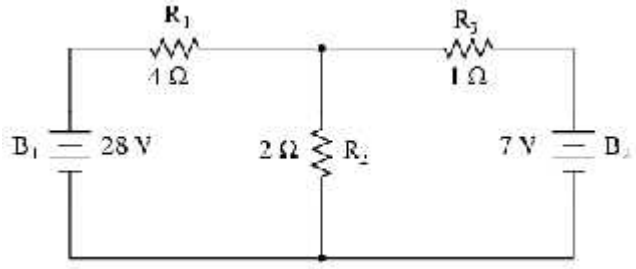
1. Three resistors are connected in series across a 12V battery. The first resistance has a value of 2 Ω, second has a voltage drop of 4V and third has power dissipation of 12 W. Calculate the value of the current in the circuit.
2. A 25 Ω resistor is connected in parallel with a 50 Ω resistor. The current in 50 Ω resistor is 8A. What is the value of third resistance to be added in parallel to make the total line current as 15A?
3. The self - inductance of a coil of 500turns is 0.25H.If 60% of the flux is linked with a second coil of 10500 turns. Calculate a) the mutual inductance between the two coils and b) emf induced in the second coil when current in the first coil changes at the rate of 100A/sec.
4. An air cored toroidal coil has 480 turns, a mean length of 30cm and a cross-sectional area of 5 cm^2.Calculate a)the inductance of the coil and b) the average induced emf, if a current of 4 A is reversed in 60 milliseconds
5. A toroidal air cored coil with 2000 turns has a mean radius of 25cm, diameter of each turn being 6cm. If the current in the coil is 10A, find mmf, flux, reluctance, flux density and magnetizing force.
6. Construct the circuit of voltage regulator.
7. Outline the applications of DC motors.
8. Develop the block diagram of the television and explain each block.
9. Build the circuit of full wave bridge rectifier.
10. Develop the block diagram of the optical fibre communication and explain each block.
11. Construct the circuit of half wave rectifier.

Analyse

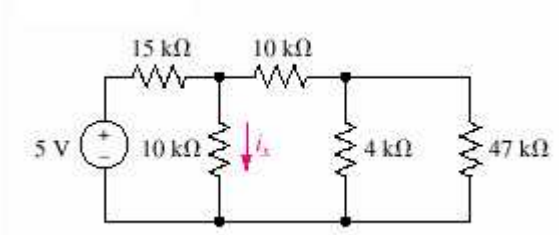
1. Analyze the voltage, current and power in a resistor supplied with an alternating voltage.
2. Obtain the equations for the equivalent star network resistances for a given delta network.
3. Derive the expression for RMS, average value, peak and form factor of sinusoidal voltage.
4. Analyze the voltage, current and power relationship in three phase star connected system.
5. Derive the expressions for self -inductance and mutual inductance.
6. Analyze the series and parallel magnetic circuit and derive the total mmf required.
7. Compare electric and magnetic circuits.
8. Derive the emf equation of DC Generator.
9. Obtain the expression for current amplification factor.
10. Derive the expression of ripple factor, efficiency of full wave bridge rectifier.

Evaluate

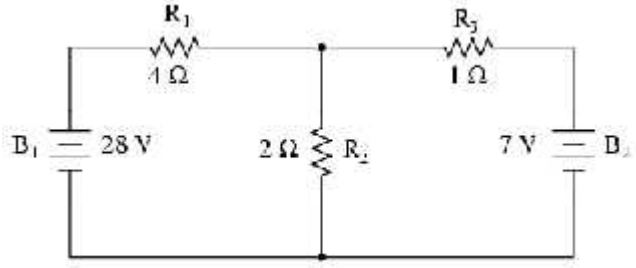
1. Estimate the value of meshcurrents inthefollowingnetwork.



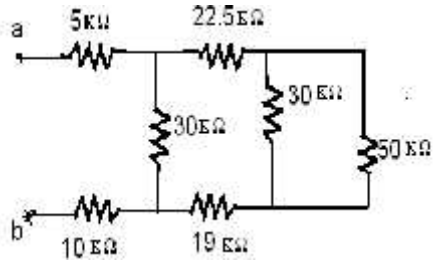
2. For the circuit in Fig. determine$i_X$and compute the power dissipated by the 15-kΩ resistor.



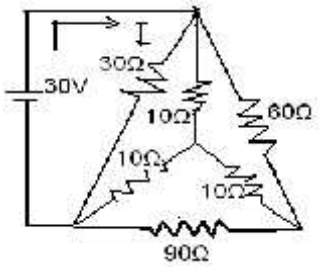
3. Estimate the value of node voltage inthefollowingnetwork.



4. An iron rod of 1cm radius is bent to a ring of mean diameter 30cm and wound with 250 turns of wire. Assume the relative permeability of iron as 800. An air gap of 0.1cm is cut across the bent ring. Calculate the current required to produce a useful flux of 20,000 lines if leakage is neglected.
5. Theeffectiveresistanceoftworesistorsconnectedinseriesis100 Ω. When connected inparallel, then effective value in 24 ohm's. Determinethevalueoftworesistors.
6. Determinetheequivalentresistanceofthefollowingcircuit



7. Calculate the total resistance R_T, and total current I in the following circuits using star delta transformationtechnique



Create

1. Create the circuit diagram of 5V regulated power supply.
2. Plan the combinational circuit diagram of EX-NOR gate using NOR gate.

3 0 2 4

15CS206 PROGRAMMING USING C++

(Common to CSE and IT)

Course Objectives

- Understand the concepts of Object Oriented Programming.
- Execute the Object oriented concepts to solve problems using C++.
- Develop programs using files and templates.

Course Outcomes (COs)

1. Explore the concept of classes and objects.
2. Develop programs using arrays and strings.
3. Implement the various types of inheritance.
4. Exemplify the concepts of functions and streams.
5. Develop programs using files, templates and exception handling.

UNIT I **9 Hours**

CLASSES AND OBJECTS

Need for object oriented programming - Characteristics of object oriented programming -Classes and Objects: Simple Class-Nesting of Member functions - Static Data Members and Member Functions - Constructors and Destructors - Returning Objects from Functions.

UNIT II **9 Hours**

ARRAYS, STRINGS AND OVERLOADING

Array Fundamentals - Arrays as Class Member Data - Arrays of Objects - String Manipulations - Operator overloading: Unary Operators - Binary Operators - Special Operators - Pitfalls of Operator Overloading and Data Conversion.

UNIT III **9 Hours**

INHERITANCE

Derived Class and Base Class - Derived Class Constructors - Overriding Member Functions - Public and Private Inheritance - Types of Inheritance: Single, Multi-Level, Multiple, Hierarchical and Hybrid - Virtual Base Classes - Abstract Classes.

UNIT IV **8 Hours**

FUNCTIONS AND STREAMS

Pointers - this Pointer - Pointers to Objects and Derived Classes - Function Overloading - Virtual Function - Friend Function - Static Function. Streams: Stream Classes - Unformatted I/O Operations - Formatted Console I/O Operations.

UNIT V **10 Hours**

FILES, TEMPLATES AND EXCEPTION HANDLING

File Stream Operations - File Pointers Manipulation-Templates: Class Templates - Function Templates - Overloading Function Templates - Exception Handling Mechanism: Try Throw and Catch.

FOR FURTHER READING

Payroll system using polymorphism -Integrated grade book for students using arrays-Virtual destructor - Proxy classes.

4 Hours

EXPERIMENT 1

Implementation of operator overloading with class and objects.

1. Write a C ++ program to find the square and cube of a number using class and object.
2. Write a C ++ program to find the area of rectangle and circle using class and object.
3. Write a C ++ program to find whether the given number is an Armstrong number using classes and objects.

6 Hours

EXPERIMENT 2

Implementation of types of Inheritance.

1. Write a C ++ program to generate employee payroll using inheritance.
2. Write a C ++ program to student details using multilevel inheritances.
3. Write a C ++ program to employee details using multiple inheritance.

6 Hours

EXPERIMENT 3

Implementation of two different classes for adding a private data member using friend function.

1. Write a C ++ program to multiply two matrices using static member function with friend function.
2. Write a C ++ program to perform complex number subtraction by overloading an operator using friend function.
3. Write a C ++ program to perform arithmetic operations using friend function.

6 Hours

EXPERIMENT 4

Implementation of operator and function overloading.

1. Write a C ++ program to perform conversion from integer to complex number by operator overloading.
2. Write a C ++ program to perform from complex number to integer using operator overloading.
3. Write a C ++ program to perform addition of two numbers using function overloading.

4 Hours

EXPERIMENT 5

Implementation of file handling operations.

1. Write a C ++ program to reading and writing a file contents.
2. Write a C ++ program to open a file and append data to the end of file.
3. Write a C ++ program to write the class objects to a file.

4 Hours

EXPERIMENT 6

Implementation of Class templates and Function templates.

1. Write a C ++ program to perform insertion sort using class template.
2. Write a C ++ program to perform quick sort using function template.
3. Write a C ++ program to perform merge sort using template.

Total: 45+30= 75 Hours

Reference(s)

1. E.Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill Publishing, New Delhi, 2011.
2. Robert Lafore, "Object Oriented Programming in C++", Galgotia Publication, 2010.
3. B. Trivedi, "Programming with ANSI C++", Oxford University Press, 2010.
4. H.M Deitel and P.J Deitel, "C++ How to Program", Seventh Edition, Prentice Hall, 2010.
5. Herbert Schildt, "C++: The Complete Reference", Fourth Edition, Tata McGraw-Hill, 2010.
6. K.R. Venugopal, Rajkumar and T.Ravishankar, "Mastering C++", Tata McGraw Hill Publishing, New Delhi, 2010.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	1	1		5	4	3			1	1				1			1							20
2	2	3	1		4	3	1			3					2			1							20
3	3	1	1		4	2	1				2			1	1			2							18
4	4	1	1		5	3	2		1				1				1	1							20
5	4	2	2		3	4	1				3				1		2								22
																								Total	100

Assessment Questions

Remember

1. Define object.
2. State the term encapsulation.
3. List the features of object-oriented programming.
4. Define algorithm.
5. Recall recursion.
6. Label the types of inheritance.
7. Define virtual function.
8. Recall the usage of constructor.
9. State the term templates.
10. Recall the advantages of dynamic initialization.
11. What is abstract class?
12. What are functionalities of file pointers?
13. Define this pointer.
14. Recall the types of overloading.

Understand

1. Exemplify the class with functions.
2. Summarize the unnamed namespace.
3. Explain how objects are used as function argument.
4. Identify the use of data conversion.
5. Exemplify the use of derived class constructors.
6. Compare class and function template.
7. Formulate how objects are initialized dynamically?
8. Identify the operators that cannot be overloaded.
9. Identify the rules for virtual functions.
10. Identify the use of data conversion.

Apply

1. Show the class declarations with access specifiers.
2. Implement how arrays work as class member data.
3. Demonstrate the use of constructors and destructors.
4. Find the Pitfalls of Operator Overloading.
5. Construct an array using new operator.
6. Demonstrate the use of virtual base classes.
7. Implement any application using Inheritance.
8. Find the advantages of pointers.
9. Show the use of File Pointers.
10. Demonstrate the Exception Handling Mechanism.
11. Show the File Pointer manipulations.

Analyse

1. Outline the nesting of member functions.
2. Differentiate unary operators and binary operators.
3. Resolve how inheritance is used in code reusability.
4. Outline the use of virtual base classes.
5. Conclude the use of abstract classes.
6. Justify – how streams is used for accessing the data.
7. Conclude the file stream operations.
8. Compare formatted and unformatted operations.

Evaluate

1. Determine the advantages of class template over function template.

15GE107 WORKSHOP PRACTICE 0 0 2 1

Common to AE, AG,AU,ME,MTRS, BT,FT,TT,FD (I Semester) and to CE,CSE,ECE,EEE,EIE,IT (II Semester)

Course Objectives

- To provide hands on training for fabrication ofcomponents using carpentry, sheet metal, fittingand weldingequipment/tools.
- To develop the skills for preparing the green sand mould using foundry tools and to make simpleelectrical &household pipe line connections using suitable tools.
- To develop the skill to make / operate/utilize the simple engineering components.
- To develop skills to assemble/dismantle hardware parts and install OS.

Course Outcomes (COs)

1. Fabricate simple components using carpentry, sheet metal, fitting & welding equipment/tools.
2. Prepare green sand mould and make simple electrical & household pipe line connection using suitable tools.
3. Make / operate / utilize the simple engineering components.
4. Acquire knowledge about system assembly, disassembly, installation of OS and network configuration.

3 Hours

EXPERIMENT 1

Forming of simple object in sheet metal using suitable tools – (Example: Dust Pan/ SoapBox) (or) making simple object using Metal Spinning Machine. (Example: Aluminum Cup).

3 Hours

EXPERIMENT 2

Prepare 'V' (or) half round (or) square (or) Dovetail joint from the given mild Steel flat.

3 Hours

EXPERIMENT 3

Fabrication of a simple component using thin and thick plates. (Example: Book rack)

3 Hours

EXPERIMENT 4

Making a simple component using carpentry power tools. (Example: Electrical switch Box/Toolbox/ Letter box].

3 Hours

EXPERIMENT 5

Construct a household pipe line connections using pipes, Tee joint,Four way joint, elbow,union,bend, Gate way and Taps (or) Construct a pipe connections of house application centrifugal pump usingpipes, bend, gate valve,flanges and foot valve.

3 Hours

EXPERIMENT 6

Prepare a green sand mould using solid pattern/split pattern.

3 Hours

EXPERIMENT 7

Construct a domestic electrical wire connections usingindicator, one way switch with calling bell, two way switch with lamp, one way switch with fan regulator and one way switch with socket.

3 Hours

EXPERIMENT 8

Study of computer components, assembling and disassembling of computer system

3 Hours

EXPERIMENT 9

Installation of Windows and Linux operating systems in PC

3 Hours

EXPERIMENT 10

Network configuration and trouble shooting in Windows and Linux

Total: 30 Hours

15MA302 DISCRETE STRUCTURES 3 2 0 4

Course Objectives

- Implement the definitions of relevant vocabulary from graph theory and combinatorics and be able to perform related calculations.
- Understand and use the terms Cardinality, finite, countably infinite and uncountably infinite, and determine which of these characteristics is associated with a given set.
- Develop enough confidence to identify and model mathematical patterns in real world and offer appropriate solutions, using the skills learned in their interactive and supporting environment.

Course Outcomes (COs)

1. Formulate short proofs using the following methods: direct proof, indirect proof and proof by contradiction.
2. Use logical notation to define and reason about fundamental mathematical concepts such as sets, relations, functions and integers.
3. Apply the different properties of injection, surjection, bijection, composition and inverse functions.
4. Apply graph theory models of data structures and state machines to solve problems of connectivity and constraint satisfaction.

UNIT I **8 Hours**

PROPOSITIONAL CALCULUS

Propositions- Logical connectives-Compound propositions-Conditional and bi conditional propositions-Truth tables - Tautologies and Contradictions - Logical and equivalences and implications - DeMorgan's Laws-Normal forms-Principal conjunctive and disjunctive normal forms - Rules of inference-Arguments-Validity of arguments.

UNIT II **7 Hours**

PREDICATE CALCULUS

Predicates-Statement Function -Variables-free and bound variables- Quantifiers- Universe of discourse- Logical equivalences and implications for quantified statements- Theory of inference- The rules of universal specification and generalization-Validity of arguments.

UNIT III **9 Hours**

SET THEORY AND FUNCTIONS

Set Operations-properties-Power set-Relations-Graph and matrix of a relation- Partial Ordering- Equivalence relations-Partitions- Functions -Types of Functions- composition of relation and functions- inverse functions.

UNIT IV **10 Hours**

COMBINATORICS

Basics of Counting - Counting arguments- Pigeonhole Principle- Permutations and Combinations- Recursion and recurrence relations-Generating Functions- Mathematical Induction- Inclusion -Exclusion.

UNIT V **11 Hours**

GRAPH THEORY

Introduction to Graphs-Graph operations- Graph and Matrices-Graph Isomorphism- Connected Graphs- Euler Graphs- Hamilton paths and circuits- planar Graph-Graph colouring-Trees- Shortest path problem.

FOR FURTHER READING

Directed and Undirected Graphs - Paths- Circuits- Matrix Representation- Flows in Networks.

Total: 45+30= 75 Hours

Reference(s)

1. Kenneth H Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, Seventh Edition, McGraw Hill Education India Private Limited, New Delhi, 2013.
2. C.L.Liu, Elements of Discrete Mathematics, Tata McGraw Hill, New Delhi, 2000.
3. A.Doerr and K.Levasseur, Applied Discrete Structures, Galgotia Publication, New Delhi, 2004.
4. B.Kolman, R.C.Busby and S.C.Ross, Discrete Mathematical Structures, Fifth Edition, Pearson Education, New Delhi, 2005.
5. Johnsonbaugh, Richard, Discrete Mathematics, Sixth Edition, Maxwell, International Edition, 2006.
6. P.RalphGrimaldi, Discrete and Combinatorial Mathematics: An Applied Introduction, Pearson Education Asia, New Delhi, 2002.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	1	2			1	6				2	6														18
2	2				2	2					6		2	2											16
3	1	1			1	2			1					2	6				6						20
4		2					6						2		12										22
5	1				1	2	4		2	6			2						6						24
																				Total					100

Assessment Questions

Remember

1. Define a biconditional statement and draw its truth table.
2. Show that $(P \wedge Q) \rightarrow (P \vee Q)$ is a tautology without constructing truth table.
3. Write the expression "Some men are clever" in symbolic form.
4. If A has 3 elements and B has 2 elements how many functions are there from A to B.
5. Let A={1,2,3,4} and R={(x, y) /x > y}. Draw the graph of the relation.
6. Define pigeonhole principle.
7. What is principle of counting?
8. Define recursive function.
9. Define isomorphic graphs.
10. Define Planar graph.

Understand

1. Estimate the PCNF and PDNF of the formula given by $(\neg P \rightarrow R) \wedge (Q \rightarrow P)$.
2. Discuss this $\neg Q, P \rightarrow Q, P \vee R \Rightarrow R$ by indirect method.
3. Show that $A - B = A \cap B'$.
4. Let A, B, C are any three sets Prove that $(A \cup B)XC = (AXC) \cup (BXC)$.
5. Let f(x) = x+2, g(x) = x-2, h(x) = 3x, for x € R, where R is the set of real numbers. Find $f \circ g, f \circ f, g \circ g, f \circ g \circ h$ and also write the corresponding matrix.
6. Prove that the sum of the degrees of the vertices of any finite graph is even.
7. If A – B = {1, 2}, B – A = {6,7} and A ∩ B = {3,4,5} find A and B.
8. If the matrix representation of a relation R on {1,2,3} is given by $M_R = \begin{pmatrix} 0 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 1 & 0 \end{pmatrix}$ list the ordered pairs in the relation.
9. Draw a complete undirected graph with four vertices. How many edges does it have?
10. Define a Tournament graph and give an example of tournament with 6 vertices.

Apply

1. Show that $\neg(p \wedge (\neg q \wedge r) \vee (q \wedge r) \vee (p \wedge r)) \Leftrightarrow r$.
2. Show that d can be arrived from the premises $(a \rightarrow b) \wedge (a \rightarrow c), \neg(b \wedge c), (d \vee a)$.

3. Prove that the premises " One student in this class knows how to write programs in JAVA" and "Everyone who knows how to write program in JAVA can get a high paying job "imply the conclusion "Someone in this class get a high paying job".
4. Show that the relation R= {(1,2), (4,3), (2,2), (2,1), (3,1)} on A = {1,2,3,4} is not transitive.
5. Obtain the closed form expression of generating function for the sequence $\{3^0, 3^1, 3^2, 3^3 \ldots\ldots\}$.
6. Find the number of different arrangements that can be made out of the letters of the word "TRIANGLE" if the vowels are to come together.
7. Suppose that a connected planar simple graph has 20 vertices each of degree 3. Into how many regions does a representation of this planar graph split the plane?
8. Obtain the number of permutations of all the letters of the words. (i) Committee (ii) engineering.
9. Show that following implication $(P \to (Q \to R)) \Rightarrow ((P \to Q) \to (P \to R))$.
10. Solve S(k)-4S(k-1)+4S(k-2)=3k+2^k, S(0) = 1, S(1) = 1.

Analyze/ Evaluate

1. Show that the following premises are inconsistent :
   If Rama gets his degree, he will go for a job. If he goes for a job, he will get married soon. If he goes for higher study, he will not get married. Rama gets his degree and goes for higher study.
2. Prove by mathematical induction that $1^2 + 3^2 + 5^2 + \ldots\ldots + (2n-1)^2 = \frac{n(2n-1)(2n+1)}{3}$.
3. Prove that a simple graph with n vertices and k components can have at most $\frac{(n-k)(n-k+1)}{2}$ edges.
4. Draw all possible simple digraphs having three nodes.
5. How many different bit strings are there of length seven?
6. Find the recurrence relation foe Fibonacci sequence.
7. Let R denote a relation on the set of ordered pairs of integers such that (x, y) *R (u, v)* iff x v = y u. Show that R is an equivalence relation.
8. Show that S$\vee$ R is tautologically implied by $(P \vee Q) \wedge (P \to R) \wedge (Q \to S)$ using automatic Theorem proving.
9. Show that if n people attend a party and some shake hands with others (but not with themselves), then at the end, there are at least two people who have shaken hands with the same number of people.
10. Find the number of different arrangements that can be made out of the letters of the word 'TRIANGLE' if the vowels are to come together.

15CS302 DATA STRUCTURES 3 0 0 3

Course Objectives

- Understand the basics of abstract data types.
- Impart knowledge about the principles of linear and nonlinear data structures.
- Build an application using sorting and searching.

Course Outcomes (COs)

1. Explore the basics of data structures and algorithm analysis.
2. Demonstrate the concept of linear data structures.
3. Design algorithms for various searching and sorting techniques.
4. Exemplify the concept of tree data structures.
5. Express the concept of graph data structures.

UNIT I **7 Hours**

INTRODUCTION

Pseudo code - Abstract data types - Model for ADT - ADT Implementations -Algorithm efficiency - Designing recursive algorithms - Recursive examples.

UNIT II **10 Hours**

STACKS, QUEUES AND LISTS

Arrays - Basic stack operation- Stack ADT - Applications of stack - Queues operations- Queue ADT - Queue applications -List ADT - Circular - Doubly linked list.

UNIT III **9 Hours**

SORTING AND SEARCHING TECHNIQUES

Sorting: Insertion Sort- Selection Sort - Bubble Sort - Merge sort - Quick sort -Heap sort-shell sort - External Sorts

Searching: Sequential search- Binary Search - Hashed list searches.

UNIT IV **10 Hours**

TREE CONCEPTS

Basic Tree concepts - Binary Trees - Tree Traversals - Expression Trees - Binary Search Trees - AVL Search Trees - Heap concepts - Implementation - Heap ADT.

UNIT V **9 Hours**

GRAPHS

Definitions - Traverse Graph: Depth first Traversal-Breadth first Traversal-Shortest Path Algorithms: Unweighted Shortest Paths - Dijkstra's Algorithm. Minimum Spanning Tree: Prim's Algorithm Kruskal's Algorithm.

FOR FURTHER READING

Applications of list - Radix sort - B-Trees - Red-Black trees - Splay trees- Bucket hashing - Heap Applications: Priority Queue - Binomial Heaps - Topological sort - Introduction to NP Completeness

Total: 45 Hours

Reference(s)

1. Richard F. Gilberg, and Behrouz A. Forouzan, Data Structures - A Pseudocode Approach with C, Thomson 2011.
2. M.A.Weiss, Data Structures and Algorithm Analysis in C, Pearson Education Asia, 2013
3. Y.Langsam, M.J.Augenstein and A.M.Tenenbaum, Data Structures using C, PHI, 2007.
4. Aho, J.E.Hopcroft and J.D.Ullman, Data Structures and Algorithms, Pearson education, Asia, 2010.
5. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, Fundamentals of Data Structures in C, Silicon Press, 2009.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	4	4			4	4																			16
2	2				2	4				6					2			2							18
3	2				2					6				2	3							6			21
4		2			2					6				2	3			2				6			23
5		2				2				6				6								6			22
																								Total	100

Assessment Questions

Remember

1. Define binary tree.
2. List the properties of Heap trees.
3. Define Graph.
4. Define Abstract Data Type.
5. List the four applications of stack.
6. List the properties of binary search tree.
7. List the merits of array.
8. List the applications of stack.
9. Define sort efficiency.
10. State the rules to be followed during infix to postfix conversions.
11. Define external sorting.
12. State the examples of backtracking

Understand

1. What is an expression tree?
2. What is atomic data?
3. How do we calculate the balance factor for each node in an AVL Tree?
4. Summarize the concept of reheapdown in a heap tree with appropriate examples.
5. Describe the dijkstra's algorithm with suitable example.
6. What is composite data?
7. What is a minimum spanning tree?
8. What is a stack?
9. Elaborate the procedure for insertion and deletion of nodes in a list ADT.
10. Explain the four applications of stack.

Apply

1. How the balance factor is calculated for each node in an AVL tree?

2. Design an algorithm to compute the greatest common divisor of two integers using recursive function.
3. Write an algorithm to generate the Fibonacci series using recursive function.
4. Show the trace of the shell sort for the following key sequence: 62, 22, 36, 6, 26, 75 and 13.
5. Construct binary search tree using the following sequence: 14, 23, 7, 10, and 80.
6. Implement the concept of the quick sort algorithm for the following sequence 62, 22, 36, 6, 79, 13, 31 and 76.
7. Write an algorithm to implement the basic operations on list ADT with appropriate example.
8. Write the procedure for the conversion of an infix expression to postfix notation.
9. Write an algorithm to implement the basic operations on queue ADT with appropriate examples.
10. Write an algorithm for inserting and deleting an element from doubly linked list.

Analyse

1. Differentiate recursion and iteration.
2. Differentiate base case and general case.
3. Compare stack and queue.
4. Differentiate heap tree and binary search tree.
5. Compare internal and external sort.
6. Differentiate array and stack.

Evaluate

1. Evaluate the time complexity of Fibonacci numbers in linear loop.
2. Evaluate the time complexity of linear logarithmic function.
3. Verify whether a binary max heap tree can be created by inserting the values 45, 17, 67, 19, 41, 30, 33, 20, 38, 14, 22 one at a time, into an initially empty tree. Also show the result of performing two delete operations in the final binary map heap obtained.

Create

1. Construct the AVL tree for the following set of values 10, 2 8,12,11,15, and 9.
2. Construct a binary min heap for the following elements: 15, 17, 19,11,10,13 and show the result of performing two delete operations in the final binary min heap.

15CS303 JAVA PROGRAMMING 3 0 0 3

Course Objectives

- Impart the fundamental concepts of core JAVA.
- Gain programming skills in JAVA.
- Gain the built in knowledge of standalone and web applications.

Course Outcomes (COs)

1. Identify the syntax, semantics and classes in Java language.
2. Develop programs using OOPS concepts and multi-threading.
3. Explore the concept of Input and Output in Java.
4. Develop programs using strings.
5. Implement programs in Applet, AWT and Event handlers in Java.

UNIT I **8 Hours**

JAVA BASICS

The Genesis of Java - Overview of Java - Data Types, Variables, and Arrays - Operators - Control Statements - Introducing Classes - Methods and Classes.

UNIT II **11 Hours**

OOPS AND MULTITHREADED PROGRAMMING IN JAVA

Inheritance: Basics - Using Super - Creating a Multilevel Hierarchy - Method overriding - Using Abstract Classes - Packages and Interfaces: Packages - Access Protection - Importing Packages- Interfaces Definitions and Implementations - Exception Handling: Types - Try and Catch - Throw - Multi-threaded Programming: Creating Threads - Inter Thread Communication.

UNIT III **7 Hours**

I/O AND EXPLORING JAVA.IO

I/O Basics - Reading Console Input -Writing Console output - Native Methods - I/ O Classes and Interfaces - File - The Byte Streams - The Character Streams - Using Stream I/ O - Serialization.

UNIT IV **9 Hours**

STRING HANDLING

String Handling: Special String operations and Methods - String Buffer - Exploring java.lang: Simple type Wrappers - System - Math - Collections Framework: Collections Interfaces and Classes - Utility Classes: String Tokenizer - Date and Time.

UNIT V **10 Hours**

APPLETS, EVENT HANDLING AND AWT

Applet Basics - Applet Architecture - Applet Display Methods - Parameter Passing - Event Handling Mechanisms - Event Classes - Event Listener - Working with Windows , Graphics , Colors and Fonts - AWT Controls - Layout Managers and Menus - JDBC Concepts.

FOR FURTHER READING

Spring framework - Container concepts - DAO Support and JDBC Framework - An introduction to Hibernate 3.5 - Integrating and configuring Hibernate - Building a Sample Application

Total: 45 Hours

Reference(s)

1. Herbert Schildt, Java 2-Complete Reference, Tata Mc Graw Hill, 2015
2. Deitel & Deitel, Java How to Program, Prentice Hall of India, 2010
3. Gary Cornell and Cay S.Horstmann, Core Java Vol.1 and Vol.2, Sun Microsystems Press, 2008
4. Jeff Linwood and Dave Minter, Beginning Hibernate Second Edition, Apress 2010
5. Rod Johnson, Juergen Hoeller, Alef Arendsen, Thomas Risberg, Colin Sampaleanu, Java Development with the Spring Framework, Wiley-India, 2012

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	6			2	6																			16
2	2				2	4				8				2				2					6		26
3	2					4				4				2	4										16
4		2			2					6				2	2								6		20
5		2				2				6				6									6		22
																								Total	100

Assessment Questions

Remember

1. List the five buzzwords of java.
2. Define byte code.
3. Define JVM.
4. List the three usage of native methods.
5. State the rules of using static keyword.
6. Define final keyword.
7. List the three features of swing.
8. List the three advantages of AWT in java.
9. Define session tracking.
10. Define JDBC.

Understand

1. Classify the types of inheritance.
2. Compare Break and Continue statement in java.
3. Illustrate the exception handling in java with an example.
4. Compare method overloading and method overriding.
5. Represent InputStreamReader with an example.
6. Distinguish character streams and byte streams in handling input.
7. Compare equals () and == in java string in terms of their function and output.
8. Compare length () and capacity () in string buffer in terms of their function and output.
9. Explain parameter passing in applet.
10. Represent the choice controls in AWT.
11. Show the life cycle of an applet with an example.

Apply

1. Implement the concept of function overloading to add int, float and double datatype.
2. Demonstrate constructor in java with an example.
3. Demonstrate the access control specifier with an example program.
4. Show the usage of String args [] in main method to read characters using command line arguments.
5. Implement multi-level inheritance for a banking system.
6. Demonstrate the abstract classes with an example.
7. Construct a package to explain the four access specifier.
8. Implement native methods to change the value of a variable in c.
9. Demonstrate the creation of menus using AWT.

Analyse

1. Differentiate while and do while loop.
2. Compare if-then and switch case.
3. Java does not support multiple inheritance. Justify.
4. Compare the keywords final and finally in terms of class, methods and exception.
5. Differentiate methods and package.
6. Distinguish methods and native methods.
7. Differentiate string and string buffer in string manipulations
8. Compare the methods in string buffer and string.
9. Compare the process of parameters passing in applet and methods.
10. Compare collections classes and interfaces.

Evaluate

1. Determine the output of the following
   class Super {
   private int a;

```
protected Super(int a) { this.a = a; }
}
class Sub extends Super {
public Sub(int a) { super(a);}
public Sub() { this.a=5;}
}
```

2. Determine the output of the following program by inserting necessary code.

```
public class Rainbow {
public enum MyColor {
RED(0xff0000), GREEN(0x00ff00), BLUE(0x0000ff);
private final int rgb;
MyColor(int rgb) { this.rgb = rgb;}
public int getRGB() { return rgb;}
};
public static void main(String[] args) {
// insert code here
}
}
```

3. Determine the code to be inserted at line 5, allows the Sprite class to compile

```
class Nav{
public enum Direction { NORTH, SOUTH, EAST, WEST }
}
public class Sprite{
// insert code here
}
```

4. Determine the output of the following program

```
class A{
public static void parse(String str) {
try {
float f = Float.parseFloat(str);
} catch (NumberFormatException nfe) {
f = 0;
} finally {
System.out.println;
}
}
public static void main(String[] args) {
parse("invalid");
}
}
```

5. Determine which can directly access and change the value of the variable name

```
package test;
class Target {
public String name = "hello";
}
```

Create

1. Generate the following output using class and methods

```
0 1
0 2 4
0 3 6 9
0 4 8 12 16
```

0 5 10 15 20 25
0 6 12 18 24 30 36
0 7 14 21 28 35 42 49
0 8 16 24 32 40 48 56 64
0 9 18 27 36 45 54 63 72 81

2. Generate the following output using class and methods
   1
   1 2 1
   1 2 3 2 1
   1 2 3 4 3 2 1
3. Given array is already sorted, and it has duplicate elements. Generate a program to remove duplicate elements and return new array without any duplicate elements. The array should contain only unique elements.
4. Generate a program to find the longest substrings without repeating characters. Iterate through the given string, find the longest maximum substrings.
5. Generate a program to find out the line with maximum number of word count in the given file. In case if it has multiple lines with max number of words, then it has to list all those lines.

15CS304 DIGITAL SYSTEM DESIGN 3 0 2 4

Course Objectives

- Understand the fundamentals of digital logic.
- Understand the implementation of logic circuits.
- Analyse and design various combinational and sequential circuits.

Course Outcomes (COs)

1. Identify the basic operations used in computers and other digital systems.
2. Design and analyze combinational circuits.
3. Implement state machines and flipflop in synchronous sequential circuits.
4. Elucidate the basic operations in Asynchronous sequential circuits
5. Design and develop applications using MSI devices.

UNIT I **9 Hours**

BOOLEAN ALGEBRA AND LOGIC GATES

Number systems and conversions - Boolean algebra - Minterm - Maxterm - SOP and POS forms - NAND and NOR implementation - Simplification of Boolean functions: K Map - Don't care conditions - Five variable K map - Quine Maccluskey method - Logic gates.

UNIT II **9 Hours**

COMBINATIONAL LOGIC

Combinational circuits - Analysis procedures - Design procedures - Adders - Subtractors - Binary adder - Carry Look Ahead Adder - BCD Adder - Magnitude comparator - Code Converters - Multiplexers and Demultiplexers- Function realization using multiplexers - Decoders and encoders.

UNIT III **10 Hours**

SYNCHRONOUS SEQUENTIAL LOGIC

Sequential circuits - Flip flops - Flip Flop Conversion - Analysis procedures - Design procedures - Moore and Mealy models - State reduction and state assignment - Shift Registers - Counters.

UNIT IV **10 Hours**

ASYNCHRONOUS SEQUENTIAL LOGIC

Design of Asynchronous sequential circuits - Analysis procedure: Transition Table - Flow Table - Race Condition- stability, Design Procedure: Primitive Flow Table- Reduction- Transition Table- Race Free State Assignment- Hazards

UNIT V **7 Hours**

DESIGN WITH MSI DEVICES

Programmable Logic Devices (PLD) - Programmable Logic Array (PLA) - Programmable Array Logic (PAL) - Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using ROM, PLA, PAL

FOR FURTHER READING

Design of a simple CPU - ASM charts - Hardware Description Language - RTL Design

2 Hours

EXPERIMENT 1

Implement Boolean Laws using Logic Gates

4 Hours

EXPERIMENT 2

Implement arithmetic circuits (Adder, Subtractor)

2 Hours

EXPERIMENT 3

Construct Code convertors (BCD, Gray, Excess -3)

4 Hours

EXPERIMENT 4

Construct Parity generator and parity checker

2 Hours

EXPERIMENT 5

Construct Magnitude comparator

4 Hours

EXPERIMENT 6

Demonstrate Multiplexer and Demultiplexers

2 Hours

EXPERIMENT 7

Function realization using multiplexers

4 Hours

EXPERIMENT 8

Demonstrate Encoder and Decoder

2 Hours

EXPERIMENT 9

Construct synchronous and Ripple counter

4 Hours

EXPERIMENT 10

Implement shift register (SISO, SIPO, PISO, PIPO)

Total: 45+30= 75 Hours

Reference(s)

1. M.Morris Mano and Michael D Ciletti, Digital Design with an introduction to the VHDL, Pearson Education, 5th Edition, 2013
2. A Anand Kumar, Fundamentals of Digital Circuits, 3rd Edition,2014
3. Charles H.Roth, Jr., Fundamentals of Logic Design, 4th Edition, Jaico Publishing House, 2000
4. Mandal, Digital Electronics Principles & Application, McGraw Hill Edu, 2013.
5. Donald D.Givone, Digital Principles and Design, Tata McGraw-Hill, 2003
6. John M.Yarbrough, Digital Logic, Application & Design, Thomson, 2002.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2		4			2	4				6						2								20
2		2								4			2						6				6		20
3	2			2			5								6					6			4		25
4			4				4						2				6							4	20
5		2				4					6								3						15
																							Total		100

Assessment Questions

Remember

1. List the number systems.
2. Define Encoder.
3. State the basic gates in digital system.
4. Label the truth table of a half subtractor
5. Define comparator.
6. State propagation delay.
7. Define Counter.
8. List the applications of a shift register.
9. State primitive flow table.
10. Define races and cycles.

Understand

1. Represent Boolean Functions F=A’C+AB’C in sum of minterms.
2. Identify the Drawbacks of K-Map method.
3. Indicate static Hazards.
4. Represent full adder from two half adder and OR gate.
5. Illustrate wave forms showing static 1 hazard.
6. Indicate data distributor.
7. Formulate -45 in 8-bit 2’s complement form.
8. Identify that AB’C+B+BD’+ABD’+A’C=B+C
9. Represent Binary up counter.
10. Indicate why subtractor ICs are not available.

Apply

1. Convert decimal 8723 to BCD codes.
2. Find the complement of F=wx+yz.
3. Construct basic gates from NOR.
4. Predict odd or even parity for 1101.
5. Compute Boolean expression to two literals for A'C'+ABC+AC'+ AB'.
6. Convert JK flip-flop to SR flip-flop.
7. Show that X+X'Y=X+Y.
8. Compute Octal-to-Binary Encoder.
9. Construct SR flip-flop from JK flip-flop.
10. Convert binary code 1101 to gray code.

Analyse

1. Compare R's and R-1's complement.
2. Differentiate combinational and sequential circuits.
3. Is it possible to group 7 variables in K-Map? Justify.
4. Resolve a four-bit binary synchronous counter with D flip-flops.
5. Compare PAL and PLA.
6. Differentiate synchronous and asynchronous sequential circuits.
7. Conclude the assumptions that must be made for fundamental mode circuit
8. Justify the need of state assignment in asynchronous circuits.
9. Disorganize the following expression F= (A+B'). (C+D').
10. Compare critical race with non-critical race.

Evaluate

1. Disorganize the following expression F= (A+B'). (C+D').
2. Simplify the Boolean expression AB + ABC + ABCD + ABCDE + ABCDEF.
3. Identify the type of parity bit for the code 110010.
4. Reduce the expression F=Πm(1,3,5,9,11,14).
5. Convert BCD number 0001 0010 0110 to binary number.
6. The binary numbers A = 1100 and B = 1001 are applied to the inputs of a comparator. What are the output levels?
7. Simplify the Boolean function F(x,y,z)=∑(2,3,4,5).
8. List the truth table for function F=XY+Y'Z.
9. Derive characteristic equation for T flip-flop.
10. Evaluate (10111101)2=?(10).

Create

1. Generalize a 16x1 multiplexer with two 8x1 and one 2x1 multiplexer.
2. Design combination circuits that generate 9's complement and 10's complement of a BCD digit.
3. Create a full subtractor with a decoder and NAND gates.
4. Derive a 4 bit self-regulating ring counter.
5. Implement a full adder with two 4x1 multiplexers.
6. Combine a sequence detector to detect the input sequence 101 by using JK Flip-flop.
7. Using D flip-flop ,design a synchronous counter which counts in the sequence 000, 001, 010, 011, 100, 1001,110,111,000
8. Implement full adder sum and carry in decoder.
9. Design a circuit of 5 input variables that generate output 1 if and only if the number of 1's in input is prime.
10. Derive a mod 16 up counter using T flip-flop.

15CS305 OPERATING SYSTEMS 3 2 0 4

Course Objectives

- Understand the basic concepts of operating system.
- Understand the concepts of process and memory management.
- Gain knowledge about the importance of virtual memory, file system structure and disk scheduling.

Course Outcomes (COs)

1. Explain the types of operating system and its services.
2. Acquire the knowledge of process management in operating system.
3. Identify the functions of memory management.
4. Exemplify the concepts of virtual memory and file system interface.
5. Explore the file system structure and mass storage structure.

UNIT I **7 Hours**

INTRODUCTION

Introduction- Single processor system- Multiprocessor systems- Clustered systems - Computing environments - Open source operating system - Operating System Services - System Calls - Types of system call- System Programs

UNIT II **11 Hours**

PROCESS MANAGEMENT

Process Concept - Process Scheduling - Operations on Processes - Cooperating Processes - CPU Scheduling: Basic Concepts - Scheduling Criteria - Scheduling Algorithms - Process Synchronization: The Critical-Section Problem - Synchronization Hardware - Semaphores - Classic problems of Synchronization

UNIT III **9 Hours**

DEADLOCK AND MEMORY MANAGEMENT

System Model - Deadlock Characterization - Methods for handling Deadlocks -Deadlock Prevention - Deadlock avoidance - Deadlock detection - Recovery from Deadlocks - Storage Management: Swapping - Contiguous Memory allocation - Paging - Segmentation

UNIT IV **9 Hours**

VIRTUAL MEMORY AND FILE SYSTEM INTERFACE

Virtual Memory: Demand Paging - Page Replacement - Allocation of frames-Thrashing-File System Interface: File Concept - Access Methods - Directory Structure - File System Mounting- File Sharing

UNIT V **9 Hours**

FILE SYSTEM STRUCTURE AND MASS STORAGE STRUCTURE

File System Structure - File System Implementation - Directory Implementation - Allocation Methods - Free-space Management- Secondary Storage Structure: Disk Structure - Disk Scheduling - Disk Management - Swap-Space Management

FOR FURTHER READING

Virtual Machines- Peterson's Solution to Critical Section- Memory Management in Linux System- File Protection- Stable Storage Implementation.

Total: 45+30= 75 Hours

Reference(s)

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, 9th Edition, John Wiley & Sons Pvt. Ltd, 2015
2. Andrew S. Tanenbaum, Modern Operating Systems, Fourth Edition, Prentice Hall of India Pvt. Ltd, 2014
3. William Stallings, Operating System, 7th Edition Prentice Hall of India, 2012
4. Harvey M. Deitel, Operating Systems, Pearson Education Pvt. Ltd, 2007

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	4	4			4	4																			16
2	2				2	4					6			2	4			4							24
3	2				2						6			2	2			6							20
4		2			2						6			2	2			6							20
5		2				2					4			6				6							20
																								Total	100

Assessment Questions

Remember

1. List the functionalities of an operating system.
2. List the advantages of multiprogramming.
3. Define thread.
4. State the general structure of a client-server system.
5. Recall the components of an operating system.
6. State the rule for deadlock occurrence.
7. Define turnaround time and response time.
8. How to retrieve the system from deadlock?
9. List the file attributes.
10. State the seek time in disk management.

Understand

1. Explain the services of an operating system.
2. Summarize the characteristics of time sharing operating system.
3. Illustrate the CPU scheduling algorithms with suitable examples.
4. Exemplify the classical problems of synchronization.
5. Identify the conditions for deadlock prevention.
6. Compare paging with segmentation.
7. Explain the page replacement algorithms with necessary examples.
8. Classify the directory structure in operating system based on file access.
9. Illustrate the disk scheduling algorithms with suitable examples.
10. Compare grouping with counting in free space management.

Apply

1. Show that how does the operating system services are used for making the programming task easier.
2. Show that how the process control blocks manages the CPU execution process.

3. Design a solution to synchronization problem for multiple processes.
4. Demonstrate the FCFS, SJF, Priority and Round Robin CPU Scheduling algorithms with necessary examples.
5. Demonstrate the Bankers algorithm for deadlock avoidance in operating system.
6. Construct the resource allocation graph with cycle but without deadlock.
7. Consider the following reference string
   1, 2, 3, 4, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7, 8, 9, 5, 4, 5, 4, 2
   Find the number of page faults using FIFO, LRU and Optimal page replacement algorithms with the frame size 3.
8. Predict the total number of page faults for the following reference string with the frame size 4.
   7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1
9. Suppose that a disk drive has 200 cylinders, numbered 0 to 199. The drive is currently serving a request at cylinder 53. The queue of pending request is given below 98, 183, 37, 122, 14, 124, 65, 67.Starting from the current head position, Compute the total distance(in cylinders) that the disk arm moves to satisfy all the pending requests for FCFS, SSTF, SCAN, and C-SCAN disk scheduling algorithms.
10. Demonstrate the free space management system in disk management.

Analyse

1. Differentiate preemptive and non-preemptive scheduling in operating system.
2. Is OS a resource manager? If so, justify your answer.
3. Justify the importance of CPU protection for protecting the process.
4. Compare FCFS CPU scheduling algorithm with SJF CPU scheduling algorithm in terms of starvation.
5. Compare and contrast first fit, best fit, and worst fit in terms of memory utilization.
6. Justify the need of segmentation with paging in memory management.
7. Differentiate logical address and physical address.
8. Compare and Contrast FIFO, LRU, and Optimal page replacement algorithms in terms of minimum page faults.
9. Justify the importance of virtual memory in process execution.

Evaluate

1. Determine the free space bit map for a disk where blocks 2,3,4,5,8,9,10,11,12,13,17,18,25,26,and 27 are free, and the rest of the blocks are allocated.

15CS306 OPEN SOURCE SYSTEMS 3 0 0 3

Course Objectives

- Understand the basics of open source software.
- Gain the knowledge of working with Linux platform and database.
- Familiar with different programming concepts in Linux.

Course Outcomes (COs)

1. Explore the Linux operating system and basic commands.
2. Install and configure the Linux software.
3. Implement networking in Linux.
4. Cognize the concepts of GDB and make files.
5. Develop programs using ruby, python and GTK.

UNIT I **8 Hours**

INTRODUCTION

Introduction to Linux Operating System - Basic UNIX Commands - File Filters: File Related Commands - Piping -Joining, awk and backup Commands - Processes in Linux: User Process and Terminal Handling.

UNIT II **10 Hours**

CONFIGURING LINUX SERVICES

Debian Linux Installation - Installing Apache: The Web Server - Samba Installation and Configuration: File Sharing -Compiling from Sources -Installing - NFS - Installing SMTP Mail Server - Installing Common Unix printing System.

UNIT III **10 Hours**

NETWORKS IN LINUX

Installing Squid Proxy and Firewalls - Users and Account Management: Configuration - Creating - Testing - Removing - Allocating - System Logging: Logging - Accounting - Graphical Tools.

UNIT IV **8 Hours**

COMPILING AND DEBUGGING

Compiling C and C++ Programs under Linux - GNU Debugger: Debugger using GDB - Make: Syntax of makefiles - Automake and Autoconf.

UNIT V **9 Hours**

PROGRAMMING IN LINUX

Introduction to Python - Ruby - OOPS through Ruby - Calling UNIX System Calls from Ruby - X Windows Architecture and GUI Programming: GTK Programming

FOR FURTHER READING

Qt Programming - Create Interface - Accessing - Connecting - Merging.

Total: 45 Hours

Reference(s)

1. N. B. Venkateshwarlu, Introduction to Linux: Installation and Programming, B S Publishers; 2014. (An NRCFOSS Publication)
2. Steve Suchring, MySQL Bible, John Wiley, 2015
3. Wesley J. Chun, Core Python Programming, Prentice Hall, 2010
4. Martin C. Brown, Perl: The Complete Reference, 2nd Edition, Tata McGrawHill Publishing Company Limited, Indian Reprint 2009.
5. Steven Holzner, PHP: The Complete Reference, 2nd Edition, Tata McGrawHill Publishing Company Limited, Indian Reprint 2009.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	4	4		2	4	4																		20
2	2		4		2					4	4			2					2			4			24
3		2			2	4				3				2	3			3							19
4		4	2							4				3				4				3			20
5	2	2					4				4			2					3						17
																								Total	100

Assessment Questions

Remember

1. What is Linux?
2. Define FOSS.
3. List any four basic UNIX commands.
4. What is a make file?
5. What are the basic commands in Linux?
6. How does an OS boots up?
7. How will you provide security of an operating system?
8. What are the controls used in Qt programming?
9. What is the use of awk?
10. What are graphical debuggers?

Understand

1. What is a log file?
2. How to install a Linux distribution?
3. What are the steps to create and manage users and groups in Linux?
4. Explain about awk scripting.
5. Discuss about bash shell and its programming.
6. Explain debugging in linux.
7. Explain the compiler collection tools in linux.
8. How will you set up proxy services in linux?

Apply

1. Set up file services using samba and NFS.
2. What are the steps to access a printer connected to a windows machine from a linux machine by Configuring Samba?
3. Install any Linux distribution.
4. Apply a Configure command in a web server using linux.

Analyse

1. Analyze the features of different linux distributions.
2. How will you configure internet connection in a Linux system?
3. How to configure printer services in Linux?
4. How will you configure sound and display cards in linux?
5. Configure a web server using linux.
6. How will you set up proxy services in linux?
7. How will you connect a printer to a linux system and configure it?
8. How to set up a firewall for a network using linux?
9. How will you implement source code versioning using tortoise SVN?
10. Compare static and dynamic linking.

Evaluate

1. Evaluate the performance of linux OS with that of Windows OS.

Create

1. Create a shell program to find if a number is even or odd.
2. Write a C program and compile it in a linux environment.
3. Create an application using Qt programming.
4. Create a window based application using GTK+ programming.
5. Create applications using python.

15CS307 DATA STRUCTURES LABORATORY

0 0 2 1

Course Objectives

- Understand the principles of linear and nonlinear data structures.
- Build an applications using sorting and searching.

Course Outcomes (COs)

1. Implement programs using recursion.
2. Implement programs using linear data structures and its applications.
3. Implement programs using nonlinear data structures and its applications.

2 Hours

EXPERIMENT 1

Program to Solve Tower-of-Hanoi Problem using Recursion

4 Hours

EXPERIMENT 2

a) Write a C program to implement a Stack ADT using array and write the routine for push operation which represent a function PUSH(X, S), Check for the condition whether S-full or not, if yes display the message otherwise insert the elements into the Stack. Perform POP operation which represents a function POP(S), Check for the condition whether S-Empty, if stack is empty, display the message otherwise delete an element from the Stack. Test your program with at least 5 elements and provide the output.

b) Write a C program to implement the Queue ADT using array and write the routine to enqueue an element X into queue, Check for the conditions Q-full, if yes display the message otherwise insert the data into the queue and dequeue an element from queue, check for the conditions Q-empty, if yes display the message otherwise deleting the element from the queue and display the elements from the Queue ADT. Test your program with at least 6 elements and provide the output

4 Hours

EXPERIMENT 3

Linked List Implementation of stack and queue.

2 Hours

EXPERIMENT 4

Write a function program to perform the following operations on a singly linked list
i. Create a list
ii. Insert an element to the list
iii. Delete the maximum element from the list
iv. Arrange the list as sorted order
v. Display the elements of the list
Write a main method to demonstrate the above functionalities.

2 Hours

EXPERIMENT 5

Write a function program to perform the following operations on a doubly linked list
i. Create a list
ii. Insert an element to the list
iii. Delete the maximum element from the list
iv. Arrange the list as sorted order
v. Display the elements of the list
Write a main method to demonstrate the above functionalities.

4Hours

EXPERIMENT 6

Program to sort the elements in ascending order using selection sort and bubble sort

2 Hours

EXPERIMENT 7

Implementation of quick sort.

2 Hours

EXPERIMENT 8

Develop a program to perform linear and binary search

4 Hours

EXPERIMENT 9

Program to construct an expression tree for a given expression and perform various tree traversal methods.

4 Hours

EXPERIMENT 10

Implement Prims algorithm with the following functionalities
i. Read a set of vertices minimum of six from the keyboard
ii. Get the number of edges and form the graph
iii. Find the value of each edge by using distance formula for two points.
iv. Develop a Minimum Spanning Tree for the graph
v. Find the total length of all edges.
Write a main method to execute the above functionalities

Total: 30 Hours

15CS308 JAVA PROGRAMMING LABORATORY 0 0 2 1

Course Objectives

- Impart knowledge about the fundamental concepts of core JAVA.
- Gain programming skills in JAVA.
- Gain the built in knowledge of standalone and web applications.

Course Outcomes (COs)

1. Develop programs using OOPS concepts.
2. Implement programs using input and Output in Java.
3. Develop programs using strings.
4. Execute programs using Applet, AWT and Event handlers in Java.

2 Hours

EXPERIMENT 1
Program on Classes and Method

2 Hours

EXPERIMENT 2
Implementation of Inheritance

2 Hours

EXPERIMENT 3
Implementation of Interfaces and Packages

2 Hours

EXPERIMENT 4
Implementation of Multithreaded Programming

2 Hours

EXPERIMENT 5
Develop a program to implement String Handling Methods

2 Hours

EXPERIMENT 6
Implementation of Exception handling mechanisms

2 Hours

EXPERIMENT 7
Implementation of Collections Interfaces and Classes

4 Hours

EXPERIMENT 8
Implementation of I/O Streams

2 Hours

EXPERIMENT 9
Implementation of Applet Programs

4 Hours

EXPERIMENT 10
Implementation of AWT Controls

2 Hours

EXPERIMENT 11
Write a program to implement Event Classes

2 Hours

EXPERIMENT 12
Implementation of JDBC concepts

2 Hours

EXPERIMENT 13
Mini projects in java

Total: 30 Hours

15CS309 MINI PROJECT I 0 0 2 1

Course Objectives

- To develop knowledge to formulate a real world problem and project's goals.
- To identify the various tasks of the project to determine standard procedures.
- To identify and learn new tools, algorithms and techniques.
- To understand the various procedures for validation of the product and analysis the cost effectiveness.
- To understand the guideline to Prepare report for oral demonstrations.

Course Outcomes (COs)

1. Formulate a real world problem, identify the requirement and develop the design solutions.
2. Express the technical ideas, strategies and methodologies.
3. Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project.
4. Test and validate through conformance of the developed prototype and analysis the cost effectiveness.
5. Prepare report and present the oral demonstrations.

15GE310 LIFE SKILLS: BUSINESS ENGLISH 0 0 2 -

Course Objectives

- To acquire command in both the receptive skills (Listening, Reading) and the productive skills (Writing and Speaking) of English language.
- To understand and make effective use of English language in business contexts.

Course Outcomes (COs)

1. Listen, Read, Speak, and Write Business English to the level of becoming independent users.
2. Appear for the Business English Certificate (BEC) Vantage level examination conducted by the Cambridge English Language Assessment.

15 Hours

LISTENING AND READING (RECEPTIVE SKILLS)

Listening for writing short answers - filling gaps in sentences - identifying topic, context and function - identify different functions of language in business situations - identify prompts -identify paraphrases of required information - Scanning - reading for gist - understanding sentence structure - error identification - identify paraphrases - cohesive words and phrases - understand the importance of analyzing the distractors - identify grammatical and semantic relationships

15 Hours

WRITING AND SPEAKING (PRODUCTIVE SKILLS)

Business Emails - notes - memos to colleagues or friends - Giving instructions - explaining a development - asking for comments - requesting information - agreeing to requests - explaining - apologising - reassuring - complaining - describing - summarising - recommending - persuading Turn-taking - sustaining interaction - initiating - responding - giving personal information - Talking about present circumstances, past experiences and future plans - expressing opinion - speculating - organising a larger unit of discourse - giving information - expressing and justifying opinions - speculating - comparing and contrasting - agreeing and disagreeing

Total: 30 Hours

Reference(s)

1. Whitehead, Russell and Michael Black. Pass Cambridge BEC Vantage Self-Study Practice Tests with Key, Heinle, a part of Cengage Learning, Delhi, 2003.

15MA403 PROBABILITY AND QUEUING THEORY 2 2 0 3

Course Objectives

- Understand the basic concepts of probability and the distributions with characteristics and also two dimensional random variables.
- Summarize and apply the methodologies of the random processes and Queuing Theory.
- Develop enough confidence to identify and model mathematical patterns in real world and offer appropriate solutions, using the skills learned in their interactive and supporting environment.

Course Outcomes (COs)

1. Demonstrate and apply the basic probability axioms and concepts in their core areas.
2. Apply the concepts of probability distributions in an appropriate place of science and Engineering.
3. Calculate the relationship of two dimensional random variables using Correlation techniques and to study the properties of two dimensional random variables.
4. Apply the concepts of random processes and stationary random processes in their core areas.
5. Identify and apply the queuing methodologies to optimize the result of the waiting line.

UNIT I **6 Hours**

PROBABILITY AND RANDOM VARIABLE

Probability - Axioms of probability - Conditional probability - Total probability - Baye's theorem- Random variable - Probability mass function - Probability density function - Properties - Moment generating functions

UNIT II **7 Hours**

STANDARD DISTRIBUTIONS

Moment generating functions of probability distributions- Concept and applications of standard probability distributions: Binomial- Poisson- Uniform -Exponential and Normal distributions.

UNIT III **5 Hours**

TWO DIMENSIONAL RANDOM VARIABLES

Joint Distribution - Discrete and continuous distributions - Marginal and Conditional Distributions - Covariance – Correlation.

UNIT IV **6 Hours**

CLASSIFICATION OF RANDOM PROCESSES

Classification- Stationary process- Markov process- Markov chains- Transition probabilities- Limiting distributions- Poisson process- Birth and death Processes.

UNIT V **6 Hours**

QUEUING THEORY

Characteristics of Queuing models - Kendall's Notation - single and multi server Markovian queuing models M/M/1, M/M/C (finite and infinite capacity) - Pollaczek-Khinchine formula

FOR FURTHER READING

M/G/1 Queuing Decision models

Total: 30 + 30 = 60 Hours

Reference(s)

1. R.A Johnson, Miller & Freund’s Probability and Statistics for Engineers, Seventh Edition, Pearson Education, Delhi, 2009.
2. Trivedi. K.S, Probability and Statistics with Reliability, Queuing and Computer Applications, John Wiley and sons, Second edition, 2012.
3. Allen. A. O, Probability, Statistics and Queuing Theory: with computer Science Applications, Academic press, 2014.
4. Gupta. S.C and Kapur.J.N, Fundamentals of Mathematical Statistics, Sultan Chand, New Delhi, 2002.
5. Taha.H.A, Operations Research: An Introduction, Eighth Edition, Prentice Hall of India Ltd, New Delhi, 2008.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	1	2			1	6				2	6														18
2	2	1			1	2					6			2					6						20
3	1	1			1	2			1		6				6										18
4		2			2		6		2		6				6										24
5	1			1			4			6			2						6						20
																				Total					100

Assessment Questions
Remember

1. State Baye's theorem
2. Define Random Variable.
3. Define the probability density function for Exponential Distribution.
4. State any two properties of joint distribution function.
5. Define stochastic process and give an example of a random process.
6. Define Poisson process.
7. Define Markov Chain and one-step transition probability.
8. State any two characteristics of queuing models.
9. Recall Kendall's Notation.
10. State Pollaczek-Khinchine formula.

Understand

1. If A and B are events in S such that P(A $\cap$ B)=1/4, P($\overline{A}$)=2/3 and $P(AUB)=\frac{3}{4}$ identify P ($\overline{A}$/B).
2. If X is a uniform random variable in [-2, 2], justify the probability density function of X and variance of X.
3. Identify the moment generating function of the binomial distribution and hence find its mean and variance.
4. The joint probability density function of the random variables (X,Y) is given by f(x,y) =K xy $e^{-(x^2+y^2)}$,x>0, y>0. Identify the value of K and prove that X and Y are independent
5. The joint probability density function (X , Y) is given by P(x,y) = k(2x + 3y), x = 0,1,2; Y = 0,1,2 explain marginal distribution.
6. The two random variables X and Y are defined as Y=4X+9, find the correlation coefficient between X and Y.
7. Identify when a random process said to be Wide-Sense Stationary.
8. Justify when the processes {x(t)} and {y(t)} said to be jointly stationary in the wide-sense.
9. Identify the formula for the waiting time for a customer in the queue and in the system for the (M/M/1) ; (∞/FIFO)
10. Write down formulae for the average number of customers in the single and multi-server queue

Apply

1. If at least one child in a family of three children is a boy, find the probability that all three are boys?
2. In a class of 100 students 75 are boys and 25 are girls. The chance that a boy gets a first class is 0.25 and the probability that a girl gets first class is 0.21.Find the probability that a student selected at random gets a first class.
3. The overall percentage of failure in a certain examination is 40. Compute the probability that out of a group of 6 candidates at least 4 passed the examination.
4. In a newly constructed township, 2000 electric lamps are installed with an average life of 1000 burning hours and standard deviation of 200 hours. Assuming the life of the lamps follows normal distribution, find the number of lamps expected to fail during the first 700 hours.
5. After widening the national highways from two to four lanes there is a significant increase in the number of accidents during night times. In majority of these cases it may be hypothesized that the accidents are occurring due to the on-road parking or due to vehicle breakdown. Let random variables X and Y denote the number of vehicles parked on-road as well as the breakdown vehicles (left on the road itself), and the number of accidents occurring over a 10 km road

stretch, respectively. If the joint probability mass function of X and Y is as given in the following table, find the following.

		Y				P(X)
		1	2	3	4	
X	0	0.05	0.01	0	0	0.06
	1	0.11	0.04	0.03	0.01	0.19
	2	0.14	0.06	0.04	0.05	0.29
	3	0.23	0.1	0.07	0.06	0.46
P(Y)		0.53	0.21	0.14	0.12	1

a. Probability of exactly one on-road parking/breakdown and one accident per 10 km.
b. What is the probability of more than two accidents occurring over 10 km stretch?
c. Determine the marginal probability mass functions of X and Y.
d. Check whether X and Y are independent variables.

6. Let X, Y and Z are uncorrelated random variables with zero means and standard deviations 5, 12 and 9 respectively. If U=X+Y and V=Y+Z, find the correlation coefficient between U and V
7. If a radioactive source emits particles at a rate of 5 per minute in accordance with Poisson process. Each particle emitted has a probability 0.6 of being recorded. Find the probability that 10 particles are recorded in 4-min period. P[N(4)=10]=0.104
8. If customers arrive at a counter in accordance with a Poisson process with a mean rate of 2 per minute, find the probability that the interval between 2 consecutive arrivals is between 1 and 2 minutes(1<T<2)=0.233.
9. At what average rate must a clerk in a super market work in order to ensure a probability of 0.90that the customer will not wait longer than 12 minutes? It is assumed that there is only one counter at which customers arrive in a Poisson fashion at an average rate of 15 per hour and that the length of the service by the clerk has an exponential distribution.
10. A two person counseling hall has 5 chairs to accommodate waiting customers, potential customers, who arrive when all 5 chairs are full, leave without entering the hall. Customers arrive at the average rate of 4 per hour and spend an average of 12 mints in the hall's chair. Find p_0, p_n, $E(N_q)$, $E(w)$

Analyze / Evaluate

1. A given lot of IC-chips contain 2% defective chips. Each is tested before delivery. The tester itself is not totally reliable. Probability of tester says the chip is good when it is really good is 0.95 and the probability of tester says chip is effective when it is actually defective is 0.94. If a tested device is indicated to be defective. Identify the probability that it is actually defective.
2. A passenger arrives at a bus stop at 10.00A.M, knowing that the bus will arrive at some time uniformly distributed between 10.00A.M and 10.30A.M. Resolve the probability that he will have to wait longer than 10 minutes? If at 10.15A.M the bus has not yet arrived, determine the probability that he will have to wait at least 10 additional minutes?
3. In a certain factory turning razor blades, there is a small chance of 1/500 for any blade to be defective. The blades are in packets of 10. Identify Poisson distribution to compute the approximate number of packets containing i) 1 defective ii) 2 defective blades respectively in a consignment of 1000 packets.
4. If X and Y are two random variables having the joint density function

$$f(x,y)=\begin{cases}\frac{1}{8}(6-x-y);0<x<2,2<y<4\\ 0:otherwise\end{cases}.$$

Determine *i)* $P(X<1\cap Y<3)$, *ii)* $P(X+Y<3)$ *and iii)* $P(X<1/Y<3)$.

5. Given is the joint distribution of X and Y :

	0	1	2
0	0.02	0.08	0.10
1	0.05	0.20	0.25
2	0.03	0.12	0.15

Identify i) Marginal distribution ii) The conditional distribution of X given Y=0.

6. If the joint probability density function of X and Y is given by f (x,y) = x + y, $0 \le x, y \le 1$, find the correlation coefficient between X and Y.
7. Consider the random process x(t)=Cos(wt+$^{-}$) where $^{-}$ is a random variable with probability density. $P(^{-}) = \begin{cases} \frac{1}{2®}, -® \le {}^{-} \le ® \\ 0, \textit{elsewhere} \end{cases}$. Identify the first and second moment of X(t), is independent of time.
8. In a single server queuing system with Poisson input and exponential service times, if the mean arrival rate is 3 calling units per hour, the expected service time is 0.25 h and the maximum possible number of calling units in the system is 2, find p_n , average number of calling units in the system and in the queue and average waiting time in the system and in the queue.
9. A one man net centre takes exactly 25 minutes to complete one browsing. If customers arrive at the centre in a Poisson fashion at an average rate of one every 40 minutes, how long on the average a customer spends in the centre? Find average waiting time a customer must wait for service?
10. The process {x(t)} whose probability distribution under certain condition is given by

P[x(t)=n] = $\frac{(at)^{n-1}}{(1+at)^{n+1}}$, n=1,2,……

= $\frac{at}{1+at}$, $n = 0$. Check whether it is stationary or not?

15CS402 MICROPROCESSORS AND MICROCONTROLLER

3 0 0 3

Course Objectives

- Understand the architecture and software aspects of 8085, 8086 microprocessors and 8051 microcontroller.
- Implement assembly language programs for various applications using the instructions of 8085, 8086 microprocessors and 8051 microcontroller.
- Impart knowledge on the methods of interfacing 8085 and 8086 microprocessors with various peripheral devices.

Course Outcomes (COs)

1. Explain the architecture, instruction set and interrupts of 8085 microprocessor.
2. Explicate the architecture, memory organization and instruction set of 8086 microprocessor.
3. Develop assembly language programs for various applications using 8086 microprocessor.
4. Analyze the modes of operations of I/O interface devices.
5. Cognize the architecture, register set and instruction set of 8051 microcontroller.

UNIT I **8 Hours**

THE 8085 MICROPROCESSOR

Microprocessor Architecture and its Operations - The 8085 MPU - 8085 Instruction Set - Programming Techniques with Additional Instructions of 8085 microprocessor - The 8085 Interrupt Process - 8085 Vectored Interrupts.

UNIT II **11 Hours**

THE 8086 MICROPROCESSOR

Register Organization of 8086 - Architecture - Signal Descriptions of 8086 - Physical memory organization - General bus Operation - I/O Addressing Capability - Special Processor Activities - Minimum Mode 8086 Architecture - Read/Write Cycle Timing Diagram for Minimum mode - Maximum Mode 8086 Architecture - Read/Write Cycle Timing Diagram for Maximum Mode - Addressing Modes of 8086 - Instruction set of 8086.

UNIT III **7 Hours**

8086 SYSTEM DESIGN

The Art of Assembly Language Programming with 8086: A few Machine Level Programs - Programming with an Assembler - Special Architecture Features and Related Programming: Introduction to stack - Stack Structure of 8086 - Interrupt and Interrupt Service Routines - Non-Maskable Interrupt - Maskable interrupt - Interrupt programming - Macros.

UNIT IV **10 Hours**

PERIPHERAL DEVICES AND I/O INTERFACING

Programmable Interrupt Controller 8259A: Architecture and Signal Descriptions of 8259A - Command Words of 8259A - Operating modes of 8259A - The Keyboard/Display Controller 8279: Architecture and Signal Descriptions of 8279 - Modes of Operation of 8279 - DMA Controller 8257: Internal Architecture and Signal Descriptions of 8257 - DMA Transfers and Operations.

UNIT V **9 Hours**

8051 MICROCONTROLLER

Architecture of 8051 - Signal Descriptions of 8051 - Register Set of 8051 - Memory Addressing - External I/O Interfacing - Addressing modes of 8051 - Instruction Set of 8051.

FOR FURTHER READING

Introduction to PIC Microcontrollers - Architecture of PIC Microcontrollers - Instruction Set of PIC Microcontroller - I/O Port Configuration - PIC Programming.

Total: 45 Hours

Reference(s)

1. Ramesh S.Gaonkar, Microprocessor Architecture, Programming and Applications with the 8085, Penram International publishing private limited, 2013.
2. A.K.Ray and K.M.Bhurchandi, Advanced Microprocessors and peripherals- Architectures, Programming and Interfacing, Tata McGraw Hill Education Private Limited, 2013.
3. Douglas V.Hall, Microprocessors and Interfacing: Programming and Hardware, TMH, 2010.
4. Yu-cheng Liu and Glenn A. Gibson, Microcomputer systems: The 8086 / 8088 Family architecture, Programming and Design, PHI, 2011.
5. Mohamed Ali Mazidi, Janice Gillispie Mazidi, The 8051 microcontroller and embedded systems, Pearson education, 2009.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1		2				4				6				2					2			2			18
2		2			2	10				4				4					2						24
3	2					4				6									2			2			16
4		2				6				4				6					2			2			22
5		2				6				4				4								4			20
																				Total					100

Assessment Questions

Remember

1. State the purpose of system bus.
2. List the 2 types of command words used in 8259A peripheral device.
3. List the 5 flags of 8085 microprocessor.
4. List the 2 modes of operation of 8279 keyboard/display controller.
5. List the 4 segment registers in 8086 microprocessor.
6. State the significance of LOCK signal in 8086 microprocessor.
7. Recall the size of program memory and data memory of 8051 microcontroller.
8. State the functions of 4 ports in 8051 microcontroller.
9. Define macros.
10. Define interrupt service routine.

Understand

1. Identify the role of clock signals generated in 8085 microprocessor.
2. Classify the instruction set of 8085 microprocessor.
3. Illustrate the physical memory organization of 8086 microprocessor.
4. Explain the stack structure of 8086 with a neat representation.
5. Illustrate the functional block diagram of DMA Controller.
6. Summarize the modes of operation of 8259A.
7. Exemplify the addressing modes of 8051 microcontroller.
8. Represent the read and write cycle timing diagrams of minimum mode and maximum mode 8086 microprocessor.
9. Represent the interrupt vector table of 8086 microprocessor.
10. Explain the mode set register of 8279.

Apply

1. Assume register B holds 93H and A holds 15H. Find the results of instructions ORA B, XRA B, and CMA.
2. Show the contents of the accumulator and the status of the CY flag when the following instructions are executed:
   MVI A, B7H
   ORA A
   RLC
3. Construct a flowchart for initialization sequence of 8259A.
4. Construct the interrupt vector table of 8086 microprocessor.
5. Compute the physical address for the logical address 1005H: 5555H.
6. Find the stack top address of a memory location where SP = 2050H and SS = 5000H using 8086 microprocessor.
7. Execute an assembly language program to display the word 'CSE' using 8079.
8. Implement an assembly language program to initialize the 8259A in fixed priority, level triggered, normal EOI and special mask mode.
9. Compute the interrupt vector addresses of the following interrupts in the 8086 interrupt vector table: (i) INTO (ii) NMI (iii) INT20H (iv) INT 55H.
10. Execute a macro 'SQUARE' that calculates square of a number.

Analyse

1. Differentiate microprocessor and microcontroller.
2. Compare 8085 microprocessor and 8086 microprocessor.
3. Contrast the functions of hardware interrupts and software interrupts of 8085 microprocessor.
4. Differentiate shift and rotate instructions of 8086 microprocessor.
5. Differentiate keyboard mode and display mode of 8279 in terms of their operations.
6. Microcontrollers can be sometimes called as embedded microcontrollers-Justify.
7. Differentiate left entry display mode and right entry display mode.
8. Compare initialization command words and operational command words of 8259A
9. Differentiate minimum mode and maximum mode 8086 system.
10. Compare the features of macros and subroutines.

Evaluate

1. Determine the control words to initialize the 8259A which is connected to 8086 in single level triggered mode. Then set the 8259A to operate with IR6 masked with special EOI mode.

Create

1. Produce an algorithm to change a sequence of sixteen 2-byte numbers from ascending to descending order.
2. Generate an ALP to interface 8051 microcontroller with LEDs.

15CS403 DATABASE MANAGEMENT SYSTEMS 3 2 0 4

Course Objectives

- Understand the data models, conceptualize and depict a database system using E-R diagram.
- Gain knowledge on the design principles of a relational database system and SQL.
- Impart knowledge in transaction processing, concurrency control and recovery techniques.

Course Outcomes (COs)

1. Differentiate database systems from file systems by enumerating the features provided by database systems.
2. Formulate solutions to a broad range of query and data update problems using relational algebra, relational calculus and SQL.
3. Recognize normalization theory and apply knowledge to the normalization of a database.
4. Explicate the database storage structures and access techniques for file and page organizations, indexing methods including B + tree, and hashing.
5. Explore the basic issues of transaction processing and concurrency control.

UNIT I **8 Hours**

INTRODUCTION

Introduction: Database system application, purpose of database system View of Data -Database Languages-Data Storage and Querying-Database Architecture - Database design and ER model: Overview of the design process-The ER Model - Constraints - Removing redundant attributes in Entity Sets-ER Diagram - Reduction to Relational Schemas - ER Design Issues.

UNIT II **9 Hours**

RELATIONAL MODEL AND DATABASE DESIGN

Introduction to Relational Model - Formal Relational Query Languages - Introduction to SQL: Data definition-Basic structure of SQL Queries-Additional Basic operations -Set operations-Aggregate functions Nested sub queries-Intermediate SQL: Joins-Views-Integrity Constraints.

UNIT III **8 Hours**

NORMAL FORMS

Functional Dependencies - Normal Forms Based on primary Keys-General Definition of Second and Third Normal Form - Boyce Codd Normal Form - Algorithms for relational database schema design - Multi valued dependencies and Fourth Normal Form.

UNIT IV **9 Hours**

DATA STORAGE AND QUERY PROCESSING

Overview of Physical Storage Media - Magnetic disk Flash storage -RAID-File and Record Organization -Indexing and Hashing :Ordered Indices - B+Tree Index File-Static Hashing -Dynamic Hashing-Query Processing: Overview-measures of Query Cost.

UNIT V **11 Hours**

TRANSACTION MANAGEMENT

Transactions: Transaction concept-Transaction Atomicity and Durability-Transaction Isolation-Serializability-Transaction Isolation and Atomicity-Transaction Isolation levels-Implementation of Isolation Levels-Concurrency Control: Lock based protocols -Deadlock handling-Multiple Granularity-Time stamp based protocols-Recovery system: Failure classification -Storage-Recovery and atomicity - Recovery Algorithms.

FOR FURTHER READING

Introduction to Parallel, Distributed and Object Oriented Databases- Introduction to MySQL and PHP.

Total: 45+30=75 Hours

Reference(s)

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, Database System Concepts , McGraw - Hill, 2015
2. Ramez Elmasri and Shamkant B. Navathe, Fundamental Database Systems,Pearson Education, 2008
3. Raghu Ramakrishnan, Database Management System, Tata McGraw-Hill Publishing Company, 2003
4. C.J.Date,An Introduction to Database system, Pearson Education, 2006
5. Peter Rob and Corlos Coronel, Database System, Design, Implementation and Management , Thompson Learning Course Technology, 2003

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	4				4	6				6															20
2	2					4				6								6				3			21
3		6				6				6								2				2			22
4		6				6				6															18
5		6				9				4															19
																								Total	100

Assessment Questions

Remember

1. Define a Database Management System.
2. List the three levels of data abstraction.
3. List the five types of database users with their roles.
4. Define strong entity and weak entity.
5. Recall the syntax for creating a table in SQL.
6. Define a primary key.
7. Define the term Normalization.
8. Define the ACID properties of DBMS.
9. List the Six states of a transaction.
10. List the three types of storage devices.

Understand

1. Summarize the responsibilities of Database Administrator.
2. Differentiate file system and Database Management System.
3. Explain the ACID properties of Database Management system with an example.
4. Explain the two types of indexing schemes that are used to store the records in a database with an example.
5. List the five types of relational algebra operations and explain the functionalities of it with an example.
6. Create a view for a relational table. Explain the functionalities of the view with an example.
7. Explain shadow paging recovery scheme with a neat diagram and example.
8. Explain full functional dependency and trivial functional dependency with examples.
9. Explain the basic operators used in relational algebra with its functionalities.
10. Discuss the five type of join operations with the functionalities of it.

Apply

1. Execute a query to display the last day of that month in 05-Oct-15.
2. Execute a query to display the month between 1-jun-10 and 1-aug-10 in full.
3. Execute a query to divide the data in groups by using the GROUP BY clause
4. Execute a query to exclude groups of date by using the HAVING clause
5. Execute a query to check the integrity constraint.
6. Create a procedure to find the factorial of a given number.
7. Create a procedure to print the Fibonacci sequence.
8. Execute a SELECT statements to access data from more than one table
9. Execute a query to perform self-join.
10. Write the query to drop index of a given table.

Evaluate

1. An organization purchases items from a number of suppliers. Suppliers are identified by SUP-ID. It keeps track of the number of each item type purchased from each supplier. It also keeps a record of supplier's addresses. Supplied items are identified by ITEM-TYPE and have description (DESC). There may be more than one such addresses for each supplier and the price charged by each supplier for each item type is stored. Identify the entities and relationships for this organization and construct an E-R diagram. From the E-R diagram, write the scripts for creating a schema.

Create

1. Construct an ER Model for Student Administration System. Students who apply for a course are registered in the system. Short listed candidates are called for interview and their marks recorded. Selected candidates are admitted.
2. Construct a B tree of order 3 by inserting the keys given. Show all the intermediate steps.
   a g f b k d h m j e s i r

15CS404 C# AND .NET PROGRAMMING 3 0 2 4

Course Objectives

- Impart knowledge in the fundamental concepts of C# and .NET.
- Use .NET components in a windows forms application.
- Incorporate accessibility features to a Windows forms application.

Course Outcomes (COs)

1. Explain the basics of .NET Framework Architecture.
2. Demonstrate the concepts of Inheritance and Generics.
3. Implement the concept of arrays, operators and type casting.
4. Explore the collections, LINQ and reflection concepts.
5. Create windows applications for real world applications.

UNIT I **7 Hours**

.NET ARCHITECTURE AND CORE C#

The relationship of C# to .NET- The common language runtime- Assemblies- Namespaces - Creating .NET Applications using C#- Fundamental of C# program- Variables- Predefined Data Types- Flow control- Enumeration- Namespaces

UNIT II **9 Hours**

OBJECTS, INHERITANCE AND GENERICS

Class- Structs- Weak Reference- Partial Classes- Static Classes- The object class- Extension Methods- Inheritance- Types of Inheritance- Implementation Inheritance- Modifiers- Interfaces-Generics overview- creating generic classes- Generics Features- Generic Interfaces- Generic Structs- Generic Methods

UNIT III **8 Hours**

ARRAYS, OPERATORS AND CASTS

Simple arrays- Multidimensional arrays- Jagged arrays-operators and cast- operators- Type Safety- Operator Overloading-User Defined casts- Referencing methods- Delegates- Lambda Expressions- Events

UNIT IV **11 Hours**

COLLECTIONS, LINQ AND REFLECTION

Collection Interface and Types - Lists- Queues- Stacks- Dictionaries- Sets- Observable Collections- BIT Arrays- Immutable Collections- Concurrent Collections-LINQ overview- Standard Query Operators- Parallel LINQ-Expression Trees-LINQ Providers. Reflection- Manipulating and Inspecting code at runtime- Custom Attributes- Using Reflection

UNIT V **10 Hours**

WINDOWS FORMS AND WEB- APPLICATION DEVELOPMENT

WindowForms- Customizing a Form- Creating and Running a Sample WinApp Windows Application - Overview of Design Patterns - Creating WinApp2 Windows Application - Web based Application on C#.NET

FOR FURTHER READING

Programming with the Entity Framework- Entity Framework Mapping- Entities- Data Context- Relationship- Querying Data- Writing Data to Database

2 Hours

EXPERIMENT 1

Implement class using the C# program.

4 Hours

EXPERIMENT 2

Implement the control statements using C#

2 Hours

EXPERIMENT 3

Implement the inheritance concept using C#

4 Hours

EXPERIMENT 4

Implement the array concept using C#

2 Hours

EXPERIMENT 5

Implement Delegates using C#

4 Hours

EXPERIMENT 6

Implement Lambda Expressions using C#

2 Hours

EXPERIMENT 7
Implement LINQ using C#

4 Hours

EXPERIMENT 8
Implement collection using C#

2 Hours

EXPERIMENT 9
Customize a Window Forms using C#.

4 Hours

EXPERIMENT 10
Create web based application using C#

Total: 45+30= 75 Hours

Reference(s)

1. Christian Nagel, Jay Glynn, Morgan Skinner, Professional C# 5.0 and .NET 4.5.1 , John Wiley & Sons, 2014
2. Ben Albahari and Joseph Albahari, C#, O'Reilly Publications, 2012
3. Herbert Schildt, C# 4.0: Complete Reference, Tata McGraw Hill, 2010
4. E.Balagurusamy, Programming in C#, Tata McGraw Hill, 2010
5. http://www.tutorialspoint.com/csharp/
6. http://www.csharp-station.com/Tutorial.aspx

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2		4		2		4								2										14
2	2				3						4				4				4						17
3	2				2		3				2			4					4				4		21
4			3		2					6						4			6				2		23
5			3		2			4			4				6			2						4	25
																								Total	100

Assessment Questions

Remember

1. Define numeric formatting.
2. List the types of variables in .Net.
3. List the various selection statements in C#.
4. Define Dictionary.
5. Define Delegate.
6. State boxing and unboxing with an example.
7. List the manipulating file path methods.
8. Define Object Context
9. List the features of WPF.
10. List the types of Button groups.
11. Represent jagged array.

Understand

1. Illustrate the concept of namespace and assembly.
2. Select the alternate approach to support multiple inheritance and its features.
3. Represent NetworkStream and BufferedStream with suitable example.
4. Illustrate the architecture of web application clients and a WCF services.
5. Represent the characteristics of inheritance in C#.
6. Illustrate the concept of Files and Streams with suitable example
7. Represent the different ways to initialize an Array.
8. Illustrate custom attributes with suitable example.
9. Represent the attribute parameter types in C#.

Apply

1. Construct a C #function that displays the student information. Accept Student's name, roll no, age, class, and display it on console.
2. Compute a program to read number and to display the fixed point format.
3. Demonstrate the dictionaries and collections in C# with an example.
4. Construct a program to use enum data type with related constants.
5. Predict the output of the C#.NET code snippet given below?
   ```
   byte b1 = 0xF7;
   byte b2 = 0xAB;
   byte temp;
   temp = (byte)(b1 & b2);
   Console.Write (temp + " ");
   temp = (byte)(b1^b2);
   Console. WriteLine (temp);
   ```
6. Construct a program for creating a ListView with columns using controls.
7. Compute a program to read number and to display the exponential form.
8. Construct a C# program that formats string data for output
9. Asses socket connection to the server with an example.
10. Compute a C# program to display the strings using linked list in collection class.

Analyse

1. Compare and contrast the various control statements in C# with examples.
2. Compare multilevel and hierarchical inheritance with suitable example.
3. Compare flushing and delete.
4. Compare common language runtime and JIT compiling.
5. Compare Array and Array list.
6. Differentiate stream and stream buffer.
7. Compare network path and relative path in manipulating file paths.
8. Compare NetworkStream and BufferedStream with suitable example.
9. Compare WPF and Silverlight.
10. Differentiate TextBox control and RichTextBox control.

Create

1. Generalize how the LINQ to entities are created in C# with suitable example.
2. Create console based application using two classes.
3. Create a class called Accounts which has data members like ACOUNT no, Customer name, Account type, Transaction type (d/w), amount, balance, D-Deposit, W-Withdrawal. If transaction type is deposit, call the credit (int amount) and update balance in this method. If transaction type is withdraw, call debit (int amt) and update balance. Pass the other information like Account no, name, Account Type through constructor. Call the show data method to display the values.

3 2 0 4

15CS405 DESIGN AND ANALYSIS OF ALGORITHMS

Course Objectives

- Understand various algorithm design techniques.
- Impart knowledge on runtime analysis of algorithms.
- Understand the limits of computation.

Course Outcomes (COs)

1. Explain the various problems types and fundamental data structures.
2. Design of mathematical analysis of non-recursive and recursive algorithms and compare runtime efficiencies of algorithms.
3. Design a sorting and searching algorithms and compare runtime efficiencies of algorithms.
4. Implement the graph algorithms.
5. Explain the backtracking, branch and bound techniques.

UNIT I **7 Hours**

INTRODUCTION

Introduction Fundamentals of Algorithmic Problem Solving Important Problem types: Sorting problem-searching problems - string processing - graph problems - combinatorial problems- Geometric Problems - Numerical problems Fundamental Data structures

UNIT II **9 Hours**

FUNDAMENTALS OF THE ANALYSIS OF ALGORITHM EFFICIENCY

Analysis Framework - Asymptotic notations - Basic Efficiency classes - Mathematical Analysis of Non-recursive Algorithm - Mathematical Analysis of Recursive Algorithm - Example: Fibonacci Numbers - Empirical Analysis of Algorithms

UNIT III **10 Hours**

ANALYSIS OF SORTING AND SEARCHING ALGORITHMS

Brute Force Strategy: Selection Sort and Bubble Sort, Sequential Search and Brute-force string matching - Divide and conquer: Merge sort, Quick Sort, Binary Search, Binary tree Traversal and Related Properties Decrease and Conquer: Insertion Sort, Depth first Search and Breadth First Search.

UNIT IV **10 Hours**

ANALYSIS OF GRAPH ALGORITHMS

Transform and conquer: Presorting, Balanced Search trees AVL Trees, Heaps and Heap sort Dynamic Programming: Warshalls and Floyd Algorithm, Optimal Binary Search trees Greedy Technique: Prims Algorithm, Kruskals Algorithm, Dijkstra Algorithm Huffman trees.

UNIT V **9 Hours**

ALGORITHM DESIGN TECHNIQUES TO NP COMPLETE AND NP HARD PROBLEMS

NP Complete problems backtracking: n-Queens Problem Hamiltonian Circuit problem Subset-Sum problem Branch and bound: Assignment problem, Knapsack problem Traveling salesman problem-Approximation algorithms for NP hard problems: Travelling salesman and knapsack problem.

FOR FURTHER READING

Sets and Dictionaries- Algorithm visualization- Exhaustive search- Knapsack problem and memory functions- Decision trees

Total: 45+30= 75 Hours

Reference(s)

1. Anany Levitin, Introduction to the Design and Analysis of Algorithms, 3rd Edition, Pearson Education Asia, 2011
2. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, Introduction to Algorithms, PHI Pvt. Ltd., 2009
3. Sara Baase and Allen Van Gelder, Computer Algorithms Introduction to Design and Analysis, Pearson Education Asia, 2010
4. A.V.Aho, J.E. Hopcroft and J.D.Ullman, The Design and Analysis of Computer Algorithms, Pearson Education Asia, 2003

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1		4	4			4	3																		15
2	2				2	5				2			6					2				2			21
3	2				2				2				6		3								6		21
4			2		2					2			6		3							6			21
5		4					3			9									6						22
																								Total	100

Assessment Questions

Remember

1. List six problem types.
2. Define greedy technique.
3. List three graph traversal methods.
4. List the steps involved in dynamic programming.
5. Define spanning tree.
6. Define divide and conquer strategy.
7. State Master‘s theorem.
8. Define feasible solution.
9. State smoothness rule.
10. Define exhaustive search.

Understand

1. Classify the three types of time complexity of algorithms.
2. Compare LIFO and FIFO search.
3. Explain the various steps involved in algorithmic problem solving.
4. Exemplify the necessary steps for analyzing efficiency of recursive algorithms with an example.
5. Illustrate the Sequential search algorithm with its worst-case behavior.
6. Enumerate the general plan of divide and conquer and explain how the quick sort algorithm works for its average case behavior.
7. Describe the construction sequence of AVL tree with a simple example.
8. Describe the algorithms for depth-first search of a graph G= (V, E).
9. Explain the need of presorting in Element Uniqueness problem.
10. Exemplify the need of presorting in calculating a mode.

Apply

1. Construct an AVL tree for the sequence 5,6,8,3,2,4,7.
2. Construct a heap for the list 1, 8, 6,5,3,7.
3. Sort the numbers 1, 8, 6,5,3,7 using Merge sort.
4. Construct an AVL tree for the sequence 3, 6, 5,1,2,4.
5. Construct a heap for the list 5,6,8,3,2,4,7
6. Construct a binary search tree for the sequence 10,7,12,13,14.20
7. Design and implement an algorithm for brute force string matching technique.
8. Design a recursive algorithm to compute the factorial function F(n) =n! for an arbitrary non negative integer n and also derive the recurrence relation.
9. Design and implement a recursive algorithm to solve the Tower of Hanoi Puzzle. Also find the time efficiency of this algorithm.
10. Design a non-recursive algorithm to determine the value of the largest element in a given array and matrix multiplication. Also find the time efficiency of those algorithms.

Analyse

1. Compare backtracking and branch-and-bound.
2. Analyze the time complexity of sorting algorithms based on divide and conquer technique.
3. Differentiate deterministic and non-deterministic problems.
4. Analyze how decrease-by-one technique is applied to insertion sort with an example.
5. Compare DFS and BFS.
6. Analyze how Brute force design technique is applied to selection sort with an example

Evaluate

1. Evaluate the algorithm design technique used in Merge sort with an example.
2. Evaluate the algorithm design technique used in Quick sort with an example
3. Determine an optimal solution to the knapsack instance n = 7, m= 15
   (p1, p2, p3, ….p7) = (10, 5, 15, 7, 6, 18, 3) and (w1, w2, w3, ...w7) (2, 3, 5, 7, 1, 4, 1)

Create

1. Derive a non-deterministic algorithm to find whether a given graph contains a Hamiltonian cycle.
2. Derive the recurrence relation for Fibonacci series; perform complexity analysis for the same.

15CS406 SOFTWARE ENGINEERING 3 0 0 3

Course Objectives

- Understand detailed concepts related to software engineering life cycle.
- Gain knowledge about the concepts of software designing and testing.
- Acquire knowledge about an overview of object oriented analysis and design, modeling language.

Course Outcomes (COs)

1. Differentiate the various software process models.
2. Elicit the requirements for real-time problems and compile a SRS pertaining to industry standards.
3. Create a design model from the set of requirements and test the software.
4. Explore the object oriented development life cycle.
5. Explicate the unified modeling language and apply in software engineering.

UNIT I **7 Hours**

SOFTWARE PROCESS MODELS

The Nature of Software-Software Process Models-Waterfall Model-Incremental Process Models-Evolutionary Process Models- Prototyping-Spiral Model-Concurrent Model-Introduction to Agile Process

UNIT II **11 Hours**

REQUIREMENT ENGINEERING

Requirements Engineering - Establishing the Groundwork - Eliciting Requirements - Building the Requirements Model - Requirements Analysis - Metrics in the Process and Project Domains - Software Measurements - Metrics for Software Quality - Software Project Estimation - Decomposition Techniques - Empirical Estimation Models - The Make/Buy Decision.

UNIT III **11 Hours**

DESIGN CONCEPTS AND TESTING

The Design Concepts - The Design Model - Architectural Design - User Interface Design: Interface Analysis - Interface Design Steps - Requirements Modeling - Software Testing Fundamentals - Black Box Testing - White Box Testing - Unit Testing - Integration Testing.

UNIT IV **7 Hours**

OBJECT ORIENTED LIFE CYCLE

Overview of Object Oriented Systems Development - Object Oriented System Development Methodology - Object Orientation - Unified Approach - Object Basics - Object Oriented Systems Development Life Cycle.

UNIT V **9 Hours**

OBJECT ORIENTED METHODOLOGY AND UML

Object Oriented Methodologies - Rumbaugh Methodology - Booch Methodology - Jacobson Methodology Unified Approach- Unified Modeling Language - Use Case - Class Diagram - Interactive Diagram - Package Diagram - Collaboration Diagram - State Diagram - Activity Diagram

FOR FURTHER READING

Risk - Risk Vocabulary - Risk Driven Project Management - Controlling the Process, Environment and Risk - Maturity in Risk Culture - Risk Scale - Preparing for Risk- Risk Management - Five Models of Risk Management.

Total: 45 Hours

Reference(s)

1. Roger S.Pressman, Software Engineering: A Practitioners Approach, McGraw Hill International edition, Seventh edition, 2010
2. Ali Bahrami, Object Oriented Systems Development, Tata McGraw-Hill, 2010
3. Ian Sommerville, Software Engineering, 8th Edition, Pearson Education, 2008.
4. Stephan Schach, Software Engineering, Tata McGraw Hill, 2007
5. Pfleeger and Lawrence Software Engineering: Theory and Practice, Pearson Education, 2nd edition, 2001

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	2			2	6								4											16
2		2			2	8				6				2				2				2			24
3	2				2	6				6				6								2			24
4	2	2			2	6								2				2							16
5		2			2	6				6												4			20
																								Total	100

Assessment Questions

Remember

1. List the three important characteristics of a software.
2. Represent the steps for preparing a use-case model using a flowchart.
3. List the four factors that are used to measure software quality.
4. Reproduce the formula to calculate Defect Removal Efficiency (DRE).
5. State the goal of agile processes.
6. State domain analysis.
7. List the four elements of analysis model.
8. List the four attributes of a ‘good test’.

Understand

1. State any four advantages of object-oriented approach.
2. List the major five system development activities.
3. Represent the steps involved in waterfall process model.
4. Classify the major three types of process models.
5. Identify four examples for incremental process model.
6. Classify the seven broad categories of software.
7. Illustrate the evolutionary process models with a neat sketch.
8. Explain the metrics used to measure the quality of software.
9. Indicate the role of agile process in software development.
10. Summarize the seven steps in requirements analysis.
11. Illustrate the object oriented system development life cycle.
12. Summarize the steps involved in Jacobson methodology.

Apply

1. Show how to test a software using white box testing.
2. Construct a state transition diagram to depict the following: A telephone can be idle or active. Initially it is idle. When it is lifted off the hook by a valid subscriber, the dial tone starts playing and the telephone becomes active. When it is active the dial tone plays or in the midst of connecting/talking.
3. Construct an interaction diagram for checking the deposit of the banking system.
4. Construct the use case diagram and class diagram for Library management system.
5. For the following code segment: execute the control flow graph, compute the cyclomatic complexity value and identify the independent paths.

```
Max(a,b,c)
{
int i,j=0;
sum=0;
if(a>b) then
print(?a is the largest?)
else
```

print(?c is the largest?)
if (b>c) then
print (? b is the largest?)
else
print(?c is the largest?)
}

6. Estimate the cost of airline reservation system using cost estimation techniques.
7. Draw the component diagram for banking application.
8. Draw the use case diagram for online railway ticket reservation system.
9. Draw the relationships between classes for the following statement.
   An airline company has employees. A team builds an airplane which has a number of components. An airplane lanks and takes off from an air strip in an airport. The airplane carrier passengers for a source to destination. An airplane is managed by a captain and co-pilot along with his cabin crew consisting of airhostess and attendants.
10. Draw the class diagram for student management system.

Analyse

1. Differentiate direct measures and indirect measures of software measurement.
2. Contrast the characteristics of block box testing and white-box testing.
3. Differentiate patterns and frameworks used in object oriented techniques.
4. Compare the object oriented techniques used in Booch methodology and Rambaugh methodology.
5. Compare the steps involved in waterfall model and incremental process model.
6. Differentiate the role of audit and testing in a software project.
7. Differentiate formal and informal reviews in terms of actors, steps and time notions.
8. Distinguish between alpha and beta testing.

Evaluate

1. Determine the effort required to build software for online gaming that produces 20 screens, 10 reports and will require approximately 60 software components using COCOMO II Model.
2. Choose the best one out of Rambaugh, Booch and Jacobson methodologies and defend your answer with any 2 reasons.

Create

1. Generate an algorithm to create a software for digital library management system.
2. Generate the test cases for testing your institution’s camps software using both black box and white box testing techniques.

15CS407 MICROPROCESSORS AND MICROCONTROLLER LABORATORY

0 0 2 1

Course Objectives

- Understand the working of 85x86 microprocessors and 8051 microcontroller.
- Develop ability in assembly language programming using 85x86 microprocessors and 8051 microcontroller.
- Work with I/O interfacing devices.

Course Outcomes (COs)

1. Identify the components of 85x86 microprocessors and 8051 microcontroller.
2. Compare the addressing modes and instruction sets of 85x86 microprocessors and 8051 microcontroller.
3. Develop assembling language programs using 85x86 microprocessors and 8051 microcontroller.
4. Implement interface between microprocessor and peripheral devices.
5. Design an interface between LED and 8051 microcontroller.

2 Hours

EXPERIMENT 1
8085 - Arithmetic Operations

4 Hours

EXPERIMENT 2
8085 - Code Conversions

2 Hours

EXPERIMENT 3
8085 - Matrix Multiplication

4 Hours

EXPERIMENT 4
8086 - Arithmetic operations

2 Hours

EXPERIMENT 5
8086 - String manipulation

4 Hours

EXPERIMENT 6
Interfacing 8085 with 8255

2 Hours

EXPERIMENT 7
Interfacing 8085 with 8279

4 Hours

EXPERIMENT 8
8051 - Arithmetic operations

2 Hours

EXPERIMENT 9
8051 - Fibonacci Series and Square of a Number

4 Hours

EXPERIMENT 10
Interfacing LED with 8051

Total: 30 Hours

Reference(s)

1. Ramesh S.Gaonkar, Microprocessor Architecture, Programming and Applications with the 8085, Penram International publishing private limited, 2013.
2. A.K.Ray and K.M.Bhurchandi, Advanced Microprocessors and peripherals- Architectures, Programming and Interfacing, Tata McGraw Hill Education Private Limited, 2013.
3. Douglas V.Hall, Microprocessors and Interfacing: Programming and Hardware, TMH, 2010.
4. Yu-cheng Liu and Glenn A. Gibson, Microcomputer systems: The 8086 / 8088 Family architecture, Programming and Design, PHI 2011.
5. Mohamed Ali Mazidi, Janice Gillispie Mazidi, The 8051 microcontroller and embedded systems, Pearson education, 2009.

15CS408 DATABASE MANAGEMENT SYSTEMS LABORATORY

0 0 2 1

Course Objectives

- Understand the DDL, DML, TCL and DCL commands in SQL.
- Understand the design principles of a relational database system and SQL.
- Implement programs using SQL and PL/SQL.

Course Outcomes (COs)

1. Write simple and complex queries in SQL to solve problems.
2. Implement programs using SQL and PL/SQL

2 Hours

EXPERIMENT 1
Working with SQL commands like DDL, DML, TCL, and DCL

4 Hours

EXPERIMENT 2
Performing Single- row functions and group functions in SQL.

2 Hours

EXPERIMENT 3
Execute simple queries using joins and Integrity constraints.

4 Hours

EXPERIMENT 4
Creation and manipulation of database objects.

2 Hours

EXPERIMENT 5
Simple programs using PL/SQL block.

4 Hours

EXPERIMENT 6
Implementation of cursor in PL/SQL block.

4 Hours

EXPERIMENT 7
Generate trigger in PL/SQL block.

4 Hours

EXPERIMENT 8
Write PL/SQL block Programs using exception handling.

4 Hours

EXPERIMENT 9
Design a PL/SQL blocks using subprograms namely functions and procedures.

Total: 30 Hours

Reference(s)

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, Database System Concepts , McGraw - Hill, 2015
2. C.J.Date,An Introduction to Database system, Pearson Education, 2006

15CS409 MINI PROJECT II 0 0 2 1

Course Objectives

- To develop knowledge to formulate a real world problem and project's goals.
- To identify the various tasks of the project to determine standard procedures.
- To identify and learn new tools, algorithms and techniques.
- To understand the various procedures for validation of the product and analysis the cost effectiveness.
- To understand the guideline to Prepare report for oral demonstrations.

Course Outcomes (COs)

1. Formulate a real world problem, identify the requirement and develop the design solutions.
2. Express the technical ideas, strategies and methodologies.
3. Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project.
4. Test and validate through conformance of the developed prototype and analysis the cost effectiveness.
5. Prepare report and present the oral demonstrations.

15GE410 LIFE SKILLS: VERBAL ABILITY 0 0 2 -

Course Objectives

- Read and understand the unseen passages with appropriate speed.
- Effectively deal with different kinds of structures.
- Develop strategies for vocabulary development.

Course Outcomes (COs)

1. Students will be able to improve their performance in the verbal ability sections of different competitive examinations.

15 Hours

UNIT 1

Synonyms - Antonym - Word groups - Verbal analogies - Etymology - Spellings - Critical Reasoning - Cloze Test - One Word Substitutes - Idioms and Phrases - Text Completion

15 Hours

UNIT 2

Sentence Formation - Sentence Correction - Sentence Improvement - Completing Statements - Sequencing of Sentences - Paragraph Formation - Instructions - Change of Voice - Change of Speech - Reading Comprehension - Sentence Equivalence

Total: 30 Hours

Reference(s)

1. Murphy, Raymond. English Grammar in Use - A Self - study Reference and Practice Book for Intermediate Learners of English.IVed. United Kingdom: Cambridge University Press. 2012.
2. Lewis, Norman.Word Power Made Easy. New York: Pocket Books.1991.
3. Baron's The Official Guide for New GMAT Review 2015. New Jersey: John Wiley &Sons, Inc.

15CS501 COMPUTER NETWORKS 3 0 0 3

Course Objectives

- Understand the state-of-the-art in network protocols, architectures and applications.
- Gain knowledge about the functions of different network layers.
- Familiarize in the various aspects of computer networks.

Course Outcomes (COs)

1. Explain the basic concept in modern data communication and computer networking.
2. Apply the functions of different layers and in depth knowledge of data link layer.
3. Analyze the different protocols and network layer components.
4. Identify the basic functions of transport layer and congestion in networks.
5. Explain the working of application layer.

UNIT I **10 Hours**

INTRODUCTION

Data Communications - Data Flow - Networks - The Internet - Protocols and Standards - Network Models: Layered Tasks - The OSI Model - TCP/IP Protocol Suite - Addressing - Transmission Media - Connecting LANs, Backbone Networks, and Virtual LANs: Connecting Devices.

UNIT II **10 Hours**

DATA LINK LAYER

Introduction - Block Coding - Cyclic codes - Checksum -Data Link Control: Framing - Flow and Error Control - Noiseless Channels - Noisy Channels - HDLC -Multiple Access: Random Access - Channelization -Wired LANs: IEEE Standards- Standard Ethernet.

UNIT III **9 Hours**

NETWORK LAYER

IPv4 Addresses- IPv6 Addresses - Internetworking - IPv4 - IPv6 - Transition from IPv4 to IPv6 -Network Layer: Delivery, Forwarding, and Routing: Address Mapping - Internet Control Message Protocol (ICMP) - Internet Group Management Protocol (IGMP) - Network Layer: Delivery, Forwarding, and Routing.

UNIT IV **9 Hours**

TRANSPORT LAYER

Process-to-Process Delivery - User Datagram Protocol (UDP) - Transmission Control Protocol (TCP) - Stream Control Transmission Protocol (SCTP) - Congestion Control and Quality of Service: Data Traffic - Congestion Control - Quality of Services (QoS).

UNIT V **7 Hours**

APPLICATION LAYER

Domain Name System (DNS): Domain Name Space - Distribution of Name Space - DNS in the Internet World Wide Web and HTTP - Simple Mail Transfer Protocol - File Transfer Protocol -Secure Shell (SSH)- TELNET.

FOR FURTHER READING

Network Management: Simple Network Management Protocol (SNMP) - Symmetric key cryptography - Security services - PGP - Firewalls.

Total: 45 Hours

Reference(s)

1. Behrouz A.Forouzan, Data Communication and Networking, 5th Edition, Tata McGraw-Hill, 2014
2. James F.Kurose and Keith W.Ross, Computer Networking: A Top-Down Approach Featuring the Internet, Pearson Education, 2005
3. Larry L.Peterson and Bruce S.Davie, Computer Networks, Elsevier, 2009
4. Andrew S.Tanenbaum, Computer Networks, Pearson Education, 2008
5. William Stallings, Data and Computer Communication, Pearson Education, 2007
6. Douglas E.Comer and M.S.Narayanan, Computer Networks and Internets, Pearson Education, 2008

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	6			4	6																			18
2					2	4				4				4								6			20
3					2	4				4				4								6			20
4	2	4			2	4							2	2								6			22
5	2	2			2	6				4				4											20
																								Total	100

Assessment Questions

Remember

1. Define Computer Network.
2. What are the 3 key design issues of a computer network?
3. List the 4 advantages of optical fiber.
4. What is circuit switching and what are its chief characteristics?
5. List the encapsulation involved in the creation of an Ethernet frame.
6. What is the difference between routable and non- routable protocols?
7. What are the Data link protocols?
8. What is Forward Error Correction?

Understand

1. Mention the categories of flow control.
2. What are the 2 categories of QoS attributes?
3. What is the purpose of Domain Name System?
4. How are the guided media differing from unguided transmission media?
5. Identify the address class of 123.167.23.20 and 250.10.24.96.
6. Can multiple circuits share a single optical fiber in a circuit-switched network?
7. Explain the data frame format of IEEE 802.11 Standard.
8. Write the subnet, broadcast address and valid host range for the following:
   a) 172.16.10.5 255.255.255.128
   b) 172.16.10.33 255.255.255.224
   c) 172.16.10.65 255.255.255.192
   d) 172.16.10.17 255.255.255.252
9. The Network address is 192.168.10.0 and the Subnet mask is 255.255.255.252.Find out how many subnets? b) How many hosts?
10. How many connections are required to connect 20 computers in a mesh network?
11. An end system sends 50 packets per sec using UDP protocol over a full duplex 100Mbps Ethernet LAN connection. Each packet consists of 1600 bytes of Ethernet frames payload data. Compute the throughput at UDP layer.

Apply

1. For the bit stream 100010100, draw the waveform for Manchester and Differential Manchester Coding and also discuss the advantages of the coding schemes
2. Calculate the latency of a packet transferred between two hosts A and B on a local network, where they are connected via a cable of length 6.21 m, and the packet size is 2024 bytes, and the capacity of the cable is 56 bps. (Assume that queuing delays are not considered. Also recall that 1 byte = 8 bits, and the speed of light = 3.0x108 m/s.)
3. Convert a classless (CIDR) network address (e.g. 192.168.0.0/24) to its IP address/mask equivalent (e.g. 192.168.0.0 255.255.255.0) and vice versa
4. A collection of five routers is to be connected in a point-to-point subnet. Between each pair of routers, the designers may put a high-speed line, a medium-speed line, or a low-speed line, or no line. If it takes 100 ms of computer time to generate and inspect each topology, compute the time required to inspect all of them.

Analyse

1. Identify whether circuit switching system or a packet switching preferable for broadcasting a copy of a video presentation. Why?
2. Switching can improve the efficiency of a network‘s link utilization, but may also cause problems. In a packet-switched network, two particular problems are increased latency and data loss.
   (i) Taking the IP packet-switching, explain how latency and loss might occur.
   (ii) To what extent are the problems of latency and loss less significant in circuit-switched networks?

Create

1. A routing protocol is a system used by routers to automatically maintain their forwarding tables. Outline a simple routing protocol which might be used to maintain the table under shortest path routing policy. Mention any additional information that you must store in the router, and any problems you notice.
2. A company has two LANs, one in Chennai with 300 hosts and another one in Madurai with 150 hosts. Could it be possible to connect those networks to the Internet using only one Class C network addresses? Justify the answer. If the answer is positive, create a network layout, assign IP addresses to every router and to one host in the network, and specify the routing tables of all routers and the specified host.

15CS502 SYSTEM SOFTWARE

3 0 0 3

Course Objectives

- Design Assembler, Linker, and Loader and Macro processor.
- Analyze the generation of object codes.
- Determine the working of device drivers.

Course Outcomes (COs)

1. Explain the relationship between system software and machine architecture.
2. Design and implement assemblers.
3. Design and implement linkers and loaders.
4. Explore the concept of macroprocessors.
5. Explain the system software tools.

UNIT I **9 Hours**

INTRODUCTION

System software and machine architecture - The Simplified Instructional Computer (SIC) - SIC/XE - Traditional CISC Machine - RISC Machine - Machine architecture - Data and instruction formats - addressing modes - Instruction sets - I/O and programming.

UNIT II **11 Hours**

ASSEMBLERS

Basic assembler functions - A simple SIC assembler - Assembler algorithm and data structures - Machine dependent assembler features - Instruction formats and addressing modes - Program relocation - Machine independent assembler features

Literals - Symbol-defining statements - Expressions - One pass & Multi pass Assembler.

UNIT III **9 Hours**

LOADERS AND LINKERS

Basic loader functions - Design of an Absolute Loader - A Simple Bootstrap Loader Machine dependent loader features - Relocation - Program Linking - Algorithm and Data Structures for Linking Loader - Machine independent loader features Automatic Library Search - Loader Options - Loader design options- Linkage Editors- Dynamic Linking - Bootstrap Loaders

UNIT IV **9 Hours**

MACRO PROCESSORS

Basic macro processor functions - Macro Definition and Expansion - Macro Processor Algorithm and data structures - Machine-independent macro processor features - Concatenation of Macro Parameters - Generation of Unique Labels - Conditional Macro Expansion - Keyword Macro Parameters - Macro within Macro - Implementation example - MASM Macro Processor.

UNIT V **7 Hours**

OTHER SYSTEM SOFTWARE TOOLS

Database Management Systems - Basic Concepts of DBMS - Levels of data description - Use of a DBMS - Text editors - Overview of the Editing Process -User Interface - Editor Structure. - Interactive debugging systems - Debugging functions and capabilities - User-Interface Criteria.

FOR FURTHER READING

Assembly language programming - MASM assembler - implementation example - MSDOS linker - ANSI C Macro language - Relationship with other parts of the system.

Total: 45 Hours

Reference(s)

1. Leland L. Beck, System Software -An Introduction to Systems Programming 3rd Edition, Pearson Education Asia, 2007.
2. Dhamdhere D M, Systems Programming and Operating Systems, 2nd Revised Edition, Tata McGraw - Hill, 1999.
3. John J. Donovan, Systems Programming, Tata McGraw - Hill Edition, 2001

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	4	4			4	2							2				2								18
2	2	2			2	4	2			4				2			2	2				2			24
3	2	2			2	2				2			2	2	2			2				4			22
4		2			2				2	4				2	2							4			18
5	2	2			2	2				4				4								2			18
																								Total	100

Assessment Questions

Remember

1. Define data Format.
2. List the types of registers used in a system.
3. State the instruction format of SIC/XE machine.
4. Define load-and-go assembler.
5. State the use of multi-pass assembler.
6. Define near jump and far jump.
7. List the functions of an absolute loader.
8. Define bit masking.
9. Define conditional macro expansion.
10. Define Linker.

Understand

1. Illustrate how communication with OS is established in SIC/XE while executing a program.
2. Identify the different instruction formats, instruction sets and addressing modes used in assembler.
3. Represent the algorithm for Macro processor.
4. Indicate the other parts of the system to which the debugger is related with.
5. Illustrate how input and Output operations are performed in PowerPC architecture.

Apply

1. Find the types of Assemblers.
2. Demonstrate the Concept of Macro processors.
3. Demonstrate the functions of Pass 1 and Pass 2 of MS-Dos linker.
4. Predict the use of nested macro expansion.
5. Demonstrate open subroutine and closed subroutines.
6. Choose a practical way that illustrates how a non-recursive macro pre-processor could allow for the invocation of macros within the macros.

Analyse

1. Compare and Contrast SIC, SIC/XE with programming examples.
2. Is it valid to write 'AIF Q > N.F'?
3. In the following macro definition,
   Define ABSDIFF(X, Y) [(X)>(Y)? (X)-(Y): (Y)-(X)] Give the expansion for ABSDIFF (I+1, j-5).
   Substantiate the necessity for more than one passes in assembler.
4. Differentiate Assembler and Interpreter.
5. Library routines are in the form of object files. Can such a routine be an absolute object file?

Evaluate

1. a. SUMMAOD
   b. LDA X&ID->1
   c. DD>2
   d. ADD X&ID->3
   e. SAX>5
   f. MND
2. Give the implementation details of MS-DOS Linker.

Create

1. Write a program segment to indicate the arithmetic operation for the SIC machine.
2. Design MASM assembler.

15CS503 THEORY OF COMPUTATION 3 2 0 4

Course Objectives

- Understand the mathematical models of computation and design grammars and recognizers for different formal languages.
- Identify the relation among regular language, context free language and the corresponding recognizers.
- Determine the decidability and intractability of computational problems.

Course Outcomes (COs)

1. Explain the fundamentals and construction of finite automata.
2. Acquire knowledge on regular expression and languages in finite automata.
3. Apply context free grammars and languages.

4. Construct Push down Automata and Turing machine.
5. Analyze the undecidability of languages.

UNIT I **8 Hours**

AUTOMATA

Introduction to formal proof - Additional forms of proof - Inductive proofs - Finite Automata (FA) - Deterministic Finite Automata (DFA) - Non-deterministic Finite Automata (NFA) - Finite Automata with Epsilon transitions.

UNIT II **9 Hours**

REGULAR EXPRESSIONS AND LANGUAGES

Regular Expression - FA and Regular Expressions - Applications of Regular Expression - Algebraic Laws for Regular Expression - Proving languages not to be regular - Closure properties of regular languages.

UNIT III **10 Hours**

CONTEXT-FREE GRAMMAR AND LANGUAGES

Context-Free Grammar (CFG) - Parse Trees - Applications of Context-Free Grammar -Ambiguity in grammars and languages - Normal forms for CFG - Pumping Lemma for CFL - Closure Properties of CFL.

UNIT IV **10 Hours**

PUSH DOWM AUTOMATA AND TURING MACHINES

Definition of the Pushdown automata - Languages of a Pushdown Automata - Equivalence of Pushdown automata and CFG. Turing Machines (TM) - Programming Techniques for TM - Storage in finite control - Multiple tracks - Checking off symbols - Subroutines.

UNIT V **8 Hours**

UNDECIDABILITY

A language that is not Recursively Enumerable (RE) - An undecidable problem that is RE - Undecidable problems about Turing Machine - Post's Correspondence Problem - Rice Theorem.

FOR FURTHER READING

Application of Finite Automata - Text Search Decision Properties of Regular Languages - Ambiguity Resolution in YACC- Extensions to the Basic Turing Machine Introduction to classes - P and NP-completeness

Total: 45+30= 75 Hours

Reference(s)

1. John E.Hopcroft, Rajeev Motwani and Jeffrey.D Ullman, Introduction to Automata Theory, Languages and Computations, Pearson Education, 3rd Edition, 2014
2. Harry R.Lewis and Christos.H.Papadimitriou, Elements of The theory of Computation,Pearson Education/PHI, 2007
3. John C.Martin, Introduction to Languages and the Theory of Computation, TMH, 2007
4. Micheal Sipser, Introduction of the Theory and Computation, Thomson Brokecole, 2005

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	2				6					6			2											18
2	2	2							1		6		1	2					6						20
3	3	2							1		6		1	2	6										21
4	4	3							1		6		1	2								6			23
5	2								1				1	2	6				6						18
																				Total					100

Assessment Questions

Remember

1. Define ε-NFA.
2. State the pumping lemma for regular languages.
3. List the three ways to simplify a context free grammar.
4. State pumping lemma for context-free languages.
5. Define Pushdown Automata.
6. Define the language acceptance methods of a PDA.
7. Define Diagonalization Language.
8. State Rice theorem.
9. Define Recursively Enumerable Language.
10. List any four additional forms of proof.
11. Define Turing machine with its notation.
12. Define diagnolization language.
13. Define epsilon PDA with an example.

Understand

1. Exemplify the conversion of CFG to PDA with its corresponding theorem.
2. Represent in DFA for accepting strings of a‘s and b‘s with at most two consecutive a‘s.
3. Explain the programming techniques of Turing machines.
4. Summarize the properties of recursive and recursively enumerable languages.
5. Explain inductive proof with suitable diagram.
6. Summarize the closure properties of regular languages.
7. Explain the closure properties of context free languages.
8. Summarize the relation between PDA and CFG with suitable theorem.
9. Exemplify the concept of Rice theorem.
10. Compare Recursive and recursively enumerable languages.

Apply

1. Show the significance of PDA.
2. . Implement the following by the principle of Induction.
   For all $n \geq 0$: $\sum i2 = (n (n+1) (2n+1))/6$.
3. Illustrate the language acceptance of a DFA with an example.
4. Illustrate the conversion of a CFG into PDA with an example.
5. Demonstrate the encoding technique of Universal TM with an example.
6. Show that the halting problem of Turing Machine is undecidable.
7. Find whether the PCP with two lists x = (1, 10111, 10) and Y = (111, 10, 0) has a solution or not.
8. Find the transitions of a PDA to accept the language which contains the string as palindrome.
9. Construct DFA for the regular expression (a/b)*abb.
10. Construct epsilon NFA for the regular expression (a/b)(a/b)(a/b).
11. Show the logic of multiplication a*b using turing machine.

Analyse

1. Differentiate NFA and DFA.
2. Differentiate decidable and undecidable language.
3. Compare epsilon PDA and epsilon NFA.
4. Differentiate recursive and recursively enumerable languages.
5. Differentiate PDA and TM.
6. Differentiate formal and inductive proofing techniques.

Evaluate

1. Check that the given CFG is ambiguous
   S → 0B|1A
   A → 0|0S|1AA
   B → 1|1S|0BB
2. Check that id+id*id can be generated by two distinct leftmost derivation in the grammar
   E → E+E|E*E| (E) |id
3. Is the language L= {aibjck|i<j<k} a CFL? Justify.
4. Check the ambiguity in the arithmetic grammar.
5. Check the usage of inductive proof with an example.

Create

1. Generate parse tree for the string aabbaabba for the CFG G whose productions are
   S → bA|aB
   A → a|aS|bAA
   B → b|bS|aBB
2. Generate derivation tree for the string aabbaa with the given production S → aAS|a, A → SbA|SS|bA

15CS504 COMPUTER ARCHITECTURE 3 0 0 3

Course Objectives

- Understand of the basic structure and operation of a digital computer.
- Impart knowledge about the operation of the arithmetic unit including the algorithms & implementation addition, subtraction, multiplication & division.
- Acquire knowledge about the diverse ways of communicating with I/O devices and standard I/O interfaces.

Course Outcomes (COs)

1. Identify the basic structure of a digital computer and instruction sets with addressing modes.
2. Comprehend the arithmetic operations of binary number system.
3. Recognize the organization of the basic processing unit and examine the basic concepts of pipelining.
4. Explicate the standard I/O interfaces and peripheral devices.
5. Determine the performance of different types of memory.

UNIT I **9 Hours**

STRUCTURE OF COMPUTERS

Functional units -Basic operational concepts -Bus structures -Software-performance-Memory locations and addresses -Memory operations-Instruction and instruction sequencing -Addressing modes-Assembly language-Basic I/O operations - Stacks and queues.

UNIT II **9 Hours**

ARITHMETIC OPERATIONS

Addition and subtraction of signed numbers-Design of fast adders-Multiplication of positive numbers - Signed operand multiplication and fast multiplication-Integer division- Floating point Numbers and Operations.

UNIT III **11 Hours**

BASIC PROCESSING UNIT

Fundamental concepts-Execution of a complete instruction-Multiple bus organization-Hardwired control-Micro programmed control- Pipelining: Basic concepts-Data hazards-Instruction hazards-Influence on Instruction sets-Data path and control consideration-Superscalar operation.

UNIT IV **8 Hours**

INPUT/OUTPUT ORGANIZATION

Accessing I/O devices-Interrupts-Direct Memory Access-Buses-Interface circuits-Standard I/O Interfaces (PCI, SCSI, USB).

UNIT V **8 Hours**

MEMORY UNIT

Basic concepts-Semiconductor RAMs -ROMs- Speed -size and cost -Cache memories -Performance consideration-Virtual memory-Memory Management requirements-Secondary storage.

FOR FURTHER READING

Categories of Instruction Set Architectures (ISA)- Multistage pipelines with variable latencies- branch prediction- Very large Instruction Word (VLIW) architectures- Instruction Level Parallelism (ILP)- Examples of modern processors- Hyper threading (HT)- Simultaneous Multithreading (SMT)- Multicore chips (Chip Multiprocessing).

Total: 45 Hours

Reference(s)

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, Computer Organization, McGraw-Hill, Third Reprint 2015.
2. William Stallings, Computer Organization and Architecture Designing for Performance, Pearson Education, 2003.
3. David A.Patterson and John L.Hennessy, Computer Organization and Design: The hardware / software interface, Morgan Kaufmann, 4th edition, 2014.
4. John P.Hayes, Computer Architecture and Organization, McGraw Hill, 3rd edition, 2002.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	3			2	8								5											20
2						2				6					6				6			5			25
3	2	5			2	8								2	6										25
4		4			3	6								2											15
5		2			2	6								5											15
																								Total	100

Assessment Questions

Remember

1. State the ways by which clock rate can be increased.
2. Define Bus.
3. List the techniques used to overcome hazards.
4. Recall the factors used to evaluate the performance of a computer.
5. Define assembler.
6. List the two approaches taken to reduce delay in adders.
7. Define virtual memory.
8. Define MFC.
9. List the four steps in pipelining.
10. Define micro programmed control.

Understand

1. Exemplify the different types of addressing modes used in the instruction set design.
2. Identify the symbol of a full adder circuit for a single stage addition.
3. Explain the Booth‘s algorithm with the help of an example.
4. Explain the various types of Adders with a neat diagram.
5. Illustrate the two techniques for speeding up the multiplication operation with an example.
6. Summarize the two control signals used for register transfer.
7. Identify the drawback in assigning one bit position to each control signal.
8. Identify the need for LRU replacement algorithm.
9. Summarize the characteristics of semiconductor RAM memories.
10. Explain briefly about the different types of secondary storage devices.

Apply

1. Implement the restoring and non-restoring division on the following 5-bit unsigned integer: 10101 / 00101.
2. Demonstrate 4-bit carry look-ahead adder with a neat diagram.
3. Predict the control sequences for fetching a word from memory, storing a word in memory, executing a complete instruction, both unconditional and conditional branch.
4. Implement the booth’s and bit-pair recoding table for the multiplicand 14 and multiplier -5.
5. Demonstrate multiple bus organization with a neat diagram.
6. Predict the control sequence needed for executing an unconditional branch instruction.
7. Implement restoring division algorithm for the multiplicand M=15 and Q=4
8. Compute the product for M=45 and Q=63 using carry save addition of summands.
9. Compute the quotient and remainder for the value Q=1000 and M=11
10. Predict the control sequence in implementing the instruction MUL R1, R2 on the processor in single bus organization. This instruction multiplies the contents of the registers R1 and R2 and stores the result in R2. Higher-order bits in the product, if any, are discarded.

Analyse

1. Compare and contrast the different policies available to update cache memory, when there is a read or write miss.
2. Differentiate big-endian and little-endian assignment.
3. Perform the steps needed to execute the machine instruction Add LOCA, R0.
4. Compare and contrast vertical organization with horizontal organization.
5. Differentiate static RAM and dynamic RAM.
6. Compare and contrast data hazard and instruction hazard.

Evaluate

1. Registers R1 and R2 of a computer contain the decimal values 1200 and 4600. What is the effective address of the memory operand in each of the following instructions?
   a) Load 20(R1), R5
   b) Add –(R2), R5
   c) Move #3000, R5
2. Using manual methods, perform the operation A*B and A/B on the 5-bit unsigned numbers A=10101 and B=00101.
3. Convert the following pairs of decimal numbers to 5-bit, signed, 2's-complement, binary numbers and add them.
   a) 5 and 10
   b) -14 and 11
   c) -10 and -13
   d)-5 and 7
4. Evaluate the arithmetic statement X = (A+B)*(C+D) using a general register computer with three address, two address and one address instruction format.

Create

1. Generate a program that can evaluate the expression A * B + C *D in a single-accumulator processor. Assume that the processor has Load, Store, Multiply, and Add instructions, and that all values fit in the accumulator.
2. Design a 4-bit carry look ahead adder and derive the equations for generate and propagate functions.

15CS507 COMPUTER NETWORKS LABORATORY 0 0 2 1

Course Objectives

- Understand the concepts of computer networks and to study the functions of different layers.
- Familiarize with different protocols and network components.
- Familiarize in the various aspects of computer networks.

Course Outcomes (COs)

1. Identify the different types of cables in networks.
2. Configure networking in a system.
3. Implement and simulate protocols.
4. Develop applications using packet tracer software.

2 Hours

EXPERIMENT 1

Study of Color coding Jack RJ45 and do the following Cabling works in a network
a. Cable Crimping
b. Standard Cabling
c. Cross Cabling and
d. Establish a LAN connection using three systems using any topology.

2 Hours

EXPERIMENT 2

Configure IP Address in a system in LAN (TCP/IP Configuration) and Implement the client server communication using socket connection.

2 Hours

EXPERIMENT 3

Write a program for transferring a file between nodes in a network.

2 Hours

EXPERIMENT 4

Perform Bit Stuffing and CRC computation.

2 Hours

EXPERIMENT 5

By varying the no of frames, design the Sliding Window Protocol.

4 Hours

EXPERIMENT 6

Simulation of ARP/RARP

2 Hours

EXPERIMENT 7

Display the routing table for the nodes in a network using Distance Vector Routing (DVR) algorithm.

2 Hours

EXPERIMENT 8

Find the minimum cost in the node to node communication by Open Shortest Path First (OSPF) protocol

4 Hours

EXPERIMENT 9

Write a program for downloading a file from HTTP server

2 Hours

EXPERIMENT 10

Develop a client that contacts a given DNS server to resolve a given host name.

2 Hours

EXPERIMENT 11

Configure a Network topology using Packet tracer software.

4 Hours

EXPERIMENT 12

Study of Network simulator (NS) and Simulation of any one of routing protocol using NS2.

Total: 30 Hours

15CS508 SYSTEM SOFTWARE LABORATORY 0 0 2 1

Course Objectives

- Design Assembler and Linker.
- Design and implement loader and macroprocessor.

Course Outcomes (COs)

1. Implement the assemblers.
2. Develop programs using macroprocessor.
3. Implement loaders and linkers.

6 Hours

EXPERIMENT 1
Implementations of a symbol table with functions to create, insert, modify, search, and display.

6 Hours

EXPERIMENT 2
Implementation of single pass assembler.

6 Hours

EXPERIMENT 3
Implementation of a macro processor.

4 Hours

EXPERIMENT 4
Implementation of a loader.

4 Hours

EXPERIMENT 5
Implementation of a direct-linking loader.

4 Hours

EXPERIMENT 6
Implementation of a simple text editor with features like insertion / deletion of a **character**, word

Total: 30 Hours

15CS509 TECHNICAL SEMINAR - I 0 0 2 1

Course Objectives

- To develop the self-learning skills to utilize various technical resources available from multiple field.
- To promote the technical presentation and communication skills.
- To impart the knowledge on intonation, word and sentence stress for improving communicative competence, identifying and overcoming problem sounds.

Course Outcomes (COs)

1. Refer and utilize various technical resources available from multiple field.
2. Improve the technical presentation and communication skills.
3. Understand the importance of intonation, word and sentence stress for improving communicative competence, identifying and overcoming problem sounds.
4. Interact and share their technical knowledge to enhance the leadership skills.
5. Understand and adhere to deadlines and commitment to complete the assignments.

15CS510 MINI PROJECT III **0 0 2 1**

Course Objectives

- To develop knowledge to formulate a real world problem and project's goals.
- To identify the various tasks of the project to determine standard procedures.
- To identify and learn new tools, algorithms and techniques.
- To understand the various procedures for validation of the product and analysis the cost effectiveness.
- To understand the guideline to Prepare report for oral demonstrations.

Course Outcomes (COs)

1. Formulate a real world problem, identify the requirement and develop the design solutions.
2. Express the technical ideas, strategies and methodologies.
3. Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project.
4. Test and validate through conformance of the developed prototype and analysis the cost effectiveness.
5. Prepare report and present the oral demonstrations.

15GE511 LIFE SKILLS: APTITUDE I **0 0 2 -**

Course Objectives

- To expose the undergraduate students to such methods and practices that help, develop and nurture qualities such as character, effective communication, aptitude and holding ethical values.

Course Outcomes (COs)

1. Distinguish the pattern of coding and decoding.
2. Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions
3. Difference between sequence and series
4. Evaluate critically the real life situations by resorting and analyzing analytical reasoning of key issues and factors
5. Identify the odd man out
6. Calculate the percentages and averages

7. Demonstrate the blood relation concept in Verbal Reasoning
8. Plot the diagrams based on direction
9. Explain the various operations

3 Hours

CODING AND DECODING

Introduction - Description of Coding method - Coding patterns - Concepts of Coding and Decoding - Problems involving Coding and Decoding methods

3 Hours

SEQUENCE AND SERIES

Introduction - Sequences of real numbers - Number and Alphabet series - Description of Number and Alphabet series - Analogy - Odd man out- Power series

3 Hours

DATA SUFFICIENCY

Introduction to Data Sufficiency - Overview of the wide variety of Data Sufficiency problems - Basic introduction on how to determine what information is sufficient to solve a given problem - Common pitfalls to avoid

3 Hours

DIRECTION

Introduction to Direction - sense test - Overview of the wide variety of Direction problems -Direction - Plotting diagrams

3 Hours

PROBLEM ON AGES

Introduction- basic concept - usage of percentage and averages- applications

3 Hours

ANALYTICAL REASONING

Introduction - basic concept - non verbal analytical reasoning - arrangements

3 Hours

BLOOD RELATION

Introduction - Basic concept - Kinds of relation - Tree diagram - Relations

3 Hours

BLOOD RELATION

Introduction -Basic concept - Kinds of relation - Tree diagram - Relations

3 Hours

VISUAL REASONING

Introduction - Basic concepts - Odd man out - Next series - Mirror image and water image

3 Hours

SIMPLIFICATIONS

Introduction - Basic concepts - Arithmetic operations -Equation solving methods - Puzzles

Total: 30 Hours

Reference(s)

1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, 4th Edition, Tata McGraw-Hill Publishing Company Ltd, 2012
2. Arun Sharma, How to prepare for Data Interpretation for the CAT, First Edition, Tata McGraw-Hill Publishing Company Ltd, 2012.
3. Dr.R S Aggarwal, Quantitative Aptitude, 7th Revised Edition, S.Chand Publishing Company Ltd, 2013.

4. Edgar Thorpe, Course In Mental Ability And Quantitative Aptitude For Competitive Examinations, Third Edition, Tata McGraw-Hill Publishing Company Ltd, 2013.
5. Arun Sharma, How to prepare for Quantitative Aptitude for the CAT, Fifth Edition, Tata McGraw-Hill Publishing Company Ltd, 2013

15GE701 ENGINEERING ECONOMICS 3 0 0 3

Common to CSE,ECE,EEE,EIE,IT (VI Semester) and to AE, AG,AU,CE,ME,MTRS,BT,FT,TT,FD (VII Semester)

Course Objectives

- Provide the theoretical foundations in micro and macro analysis in terms of concepts and theories.
- Emphasis the systematic evaluation of the costs and benefits associated with projects.
- Enumerate the idea of Balance sheet and Balance of payments.

Course Outcomes (COs)

1. Understand the micro economic environment for creating a favourable business environment.
2. Take decision by making use of the major concepts and techniques of engineering economic analysis.
3. Compare the cost of multiple projects by using the methods learned, and make a quantitative decision between alternate facilities and/or systems.
4. Apply the appropriate engineering economics analysis method(s) for problem solving: present worth, annual cost, rate-of-return, payback, break-even, benefit-cost ratio.
5. Examine and evaluate the issues in macro-economic analysis.

UNIT I **9 Hours**

INTRODUCTION

Introduction to Micro and Macro economics - Kinds of Economic Systems - Production Possibility Frontier - Opportunity Cost - Objective of Organizations - Kinds of Organization.

UNIT II **9 Hours**

DEMAND AND SUPPLY

Functions of Demand and Supply - Law of diminishing Marginal Utility - Law of Demand and Supply - Elasticity of Demand - Demand Forecasting Methods - Indifference curve.

UNIT III **9 Hours**

PRODUCTION AND COST

Production Function - Returns to Scale - Law of Variable Proportion - Cost and Revenue concepts and Cost Curves - Revenue curves - Economies and Dis-economies of scale - Break Even point.

UNIT IV **9 Hours**

MARKET STRUCTURE

Market Structure - Perfect Competition - Monopoly - Monopolistic - Oligopoly - Components of Pricing - Methods of Pricing - Capital Budgeting IRR - ARR - NPV - Return on Investment - Payback Period.

UNIT V **9 Hours**

INTRODUCTION TO MACRO ECONOMICS AND FINANCIAL ACCOUNTING

National Income - Calculation Methods - Problems - Inflation - Deflation - Business Cycle - Taxes - Direct and Indirect Taxes - Fiscal and monetary policies.

FOR FURTHER READING

Nature and characteristics of Indian Economy - Role and functions of Central bank - LPG - GATT - WTO.

Total: 45 Hours

Reference(s)

1. A Ramachandra Aryasri and V V Ramana Murthy, Engineering Economics and Financial Accounting, Tata McGraw Hill Publishing Company Limited, New Delhi, 2006.
2. V L Samuel Paul and G S Gupta, Managerial Economics Concepts and Cases, Tata McGraw Hill Publishing Company Limited, New Delhi, 1981.
3. R Kesavan, C Elanchezhian and T Sunder Selwyn, Engineering Economics and Financial Accounting, Laxmi Publication Ltd, New Delhi, 2005.
4. S N Maheswari, Financial and Management Accounting, Sultan Chand
5. V L Samuel Paul and G S Gupta, Managerial Economics-Concepts and Cases

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2					2					8			6											18
2		2					2			8					6				4						22
3			2			2				8								4							16
4	2						2		8						6				4						22
5		2				2				8				6				4							22
																								Total	100

Assessment Questions

Remember

1. Define Economics
2. What is opportunity cost?
3. List the types of Demand.
4. State the law of Demand.
5. Define Elasticity of Demand.
6. State the different degrees of elasticity of Demand?
7. List the factors determining Elasticity of Demand?
8. State the Law Of Diminishing Marginal Utility.
9. Define Replacement Cost and Historic Cost
10. Define Monopoly.
11. Define Oligopoly.
12. Name the two types of Oligopoly.
13. List the objectives of Pricing
14. Define Accounting.
15. Define inflation.

Understand

1. Explain the nature and scope of Economics.
2. List and explain the focus areas of Managerial economics.
3. Give reasons why mangers aim to maximize sales even at the cost of a lower profit.
4. Explain the nature of Demand.
5. What are the assumptions made when talking about the Law of Diminishing Marginal Utility?
6. Explain the characteristics of the Indifference Curve with examples.
7. Can Demand Forecasting principles be applied to Services? Substantiate your answer with an example.
8. What are the characteristic features of an oligopoly industry?
9. What causes Oligopoly?
10. Explain the types and features of Cost Based Pricing.
11. Explain the types and features of Demand Based Pricing.
12. Under what conditions does a company go in for Cross Subsidization pricing?
13. What is the role of the Central bank in controlling inflation?

Apply

1. Explain decisions based on the degree of certainty of the outcome with examples.
2. Give examples of products falling under the various kinds of competition, and the reasons they are able to survive in the market.
3. Give six examples of products that fall under Monopolistic Competitive pricing.
4. Give six examples of products that fall under Oligopolistic pricing.
5. Pick any six Consumer Items and based on your knowledge of the markets, explain the pricing. Method that you think is most likely to have been followed for each of these items.

Analyse

1. Differentiate between Macro and Micro economics.
2. Differentiate between Extension and Increase in Demand.
3. Distinguish between Cost and Price.
4. Compare the merits and demerits of the Deductive Method and the Inductive Method of Investigation.
5. The per-capita income of farmers in the country has to be raised by 20% this year to prevent their migration to cities. Discuss this statement from the point of view of Positive and Normative Economics.
6. Decision making improves with age and experience- Discuss.
7. Do a survey of the automotive (only cars) industry and analyze the reasons and timing for discounts offered from the point of view of elasticity of demand.
8. How would you modify a sealed bid pricing system to take care of different technical approaches by different bidders for a project for which bids are called for, given that the cost varies depending on the technical approach?

Evaluate

1. Create a matrix consolidating the definitions of the word? Economics as defined by the leading Economists in the prescribed textbook. Using this define economics the way you understand it, in less than 50 words.
2. Study the price of a commodity over a period of one year and explain the possible reasons for the fluctuations from an economist‘s point of view.
3. You are in a job which is paying you adequately. You are called for an interview for a job that double your salary. Unfortunately you miss the only train that will take you in time for the interview. How will you justify the cost of taking a flight considering the cost concepts you have learnt.

15CS602 WEB TECHNOLOGY 3 0 0 3

Course Objectives

- Understand the scripting languages XHTML, JavaScript and PHP.
- Familiar with the different server technologies.
- Gain knowledge in the concepts of web services.

Course Outcomes (COs)

1. Explore the internet related technologies and hierarchy of objects in XHTML, CSS and Social media.
2. Design dynamic and interactive web pages by embedding Java Script code in XHTML.
3. Implement server side programming and build web applications using PHP.
4. Develop the interactive web applications using ASP.NET.
5. Build and consume web services.

UNIT I **10 Hours**

INTRODUCTION TO WEB AND XHTML

Introduction - Blogging - Social Networking - Social media - Tagging - Software development - Introduction to XHTML and Editing XHTML Headings - Linking - Images - Special characters and Horizon rules - Lists - Tables - Forms -Internal Linking- Meta Elements - Cascading Style Sheets

UNIT II **10 Hours**

JAVASCRIPT

Introduction to scripting - Control statements I, II - Functions: Definition - Random Number Generation - Global function - Recursion - Arrays: Declaring and allocating arrays Multidimensional arrays - Objects : Math object - String object - Date object - Boolean, Number object - Document object - Window object - Events.

UNIT III **8 Hours**

INTERNET APPLICATION SERVER TECHNOLOGIES

Web server (IIS and Apache): Multitier Architecture - Client/ Server side scripting - Accessing web services - Microsoft IIS - Apache HTTP server - Database: Relational database - SQL - PHP: Basics - String and Form Processing - connecting to database - Ruby on Rails - Rail framework - Database driven web application.

UNIT IV **9 Hours**

ASP .NET AND AJAX

Introduction - creating and running a simple web form - Web controls - session tracking - case study: Connecting to a database in ASP.NET. - Introduction to AJAX- AJAX XML Http request- AJAX Events.

UNIT V **8 Hours**

WEB SERVICES

Introduction - Java web services Basics - Creating Publishing, Testing and describing web service - Consuming web service - SOAP - Session Tracking in web services - Consuming a Database driven web service from a web application - Passing an object of a User defined type to a web service

FOR FURTHER READING

Introduction - Java web technologies - Creating and running a simple application in Netbeans - JSF components - Session tracking: cookies

Total: 45 Hours

Reference(s)

1. P.J. Deitel AND H.M. Deitel, Internet and World Wide Web - How to Program, Pearson Education, 2009.
2. Deitel, Deitel and Nieto, Internet and World Wide Web How to Program, Pearson Education, 2002.
3. Uttam K.Roy, Web Technologies, Oxford University Press, 2010.
4. Rajkamal, Web Technology, Tata McGraw-Hill, 2009.
5. www.w3schools.com/ajax.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1					4	4				4				2							4	4			22
2					2	4				4				2				2			4				18
3						4				6				2							2	6			20
4					2					6				4				4			2	4			22
5		4			4	4				6															18
																								Total	100

Assessment Questions

Remember

1. List the ways of including style information in a document.
2. Define cascading.
3. List the methods available in String object.
4. Retrieve the 5 event handlers in JavaScript with an example.
5. State the advantages of using MySQL.
6. Define session tracking.
7. State the reason for why ASP is called as server side scripting.
8. Recall the three logic layers used in MVC.
9. List the steps involved in publishing a web service.

10. Recall the SOAP messaging structure.

Understand

1. Represent the use of CSS in designing a web page.
2. Indicate the different XHTML form tags with its attributes.
3. Identify the output for the following
   window.alert ("x="+x);
   window.alert ("the value of x+x is " +(x+x));
4. Classify the various objects used in java script with an example.
5. Exemplify the IIS and Apache webserver architecture in detail.
6. Represent the use of cookies in server side programming.
7. Summarize the 6 steps involved in connecting an ASP.NET application with a database.
8. Classify the 3 web controls used in ASP.NET.
9. Illustrate about passing an object of a user defined type to a web service in detail.

Apply

1. Construct the JavaScript for the following statements.
   1. Declare variables sum and x
   2. Assign 1 to variable x
2. Implement a CSS that makes all text 1.5 times larger than the base font and color is red.
3. Find the error in the following
   x=1;
   While(x<=10);
   ++x;
   }
4. Design a script that contains a button and a counter in a div. The button should increment the counter each time it is clicked.
5. Demonstrate the multi-tier architecture with a neat sketch.
6. Select and correct the error in the following php. <php print (“hello world”);>
7. Execute PHP script to count the number of visitors and display it on webpage every time it is loaded.
8. Demonstrate the steps involved in creating and running a simple web form.
9. Use ASP.NET, to build a web form that displays data from a database.
10. Demonstrate about how to consume a web service.

Analyse / Evaluate

1. Compare HTML with XHTML.
2. Justify the remainder operator can be used only with numeric operands.
3. Outline the different tags used in table tag of XHTML.
4. Differentiate recursion and iteration.
5. Compare client side scripting and server side scripting.
6. Outline the steps involved in creating a database in SQL.
7. Outline the overview of JavaScript with PHP.
8. Differentiate delete and drop in SQL.
9. Organize the different web controls used in ASP.NET.
10. Outline the steps for creating, publishing, testing and describing a web service.

Create

1. Create an XHTML document using tags p, strong, img, hyperlink and hr.
2. Build a web form that displays data from a database.

15CS603 COMPILER DESIGN

3 0 0 3

Course Objectives

- Acquire knowledge in different phases of a Compiler and its applications.
- Understand the implementation of lexical analyzer and parsers.
- Familiar with the code generation schemes and optimization methods.

Course Outcomes (COs)

1. Explain various phases of a compiler and its applications.
2. Explain the lexical analyzer and tools.
3. Implement syntax analyzers and tools.
4. Apply intermediate code generation techniques.
5. Analyze the code generation and optimization methods.

UNIT I **8 Hours**

INTRODUCTION TO COMPILER

Language processors - Structure of a compiler - Grouping of phases into passes- Compiler construction tools - Applications of compiler technology: Implementation of high-level programming languages - Optimizations for computer architectures-Design of new computer architecture - Program Translations- Software productivity tools

UNIT II **9 Hours**

LEXICAL ANALYSIS

Lexical Analysis: Role of Lexical Analyzer - Input Buffering - Specification of tokens - Recognition of Tokens -The Lexical-Analyzer Generator Lex - Finite automata - Regular expression to finite automation- Optimization of DFA based Pattern Matchers.

UNIT III **11 Hours**

SYNTAX ANALYSIS

Introduction-Role of the parser - Context-Free Grammars -Writing a Grammar-Top Down parsing - Recursive Descent Parsing - Nonrecursive Predictive Parsing - Bottom-up parsing - Shift Reduce Parsing- LR Parsers: Simple LR Parser - Canonical LR Parser - LALR Parser - Parser generator Yacc.

UNIT IV **8 Hours**

INTERMEDIATE CODE GENERATION

Variants of Syntax Trees -Three-Address Code - Types and Declarations - Translation of Expressions - Control Flow -Backpatching - Switch-Statements - Intermediate Code for Procedures

UNIT V **9 Hours**

CODE GENERATION

Issues in the Design of a Code Generator - The Target Language - Addresses in the Target Code - Basic Blocks and Flow Graphs - Optimization of Basic Blocks - A Simple Code Generator - Peephole Optimization- Principal Sources of Optimization

FOR FURTHER READING

The evolution of programming languages-The science of building a compiler - Run time Environments - Storage Organization - Stack Allocation of Space- Heap Management.

Total: 45 Hours

Reference(s)

1. Alfred V. Aho, Ravi Sethi and Jeffrey D. Ullman Compilers: Principles, Techniques and Tools, 2nd Edition, Pearson, 2012.
2. D. Grune, H.E. Bal, C.J.H. Jacobs, K.G. Langendoen, Modern Compiler Design, Wiley, 2008
3. Kennath C. Louden, Compiler Construction Principles and Practice. New Delhi: Vikas publishing House, 2003.
4. Allen I. Holub, Compiler Design in C, Prentice Hall of India, 2003.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	4				1	6							3												14
2	3					1				4													12		20
3	2	2			2										6				2			12			26
4	2	2				6				2	6							2							20
5	2	2			2	14																			20
																								Total	100

Assessment Questions

Remember

1. Define compiler.
2. List any four applications of compiler technology.
3. Define handle pruning.
4. Define back patching.
5. List any four function preserving transformations on basic blocks.
6. State the rules for definig basic blocks.
7. List the four forms of intermediate code representations.
8. List the three types of error recovery procedures used in syntax analyzer.
9. Define DAG.
10. State the syntax directed translation for if-else statement.

Understand

1. Classify language translators.
2. Explain the 8 phases of compiler.
3. Summarize the compiler construction tools.
4. Exemplify the role of lexical analyzer.
5. Explain the input buffering technique in lexical analyzer.
6. Explain the role of parser in compilation.
7. Illustrate the three types of implementation methods for three address code with examples.
8. Explain the syntax directed translation for assignment statements.
9. Summarize the principal sources of optimization.
10. Exemplify the code generation phase of a compiler.

Apply

1. Implement the eight phases of a compiler for an arithmetic expression.
2. Show the program translation process for a program segment.
3. Construct a DFA for the regular expression a*

4. Construct a syntax tree for the regular expression (a/b)*a
5. Show the construction of a CLR parser for a CFG with an example.
6. Show the functioning of a shift reduce parser with an example.
7. Construct a DAG for the expression d=-b*c+-b*c
8. Construct the three address code for the expression a=-b*c+d/e-(f/g)
9. Show the construction of basic blocks for the quick sort program segment.
10. Show the optimization on basic blocks with an example.

Analyse

1. Compare compiler and interpreter.
2. Differentiate NFA and DFA.
3. Compare the top-down and bottom-up parsers.
4. DAG representation is more suitable than syntax tree for the intermediate code representation. Justify.
5. Quadruples are the most commonly used representation in optimizing compilers. Justify.

Evaluate

1. Determine the source language issues involved in the code generation phase of a compiler.
2. How many tokens are there in the following C statement?
   printf ("j=%d, &j=%x", j,&j)
3. Determine whether the following grammar is ambiguous or not
   E → E+E|E-E|id

Create

1. Generate a CLR parsing table for the grammar S → CC C → cC|d
2. Generate a three address code, basic blocks and flow graph for the programming segment of Quick sort.

15CS604 SECURITY IN COMPUTING 3 0 0 3

Course Objectives

- Understand the vulnerabilities and threats in the computing systems.
- Acquire knowledge about the cryptography based approaches in security.
- Familiar with the implementation and use of security mechanisms.

Course Outcomes (COs)

1. Identify the variety of generic security threats and the risks faced by computer systems.
2. Identify and analyze security problems in computer systems.
3. Apply appropriate security techniques in databases and data mining.
4. Identify and analyze security problems in operating system
5. Cognize the legal, copyright and privacy issues.

UNIT I 9 Hours

SECURITY ISSUES IN COMPUTING

Introduction to computer security - Computer criminals - Methods of defense - Cryptography-Substitution ciphers- Transpositions - Making encryption algorithms - Data encryption standard - Public key encryption.

UNIT II **9 Hours**

PROGRAM SECURITY AND NETWORK SECURITY

Secure programs - Targeted malicious code- Trojans - Trapdoors - Salami attack -Keystroke logging- Man-in-the middle attack- Covert channels- Controls against program threats

UNIT III **9 Hours**

DATABASE SECURITY AND DATA MINING SECURITY

Introduction to databases - Security requirements - Reliability and integrity - Sensitive data - Inference - Multilevel database-Proposals for multilevel security - Data mining- Privacy and sensitivity - Data correctness and integrity- Availability of data.

UNIT IV **9 Hours**

DESIGN AND PROTECTION OF OPERATING SYSTEM

Protected objects and methods of protection- Memory and address protection- Control of access to general objects-File protection mechanisms - User authentication.

UNIT V **9 Hours**

LEGAL ISSUES IN COMPUTER SECURITY

Protecting programs and data - Information and the law - Rights of employees and employers - Computer crime.

Administering security- Security planning - Risk analysis - Organizational security policies- Physical security.

FOR FURTHER READING

Cyber security- AES encryption algorithm- Viruses and targeted malicious code

Total: 45 Hours

Reference(s)

1. Charles B.fleeger and Shari Lawrence Pfleeger, Security in Computing, Pearson Education, 2014.
2. William Stallings, Cryptography and Network Security: Principles and Practice, Prentice Hall of India/Pearson Education, New Delhi, 2007.
3. Dieter Gollmann, Computer Security, John Wiley & Sons Ltd., 2011.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	4	4			4	4																			16
2	4				2	4				6				2				2							20
3	8				2					6				2	3										21
4		4			4					6				2	3				2						21
5		4				6				6				6											22
																				Total					100

Assessment Questions

Remember

1. Identify the different ways for operating system in security models.
2. List the 2 categories of attacks.
3. Define risk analysis.

4. Define security.
5. How cryptanalysis work?
6. List the security policies.
7. Define sniffing.
8. List the issues in security plan.
9. Retrieve which disclosure exact values in the database.
10. State biometrics.

Understand

1. Classify some of the problems in biometrics.
2. Explain about encryption methods.
3. Classify the 3 important security goals
4. Explain about encryption methods.
5. Infer some of the problems in biometrics.
6. Explain about intrusion detection.
7. Exemplify some of the factors that make sensitive data
8. Explain the steps in risk analysis.
9. Illustrate multilevel database.
10. Compare vulnerability and threat.

Apply

1. Formulate MOM techniques.
2. Identify the factors that make sensitive data.
3. Exemplify Bluetooth vulnerability.
4. List the characteristics of a good security.
5. Explain the steps in risk analysis.
6. Show the computer criminal based on the law.
7. Find the measure the of salami attack.
8. Predict where we using transposition algorithm for security.
9. List the major security issues dealt with at each level of the OSI protocol stack.
10. Demonstrate which Unix operation system use a nondiscretionary access control.

Analyse

1. Evaluate the performance level of multilevel security.
2. Compare cold site and hot site.
3. Differentiate symmetric and asymmetric systems.
4. Compare reliability and integrity.
5. Analyze the methods in TCP session hijacking.

Evaluate

1. Criticize why exportability should be a criterion for selection of a cryptographic standard.
2. Difference between hardware vulnerability and software vulnerability.
3. Predicate which transposition algorithm for security.
4. Justify the methodology of hacking.
5. Check which method is used to extract sensitive data from non-sensitive information.

15CS607 WEB TECHNOLOGY LABORATORY 0 0 2 1

Course Objectives

- Understand and apply the role of scripting languages like HTML, CSS, JavaScript, ASP.NET and PHP for designing interactive web applications.
- Familiar with the different types of server technologies.
- Gain knowledge about the concepts of web services.

Course Outcomes (COs)

1. Acquire the knowledge about the usage of various elements used in XHTML.
2. Use Cascading style sheets to implement a variety of presentation effects in XHTML including explicit positioning of elements
3. Create dynamic web pages by incorporating JavaScript in XHTML
4. Design the interactive web applications by connecting SQL with ASP.NET
5. Demonstrate the concepts of web services to build and consume it.

2 Hours

EXPERIMENT 1

Create a XHTML document for the college website with Text styling, Linking, Images, Lists, Table by highlighting the facilities in the department.

4 Hours

EXPERIMENT 2

Create an XHTML document for an online Bookstore that has a Registration form with text box, Radio Button, Selection box, Checkbox, Submit and reset buttons.

2 Hours

EXPERIMENT 3

Design a web page using CSS which includes the following:
a) Use different font styles
b) Set background image for both the page and single elements on page.
c) Control the repetition of image with background-repeat property
d) Define style for links as a: link, a: active, a: hover, a: visited

4 Hours

EXPERIMENT 4

Write a java script to validate the following fields in a registration page
a) Name (should contains alphabets and the length should not be less than 6 characters)
b) Password(should not be less than 6 characters)
c) E-mail(should not contain invalid addresses)

2 Hours

EXPERIMENT 5

Write a JavaScript function to get nth largest element from an unsorted array.

4 Hours

EXPERIMENT 6

Create a web page with real time clock using Java script event handling mechanism.

2 Hours

EXPERIMENT 7

Write an AJAX program to display the content of the text file.

4 Hours

EXPERIMENT 8

Write a program with ASP .net by connecting with SQL
a. Create login form to enter into website
b. Building web form that displays data from a database

2 Hours

EXPERIMENT 9

Assume four users user1, user2 and user3 having the passwords pwd1, pwd2, and pwd3 respectively. Write a PHP for doing the following.

1. Create a Cookie and add these four user and passwords to this Cookie.
2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies. If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display "you are not an authenticated user"

4 Hours

EXPERIMENT 10

Create a SOAP based web service for a simple Java Calculator class with operations add and subtract then create a web service client which then consumes the web service and displays the result of the invoked web service.

Total: 30 Hours

15CS608 COMPILER DESIGN LABORATORY

0 0 2 1

Course Objectives

- Understand the functions of all the phases of a compiler.
- Implement the phases of a compiler.
- Gain knowledge about lex and Yacc tools.

Course Outcomes (COs)

1. Identify and implement the phases of compiler.
2. Implement programs using lex and yacc.
3. Implement top-down and bottom-up parsers.
4. Generate Intermediate Code for inputs.
5. Construct a DAG representation for input.

2 Hours

EXPERIMENT 1

Implementation of Lexical Analyzer using C.

4 Hours

EXPERIMENT 2

Implementation of Simple Lex and Yacc programs.

2 Hours

EXPERIMENT 3
Implementation of lexical analyzer using Lex.

4 Hours

EXPERIMENT 4
Show the execution of Shift Reduce Parsing Algorithm for an input.

2 Hours

EXPERIMENT 5
Implementation of left recursion removal and left factoring.

4 Hours

EXPERIMENT 6
Finding the FIRST and FOLLOW of the non-terminals in a grammar.

2 Hours

EXPERIMENT 7
Construction of Top-Down Predictive Parsing Table for a grammar.

4 Hours

EXPERIMENT 8
Generation of Intermediate Code for an expression.

2 Hours

EXPERIMENT 9
Implementation of three address code.

4 Hours

EXPERIMENT 10
Construction of DAG representation for an expression.

Total: 30 Hours

15CS609 TECHNICAL SEMINAR II **0 0 2 1**

Course Objectives

- To develop the self-learning skills to utilize various technical resources available from multiple field.
- To promote the technical presentation and communication skills.
- To impart the knowledge on intonation, word and sentence stress for improving communicative competence, identifying and overcoming problem sounds.

Course Outcomes (COs)

1. Refer and utilize various technical resources available from multiple field.
2. Improve the technical presentation and communication skills.
3. Understand the importance of intonation, word and sentence stress for improving communicative competence, identifying and overcoming problem sounds.
4. Interact and share their technical knowledge to enhance the leadership skills.
5. Understand and adhere to deadlines and commitment to complete the assignments.

0 0 2 1

15CS610 MINI PROJECT IV

Course Objectives

- To develop knowledge to formulate a real world problem and project's goals.
- To identify the various tasks of the project to determine standard procedures.
- To identify and learn new tools, algorithms and techniques.
- To understand the various procedures for validation of the product and analysis the cost effectiveness.
- To understand the guideline to Prepare report for oral demonstrations.

Course Outcomes (COs)

1. Formulate a real world problem, identify the requirement and develop the design solutions.
2. Express the technical ideas, strategies and methodologies.
3. Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project.
4. Test and validate through conformance of the developed prototype and analysis the cost effectiveness.
5. Prepare report and present the oral demonstrations.

15GE611 LIFE SKILLS: APTITUDE II

0 0 2 -

Course Objectives

- The undergraduate students to such methods and practices that help, develop and nurture qualities such as character, effective communication, aptitude and holding ethical values.

Course Outcomes (COs)

1. Perform arithmetical operations with complex numbers.
2. Explain the meanings of a relation defined on a set, an equivalent relation and a partition of a set.
3. Calculate percentages in real life contexts , find any percentage of a given whole using their knowledge of fraction multiplication and increase / decrease a given whole by a percentage.
4. Calculate the Ratio, Proportions and Variation.
5. Identify the percentage gain or percentage loss.
6. Differentiate Pipes and Cisterns.
7. Demonstrate the situations like motion in as straight line , Boats and Streams , Trains, Races and clocks.
8. Evaluate the Counting techniques, Permutation and Combination, Recursion and generating functions.
9. Categorize the distributions of probability with respect to the random variables.
10. Discuss the different cases of Mixtures and Alligation.

3 Hours

NUMBER SYSTEMS

Introduction - definition- classification on Numbers -power cycles and remainders - short cut process - concept of highest common factor - concept of least common multiple - divisibility - number of zeros in an expression

3 Hours

PERCENTAGES

Introduction - definition and Utility of percentage - importance of base/denominator for percentage calculations - concept of percentage values through additions - fraction to percentage conversion table

3 Hours

AVERAGES

Introduction - average of different groups - addition or removal of items and change in average- replacement of some of the items

3 Hours

RATIO, PROPORTIONS AND VARIATION

Introduction- Ratio- properties-dividing a given number in the given ratio - comparison of ratios - proportions - useful results on proportion- continued proportion - relation among the quantities more than two - variation

3 Hours

PROFIT AND LOSS

Gain/Loss and percentage gain or percentage loss-multiplying equivalents to find sale price - relation among cost price, sale price, gain/loss and percentage gain or percentage loss - an article sold at two different selling price - two different articles sold at same selling price - percentage gain or percentage loss on selling price - percentage gain or percentage loss on whole property

3 Hours

TIME AND WORK

Introduction - Basic concepts -Concepts on working with different efficiency - Pipes and Cisterns - Work Equivalence (Man Days) -Alternative approach

3 Hours

TIME, SPEED AND DISTANCE

Definition - Basics of Time, Speed and Distance - Relative speed - Problems based on Trains- Problems based on Boats and Streams -Problems based on Races - time taken with two difference modes of transport - time and distance between two moving bodies

3 Hours

PERMUTATION AND COMBINATION

Definition - Fundamental rules - Theorems on Permutation - Theorems on Combination

3 Hours

PROBABILITY

Concept and importance of probability - underlying factors for Real- Life estimation of probability - Basic facts about probability - some important consideration while defining event.

3 Hours

MIXTURES AND ALLIGATION

Definition - alligation rule - mean value (cost price) of the mixture - some typical situations where allegation can be used.

Total: 30 Hours

Reference(s)

1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, 4th Edition, Tata McGraw-Hill Publishing Company Ltd, 2012
2. Arun Sharma, How to prepare for Data Interpretation for the CAT, 1st Edition, Tata McGraw-Hill Publishing Company Ltd, 2012
3. Dr.R S Aggarwal, Quantitative Aptitude, Seventh Revised Edition, S.Chand Publishing Company Ltd, 2013.
4. Edgar Thorpe , Course In Mental Ability And Quantitative Aptitude For Competitive Examinations, 3rd Edition, Tata McGraw-Hill Publishing Company Ltd, 2013
5. Arun Sharma, How to prepare for Quantitative Aptitude for the CAT, 5th Edition, Tata McGraw-Hill Publishing Company Ltd, 2013

15GE601 PROFESSIONAL ETHICS 2 0 0 2

Common to AE, AU, CE, ME, MTRS, BT,FT,TT,FD (VI Semester) ;
CSE, ECE, EEE, EIE, IT (VII Semester)

Course Objectives

- To understand Human values, ethical theory, codes of ethics, work place responsibilities, rights, engineering experimentation, global issues and contemporary ethical issues
- To understand personal ethics, legal ethics, cultural associated ethics and engineer's responsibility

Course Outcomes (COs)

1. Articulate engineering ethics theory with sustained lifelong learning to strengthen autonomous engineering decisions
2. Be an example of faith, character and high professional ethics, and cherish the workplace responsibilities, rights of others, public's welfare, health and safety
3. Contribute to shape a better world by taking responsible and ethical actions to improve the environment and the lives of world community
4. Fortify the competency with facts and evidences to responsibly confront moral issues raised by technological activities, and serve in responsible positions of leadership
5. Be Proficient in analytical abilities for moral problem solving in engineering situations through exploration and assessment of ethical problems supported by established experiments

6 Hours

UNIT I

HUMAN VALUES

Morals and Ethics - Honesty - Integrity - Values - Work Ethic - Civic Virtue - Respect for Others - Living Peacefully - Caring and Sharing - Self-Confidence - Courage - Co-operation - Commitment - Empathy.

UNIT II **6 Hours**

ENGINEERING ETHICS AND PROFESSIONALISM

Scope of 'Engineering Ethics'- Variety of moral issues - Types of inquiry - Accepting and sharing responsibility - Ethical dilemmas - Moral autonomy - Kohlberg's and Gilligan's theory - Consensus and controversy - Profession and Professionalism - Models of Professional Roles - Right action theories - Senses of corporate responsibility - Codes of ethics: Importance - justification - limitation - Abuse - Sample codes NSPE - IEEE - Institution of Engineers (India).

UNIT III **6 Hours**

ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering as experimentation - Engineers as responsible experimenters - Balanced outlook on law - Cautious optimism - Safety and risk - Assessing and reducing risk - Safe exits - The Challenger case study - Bhopal Gas Tragedy - The Three Mile Island and Chernobyl.

UNIT IV **6 Hours**

WORKPLACE RESPONSIBILITIES AND RIGHTS

Fundamental Rights - Responsibilities and Duties of Indian Citizens - Teamwork - Ethical corporate climate - Collegiality and loyalty - Managing conflict - Respect for authority - Collective bargaining - Confidentiality - Conflicts of interest - Occupational crime - Professional rights - Employee rights.

UNIT V **6 Hours**

GLOBAL ISSUES

Multinational corporations: Technology transfer and appropriate technology - International rights - promoting morally just measures - Environmental ethics: Engineering, ecology - economics - Human and sentient centred - and bio and eco centric ethics - Computer ethics and internet - Engineers as managers - Consulting engineers - Engineers as expert witnesses and advisors - Moral leadership.

FOR FURTHER READING

The Challenger case study - Bhopal Gas Tragedy - The Three Mile Island and Chernobyl case studies - Fundamental Rights, Responsibilities and Duties of Indian Citizens -Sample code of ethics like IETE, ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management.

Total: 30 Hours

Reference(s)

1. Mike W Martin and Roland Schinzinger, Ethics in Engineering, 4th edition, Tata McGraw Hill Publishing Company Pvt Ltd, New Delhi, 2014.
2. M Govindarajan, S Natarajan and V S Senthil Kumar, Engineering Ethics, PHI Learning Private Ltd, New Delhi, 2012.
3. R S Naagarazan, A text book on professional ethics and human values, new age international limited, New Delhi, 2006.
4. Charles D Fleddermann, Engineering Ethics, Pearson Education/ Prentice Hall of India, New Jersey, 2004.
5. Charles E Harris, Michael S Protchard and Michael J Rabins, Engineering Ethics - Concepts and Cases, Wadsworth Thompson Learning, United States, 2005.
6. http://www.slideworld.org/slidestag.aspx/human-values-and- Professional-ethics

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	5					10					5														20
2		5			5						10														20
3		5					10				5														20
4	5						5			5	5														20
5	5					5				5	5														20
																								Total	100

Assessment Questions

Remember

1. Define Human Values.
2. What are Morals and Values?
3. What do you mean by Civic virtue and Respect for others?
4. Write the various meanings of Spirituality?
5. List four different types of Virtues.
6. Mention different Human values.
7. What is meant by moral autonomy?
8. Classify the types of inquiry.
9. What are the steps needed in confronting moral dilemmas?
10. List the levels of moral development suggested by Kohlberg.
11. What do you understand by self-interest and ethical egoism?
12. What are the steps needed in confronting moral dilemmas?
13. What are the three virtues of religion?
14. What are the professional responsibilities?

Understand

1. Which are the practical skills that will help to produce effective independent thought about moral issues?
2. Why does engineering have to be viewed as an experimental process?
3. Why isn‘t engineering possible to follow a random selection in product design?
4. Why is the code of ethics important for engineers in their profession?
5. What does the Balanced Outlook on Law stress in directing engineering practice?
6. Are the engineers responsible to educate the public for safe operation of the equipment? How?
7. What kind of responsibility should the engineer have to avoid mistakes that may lead to accident due to the design of their product?
8. What is the use of knowledge of risk acceptance to engineers?
9. Why is Environmental Ethics so important to create environmental awareness to the general public?
10. Why do the engineers refuse to do war works sometimes?

Apply

1. How does the consideration of engineering as a social experimentation help to keep a sense of autonomous participation is a person’s work?
2. How does the code of ethics provide discipline among the engineers?
3. Exemplify the space shuttle Challenger case accident?
4. How does the manufacturer understand the risk in a product catalog or manual?
5. How does the knowledge of uncertainties in design help the engineers to access the risk of a product?

6. How can the quantifiable losses in social welfare resulting from a fatality be estimated? Give some examples.
7. How does the engineer act to safeguard the public from risk?

15CS702 GRAPHICS AND MULTIMEDIA 3 0 0 3

Course Objectives

- Understand the fundamentals of graphics and multimedia.
- Gain knowledge in the concepts of 2D and 3D graphics programming.
- Acquire skills related to multimedia compression and animation.

Course Outcomes (COs)

1. Develop 2D transformation using 2D primitives.
2. Design and develop 3D projections and transformations.
3. Implement graphics programming using OpenGL.
4. Explore the basic of multimedia.
5. Illustrate the multimedia authoring systems.

UNIT I **9 Hours**

2D PRIMITIVES

Output primitives- Line, Circle and Ellipse drawing algorithms - Attributes of output primitives- Two dimensional Geometric transformations - Two dimensional viewing - Cohen-Sutherland Line Clipping, Sutherland Hodgeman Polygon clipping algorithms.

UNIT II **8 Hours**

3D CONCEPTS

Parallel and Perspective projections - Three dimensional object representation - Polygons, Curved lines, Splines, Quadric Surfaces- Visualization of data sets - 3D transformations - Viewing -Visible surface identification

UNIT III **10 Hours**

GRAPHICS PROGRAMMING

Color Models- RGB, YIQ, CMY, HSV - Animations - General Computer Animation, Raster, Key frame - Graphics programming using OPENGL - Basic graphics primitives - Drawing three dimensional objects

UNIT IV **9 Hours**

MULTIMEDIA BASICS

Introduction and definitions - applications - elements - Animations - Compression-Types of Compressions: Lossless - Lossy - Video compression - Image Compression -Audio compression- Data and file format standards

UNIT V **9 Hours**

MULTIMEDIA SYSTEMS

Multimedia Authoring Systems - Hypermedia Design considerations - User Interface Design - Object Display and Play back issues- Hypermedia Messaging- Distributed Multimedia Systems - Components - multimedia Object Servers -Managing Distributed Objects

FOR FURTHER READING

Virtual reality, Augmented reality, Content based retrieval in digital libraries.

Total: 45 Hours

Reference(s)

1. Donald Hearn, M.Pauline Baker, Computer Graphics C Version, 2nd edition, Pearson Education, 2004.
2. Ze-Nian Li and Mark S.Drew, Fundamentals of Multimedia, 1st Edition,Pearson Education, 2007
3. F.S.Hill,Computer Graphics using OPENGL, 2nd edition, Pearson Education,2009
4. Prabhat K Andleigh, Kiran Thakrar, Multimedia systems design, 1st Edition, PHI,2007

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	4			2	6																			14
2	2					6				6				6				2				6			28
3	2				2					4				6				4				6			24
4	2	2				4				4				2											14
5	2	2			2					4				4								6			20
																								Total	100

Assessment Questions

Remember

1. List 3 types of printer.
2. Specify the operations involved in a 2D Transformation.
3. Define Spline.
4. Write the 2 properties of Bezier Curves.
5. Define Document Imaging.
6. Specify the basic hardware devices needed for multimedia.
7. List out the three color models.
8. Define an Authoring system.
9. List the advantages of OpenGL package.
10. List any five CD format you are aware of.

Understand

1. Write a procedure to generate the reflection of an object.
2. Explain the steps involved for rotating the object from any pivot point.
3. Write the rotation procedure in 3D.
4. Compare HSV with CMY color model.
5. Write how to represent an object on 3D scene.
6. Compare optical character recognition and handwritten character recognition.
7. Compare and contrast lossy &lossless compression technique.
8. State the difference between data duplication and data replication.
9. List out the 3 types of multimedia server.

10. Specify the steps needed for Hypermedia report generation.

Apply

1. Explain how the rotation of an object about the pivot point is performed.
2. Rasterizing the line from (-1,1) to (5,-8) using Bresenhams line drawing Algorithm.
3. Derive transformation matrix for 3D scaling followed by rotation about fixed point.
4. Rotate a triangle ABC with vertices A(2, 3, 1), B(3, 4, 5) and C(5, 6, 7) about a line Y = 2
5. Derive the 3D transformation matrix for rotation about (i) an arbitrary axis (08) (ii) an arbitrary plane.
6. Specify how recording and editing is done in digital audio.
7. Write a C program to implement image compression algorithm.
8. Write a c program for implementing the 3D projection.
9. Convert the HSV values to RGB values using C program.
10. Implement the 3D scenes.

Analyse

1. State the difference between data duplication and data replication.
2. Specify how the objects motion in an animation system.
3. Compare various types of compression and decompression algorithms.
4. Compare and contrast the use of MIDI and digitized audio in multimedia production.
5. Describe the different key aspects of integrated multimedia message standards.
6. Differentiate the types of multimedia authoring systems.

Evaluate

1. Given a circle radius r=5, demonstrate the midpoint circle algorithm by determining positions along the circle octant in the first quadrant form x=0 to x=y.
2. Derive the general transformation matrix of 2D reflection of an object about the line y=x.
3. Prove that the multiplication of 3D transformations matrices for each of the following sequence of operations is commutative i) Any two successive translations.
4. Consider a triangle ABC whose coordinates are A[4,1], B[5,2], C[4,3]
   a. Reflect the given triangle about X axis.
   b. Reflect the given triangle about Y-axis

Create

1. To write a C program for implementation of 2D transformation.
2. Design a polygon using DDA line drawing algorithm.
3. Design 2D Animation of a moving wheel and a pendulum.

15CS703 MOBILE AND PERVASIVE COMPUTING 3 0 0 3

Course Objectives

- Understand the fundamental concepts of mobile computing.
- Acquire knowledge on mobile technologies and networking.

Course Outcomes (COs)

1. Explore the basics of mobile computing with its security and standards.
2. Explicate the emerging mobile technologies.
3. Describe the concept of WLAN and mobile network.
4. Identify the fundamentals of pervasive computing.
5. Elucidate the applications and operating systems of pervasive computing.

UNIT I **8 Hours**

INTRODUCTION TO MOBILE COMPUTING

Mobility of bits and bytes - Wireless the beginning - Mobile computing- Dialogue control- Networks - Middleware and gateways- Application and services- Developing mobile computing applications- Security- Standards- Players in wireless space- Architecture for mobile computing-Three tier architecture.

UNIT II **8 Hours**

MOBILE TECHNOLOGIES

Emerging technologies: Bluetooth-Radio frequency identification- Wireless broadband-Mobile IP-Internet protocol version 6- Short message Service: Mobile computing over SMS-Short message services-General packet radio services: Packet data network- Architecture-Operations-Data services-Application for GPRS-Limitations of GPRS.

UNIT III **10 Hours**

MOBILE NETWORKING

Wireless LAN: Advantage-Standards-Architecture-Mobility-Deploying-Mobile Ad Hoc networks and sensor networks-Security- Wi-Fi verses 3G-Internet networks and interworking: Fundamentals of call processing - Intelligence in the networks-SS #7 signaling-In conceptual model-Soft switch-Programmable networks.

UNIT IV **9 Hours**

INTRODUCTION TO PERVASIVE COMPUTING

Introduction to pervasive computing: Scenarios - Roaming environment-Pervasive computing infrastructure-Personalized services - Pervasive computing market- M-business- Applications examples-Hardware - Human - Machine interfaces biometrics and operating systems.

UNIT V **10 Hours**

PERVASIVE COMPUTING APPLICATION

Device connectivity - Protocols, security and device management - Voice technology: Speech application - Speech and Pervasive Computing - Personal digital assistants: Device- Operating systems-Characteristics-Software components-Standards-Mobile applications

FOR FURTHER READING

IP Multimedia Subsystem - Mobile VoIP - Application to voice access - Example

Total: 45 Hours

Reference(s)

1. Asoke K Talukder and Poopa R Yavagal, Mobile Computing,Tata McGraw-Hill,2013
2. Jochen Buekhardt, Horst Henn, Stefan Hepper, Klaus Rintdorff and Thomas Schack,Pervasive Computing: Technology and architecture of mobile internet applications,Pearson Education,2010
3. Reza B Fat and Roy T Fielding, Mobile Computing Principles, Cambridge University Press, 2010.
4. Hansmann Uwe, Merk Lothar and Nicklous Mart, Pervasive Computing: The Mobile World, Springer Professional, 2011.
5. Chimay J, Anumba and Xiangyu Wang, Mobile and Pervasive Computing, Springer Professional, 2012.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	2				6					6			2			2								20
2	2	3				6					6			2											19
3	2	2				1					6						1								12
4	2	2				2			1				1	2	6			6							22
5	3	2				6			1		6		1	2	6										27
																								Total	100

Assessment Questions

Remember

1. Define mobile computing.
2. List the functions of mobile computing.
3. List the classification of Bluetooth protocol stack.
4. State the different types of networks used by mobile computing.
5. List the challenges faced in designing a good wireless adhoc network.
6. List the any six elements in a soft switch architecture network.
7. Define pervasive computing.
8. List the key enablers of m-business.
9. List the characteristics of Bluetooth.
10. State the uses of desktop speech recognition.

Understand

1. Give the schematic representation of mobile computing environment and explain each.
2. Summarize the importance of IPv6 with its addressing, security and packet payload.
3. Give the schematic representation of 802.11architecture and explain about each layer.
4. Summarize the capabilities of current hand held computing devices in mobile environment with the evolution of each device technology.
5. With a neat sketch exemplify the perception, technology and business aspects of pervasive computing.
6. Explain PALM OS functionalities and features with suitable diagram.
7. Illustrate the speech application in different areas with suitable example.
8. Identify the importance of PDA with its internal components and neat diagram.
9. Explain how SCP is used to implement virtual calling card facility.
10. Illustrate the ISUP call establishment procedure with its suitable diagram.

Apply

1. Show how mobile computing functions are logically divided.
2. Show how Bluetooth security is achieved in wireless environment.
3. Show how SS#7 security is achieved in network.
4. Demonstrate how OSGi gateway integrated into a car information system.
5. Show how transcoding is done in web applications.
6. Implement the two main tasks performed by WAP gateway
7. Demonstrate how the messages are exchanged between WAP gateway and mobile devices.
8. Find the procedure to establish virtual home.
9. Demonstrate how the E-mail access is done via WAP and voice.
10. Find the importance of biometric authentication with diagram.

Analyse / Evaluate

1. Differentiate wireless and ad-hoc networks.
2. Compare mobile IP and IPv6.
3. Differentiate Adhoc and Infrastructure mode.
4. Compare the expected life time for NiCad, NiMH and Li ion batteries.
5. Differentiate EPOC16 Vs EPOC 32.
6. PC/SC is the standard interface for native smart card aware application on windows operating systems – Justify with its architecture.
7. To run a WAP application, a complex WAP infrastructure is required- Analyze.
8. Compare word and character recognition in hand writing recognition.
9. Compare desktop computer and portable computer like PDA.
10. Compare IEEE 802.11a and IEEE 802.11b.

15CS704 CLOUD INFRASTRUCTURE SERVICES 3 0 0 3

Course Objectives

- Understand the phases of journey to the cloud.
- Describe the key elements of Classic data center.
- Understand the concepts of virtualized Data Center.

Course Outcomes (COs)

1. Explore the basics of cloud computing.
2. Explain the Classic Data Center and its applications.
3. Build a virtualized Data Center using cloud.
4. Manage the Cloud infrastructure and services.
5. Implement cloud security measures.

UNIT I **9 Hours**

JOURNEY TO THE CLOUD

Business drivers for cloud computing, Definition of cloud computing, Characteristics of cloud computing as per NIST, steps involved in transitioning from classic data center to cloud computing environment.

UNIT II **9 Hours**

CLASSIC DATA CENTER (CDC)

Application, DBMS, Compute, Storage and Networking, Object based and Unified storage technologies, Business continuity overview and backup, Replication technologies, CDC Management.

UNIT III **9 Hours**

VIRTUALIZED DATA CENTER (VDC)

Compute, Storage, Network virtualization techniques, Virtual machine components and process of converting physical to VMs, Block and file level storage virtualization, Virtual provisioning and automated storage tiering, Virtual LAN (VLAN) and Virtual SAN(VSAN) and their benefits, Key network traffic management techniques in VDC, Methods for implementing desktop virtualization, their benefits, and considerations, Application virtualization methods, benefits, and considerations, Backup and recovery of Virtual Machines(VMs), VM replication and migration technologies Recovery options from total site failure due to disaster.

UNIT IV **9 Hours**

CLOUD COMPUTING AND INFRASTRUCTURE

Cloud services models, Cloud deployment methods, Economics of Cloud, Cloud infrastructure components, Cloud service creation process, and Cloud service management process.

UNIT V **9 Hours**

CLOUD SECURITY AND MIGRATION TO CLOUD

Security concerns and counter measures in a VDC and Cloud environment, Governance, Risk, and Compliance aspects in Cloud, Cloud security best practices, Cloud models suitable for different categories of users, Consideration for choosing applications suitable for Cloud, Different phases to adopt the Cloud.

FOR FURTHER READING

Cloud evolution- Data center requirements- vmware virtualization- Google Infrastructure- Google Cloud Security

Total: 45 Hours

Reference(s)

1. Cloud Infrastructure and Services EMC2 Bangalore Book.
2. Anthony T Velte, Cloud Computing: A practical Approach, Tata McGraw Hill, 2009.
3. Halper Fern, Kaufman Marcia, Bloor Robin, Hurwit Judith, Cloud Computing for Dummies, Wiley India, 2009.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	4	4			2	4																			14
2	2				2	4				2				2				2	2			6			22
3	2				2					2				6	3							6			21
4		2			2					2				6	3							6			21
5		4				4				6								4				4			22
																								Total	100

Assessment Questions

Remember

1. Define cloud computing.
2. List the four characteristics of cloud.
3. Define a virtual machine.
4. List the three business drivers for cloud computing.
5. Recall Virtual LAN (VLAN).
6. Recall Virtual SAN (VSAN).
7. List the five services in cloud computing.
8. Define DBMS.
9. List any five applications of cloud.
10. List any two measures in a VDC.

Understand

1. Explain the characteristics of cloud computing as per NIST.
2. Classify the object based and Unified storage technologies.
3. Illustrate the methods for implementing desktop virtualization, their benefits and considerations.
4. Summarize the cloud infrastructure components.
5. Identify the considerations for choosing applications suitable for cloud.
6. Classify the cloud computing models.
7. Indicate the security measure suitable for aengineering college cloud.
8. Formulate a virtualized data center for a textile company.
9. Summarize the applications of cloud.

Apply

1. Predict the method of making a transition from classic data center to cloud computing environment.
2. Implement the approach to develop CDC management.
3. Implement the backup and recovery mechanism for virtual machines (VMs).
4. Construct a cloud service for a real time application.
5. Construct cloud models suitable for different categories of users.
6. Construct a Iaas model for a primary school.
7. Implement a Saas model for an IT company.
8. Demonstrate the cloud security measures.
9. Design a virtualized data center for an IT company.
10. Design a security measure for the cloud in your college.

Analyse

1. Conclude the deployment model suitable for any educational institution.
2. Organize the security measures to be used for a cloud storage.
3. Justify the reason for moving towards Replication technologies.
4. Differentiate the various cloud models with respect to its pricing.
5. Differentiate Iaas and Saas.

Evaluate

1. Determine the best practices for cloud security.
2. Criticize the various virtualization methods along with their benefits and considerations.
3. Determine the applications of Iaas.
4. Determine the applications of Saas.
5. Determine the applications of Paas.

Create

1. Create a customized virtualized cloud for desktop applications.
2. Plan a storage and networking mechanism for an engineering college using cloud.

15CS707 GRAPHICS AND MULTIMEDIA LABORATORY

0 0 2 1

Course Objectives

- Create 3D graphical scenes using open graphics library suits.
- Perform image manipulation, enhancement.
- Create animations and multimedia presentation/Game/Project.

Course Outcomes (COs)

1. Implement the 2D and 3D line drawing algorithms.
2. Implement 2D and 3D transformations.
3. Create 3D graphical scenes using open graphics library suits.
4. Design and edit the animation.

2 Hours

EXPERIMENT 1

Write program to draw line using Bresenhams Line drawing program and apply the above program to create Solid Line, Dotted Line, Center Line, Dashed Line and User bit Line using line attributes.

4 Hours

EXPERIMENT 2

Perform 2D Geometric transformations

2 Hours

EXPERIMENT 3

Write a program to draw 3D objects using openGL

4 Hours

EXPERIMENT 4

Write a program to perform Cohen Sutherland line clipping program.

2 Hours

EXPERIMENT 5

Write a program to perform Sutherland Hodgeman polygon clipping program.

4 Hours

EXPERIMENT 6

Write a program to apply translation and rotation to 3-Dimensional shapes.

2 Hours

EXPERIMENT 7

Compression Algorithms - To implement text and image compression algorithms.

4 Hours

EXPERIMENT 8
2D Animation - To create Interactive animation using any authoring tool

2 Hours

EXPERIMENT 9
Image Editing and Manipulation - Basic Operations on image using any image editing software, Creating gif animated images, Image optimization

4 Hours

EXPERIMENT 10
Create three dimensional scenes

Total: 30 Hours

15CS708 MOBILE APPLICATION DEVELOPMENT LABORATORY

0 0 2 1

Course Objectives

- Understand the fundamental concepts of mobile computing.
- Acquire knowledge on mobile technologies and networking.

Course Outcomes (COs)

1. Develop forms for mobile applications.
2. Implement mobile applications using Android SDK.
3. Create applications using iPhone SDK.
4. Test mobile applications using emulators.

2 Hours

EXPERIMENT 1
General Form Design in mobile application development

4 Hours

EXPERIMENT 2
Mobile browser based interactive applications

2 Hours

EXPERIMENT 3
Applications using controls

4 Hours

EXPERIMENT 4
Mobile networking applications (SMS/Email)

2 Hours

EXPERIMENT 5
Applications involving data retrieval

4 Hours

EXPERIMENT 6
Launching services in a mobile phone

2 Hours

EXPERIMENT 7
Web portal development

4 Hours

EXPERIMENT 8
Applications using Android SDK framework (like interactive applications, applications that make use of accelerometer sensor, video applications)

2 Hours

EXPERIMENT 9
Applications that use the iPhone SDK framework

4 Hours

EXPERIMENT 10
Testing the applications using emulators

Total: 30 Hours

15CS709 MINI PROJECT V 0 0 2 1

Course Objectives

- To develop knowledge to formulate a real world problem and project's goals.
- To identify the various tasks of the project to determine standard procedures.
- To identify and learn new tools, algorithms and techniques.
- To understand the various procedures for validation of the product and analysis the cost effectiveness.
- To understand the guideline to Prepare report for oral demonstrations.

Course Outcomes (COs)

1. Formulate a real world problem, identify the requirement and develop the design solutions.
2. Express the technical ideas, strategies and methodologies.
3. Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project.
4. Test and validate through conformance of the developed prototype and analysis the cost effectiveness.
5. Prepare report and present the oral demonstrations.

15GE710 LIFE SKILLS : COMPETITIVE EXAMS 0 0 2 -

Course Objectives

- Understand the concepts of data structures, algorithms and computer architecture.
- Understand the OS and design of compilers.
- Familiar with the database and network concepts.

Course Outcomes (COs)

1. Explore the concepts of data structures, algorithms and computer architecture.
2. Elucidate the concepts of operating systems and designing compilers.
3. Explain the concepts of networks and manage databases.

10 Hours

UNIT 1

Data structures and algorithmsIntroduction -Linear data structures - Nonlinear data structures Asymptotic Notation - Space and Time complexity - Greedy approach - Dynamic Programming - Divide and conquer - Hashing Computer Organization: Machine Instruction and Addressing modes- Memory interface instruction Pipe lining - Cache and Main memory - Secondary storage.

10 Hours

UNIT 2

Compiler Design: Lexical analysis -Parsing - Syntax directed translation - Intermediate and target code generation - Basics of code optimization. Operating System: Processes - Threads - Deadlock - CPU scheduling - Memory management and virtual memory.

10 Hours

UNIT 3

Database Management System: File systems -ER-model - Relational model (relational algebra, tuple calculus) - Database design (integrity constraints, normal forms) -Query languages (SQL) - File structures - Transactions and concurrency control.
Computer Networks: ISO/OSI Layer - Flow and Error control techniques - Routing algorithms - Congestion control - TCP/UDP and sockets - IP(v4) - Application layer protocols - Digital Signature - Firewalls.

Total: 30 Hours

Reference(s)

1. M.A.Weiss, Data Structures and Algorithm Analysis in C, Pearson Education Asia, 2013.
2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, Computer Organization, McGraw-Hill, Third Reprint 2015.
3. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne,"Operating System Principles", John Wiley & Sons (Asia) Pvt. Ltd, 9th Edition, 2013.
4. Alfred V. Aho, Ravi Sethi and Jeffrey D. Ullman Compilers: Principles, Techniques and Tools, 2nd Edition, Pearson, 2012.
5. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, Database System Concepts, McGraw - Hill, 2015.
6. Behrouz A.Forouzan, Data Communication and Networking, 5th Edition, Tata McGraw-Hill, 2014.

15CS804 PROJECT WORK

- - - 9

Course Objectives

- To develop knowledge to formulate a real world problem and project's goals.
- To identify the various tasks of the project to determine standard procedures.
- To identify and learn new tools, algorithms and techniques.
- To understand the various procedures for validation of the product and analysis the cost effectiveness.
- To understand the guideline to Prepare report for oral demonstrations.

Course Outcomes (COs)

1. Formulate a real world problem, identify the requirement and develop the design solutions.
2. Express the technical ideas, strategies and methodologies.
3. Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project.
4. Test and validate through conformance of the developed prototype and analysis the cost effectiveness.
5. Prepare report and present the oral demonstrations.

LANGUAGE ELECTIVES

15LE101 BASIC ENGLISH I

3 0 0 3

Course Objectives (COs):

- To offer students the basics of the English Language in a graded manner.
- To promote efficiency in English Language by offering extensive opportunities for the development of all the four language skills (LSRW) within the classroom.
- To focus on improving and increasing vocabulary.
- To improve spelling and pronunciation by offering students rigorous practice and exercises.

Course Outcome (CO):

1. Converse in English with more confidence.

Unit I **7.5 Hours**

Module	Vocabulary/ Grammar	Skills Sets	Skill Sets
1	Basic words- 12 most used words in English, usage and pronunciation	Starting a conversation and talking about what one does	Sentence construction bolstered by mother tongue
2	Basic words- 20 often used words, usage and pronunciation	Analysing an action plan	Creating and presenting one's own action plan
3	Basic words with a focus on spelling	Discriminative listening	Informal conversation
4	Basic words- 10 oft used words, usage and pronunciation	Content listening and Intonation	Reading comprehension
5	Unit Test I		

Unit II **7.5 Hours**

Module	Vocabulary/ Grammar	Skills Sets	Skill Sets
6	Basic words + greetings to be used at different times of the day	Formal conversation	Intonation to be used in formal address
7	Last 28 of the 100 most used words	Informal conversation between equals	Reading practice and peer learning
8	Using the 14 target words to form bigger words	Informal dialogues using contracted forms	Guided speaking- talking to peers using contracted forms
9	Palindromes, greetings- good luck, festivals	Placing a word within its context- culling out meaning	Offering congratulations
10	Unit Test II		

Unit III **7.5 Hours**

Module	Vocabulary/ Grammar	Skills Sets	Skill Sets
11	Homophones	Formal and informal methods of self-introduction	Let's Talk is a group activity that gives them some important pointers of speech
12	Homophone partners, matching words with their meanings	Contracted forms of the – be verbs, 've and 's	Translating English sentences to Tamil
13	Briefcase words- finding smaller words from a big word	Formal and informal ways of introducing others	Team work- speaking activity involving group work, soft skills
14	Compound words and pronunciation pointers	Giving personal details about oneself	Using the lexicon
15	Unit Test III		

Unit IV **7.5 Hours**

Module	Vocabulary/ Grammar	Skills Sets	Skill Sets
16	Proper and common nouns	Asking for personal information and details	Pronunciation pointers- an informal introduction to the IPA
17	Pronouns	Telephone skills and etiquette	Reading aloud and comprehension
18	Abstract and common nouns	Dealing with a wrong number	Reading practice and comprehension
19	Group names of animals, adjectives	Taking and leaving messages on the telephone	Pronunciation pointers
20	Unit Test IV		

Unit V **7.5 Hours**

Module	Vocabulary/ Grammar	Skills Sets	Skill Sets
21	Determiners	Interrupting a conversation politely- formal and informal	Pair work reading comprehension
22	Conjugation of the verb 'to be'- positive and negative forms	Thanking and responding to thanks	Comprehension questions that test scanning, skimming and deep reading
23	Am/is/are questions	Giving instructions and seeking clarifications	Small group activity that develops dialogue writing
24	Present continuous tense-form and usage	Making inquiries on the telephone	Finishing sentences with appropriate verbs
25	Unit Test V		

Unit VI **7.5 Hours**

Module	Vocabulary/ Grammar	Skills Sets	Skill Sets
26	Words with silent 'b' Present continuous questions	Calling for help in an emergency	Dialogue writing
27	Words with silent 'c' Simple present tense- form and usage	Making requests and responding to them politely	Identifying elements of grammar in text extract
28	Simple present tense- rules	Describing people	Guided writing
29	Words with silent 'g' Questions in the simple present tense	Describing places	Filling in the blanks with correct markers of tense
30	Unit Test VI		

Total: 45 Hours

Reference(s)

1. Basic English Module, L&L Education Resources, Chennai, 2011.

15LE102 COMMUNICATIVE ENGLISH I 3 0 0 3

Course Objectives

- To acquire effective listening and reading skills.
- To develop speaking and writing skills.
- To improve their understanding of grammar, vocabulary and pronunciation.

Course Outcomes (COs)

1. Develop their fluency and language competency in English.

UNIT I **9 Hours**

GRAMMAR

Content words- Structural words - Subject - Verbs and verb phrase - Subject - Verb agreement - Tenses - Active voice and passive voice - Sentence types (declarative, imperative, exclamatory & interrogative) - Framing questions - Comparative adjective

UNIT II **9 Hours**

LISTENING

Listening for specific information: Short conversations / monologues - Gap filling - Telephone conversations - Note-taking - Listening for gist / interviews - Listening to songs and completing the lyrics - Clear individual sounds - Word stress - Telephone etiquette

UNIT III **9 Hours**

READING

Prediction - Skimming for gist - Scanning for specific information - Understanding text and sentence structure

UNIT IV **9 Hours**

WRITING

Short documents: E-mail - memo - note - message- notice -advertisement -Short reports / proposals - Principles of writing a good paragraph: Unity, cohesion and coherence -Identifying the topic sentence and controlling ideas - Paragraph writing (descriptive, narrative, expository & persuasive)

UNIT V **9 Hours**

SPEAKING

Self-introduction -Giving personal and factual information - Talking about present circumstances, past experiences and future plans - Mini-presentation - Expressing opinions and justifying opinions - Agreement / disagreement - Likes and dislikes - Speculation - Tongue twisters

FOR FURTHER READING

Novel Reading -Book Review

Total: 45 Hours

Reference(s)

1. Murphy, Raymond. English Grammar in Use - A Self-Study Reference and Practice Book for Intermediate Learners of English .IVed. United Kingdom: Cambridge University Press. 2012.
2. Seely, John. Oxford Guide to Effective Writing and Speaking. Indian ed. New Delhi: Oxford University Press. 2005.
3. Anderson, Kenneth etal. Study Speaking: A Course in Spoken English for Academic Purposes. United Kingdom: Cambridge University Press. 2004.

15LE201 BASIC ENGLISH II

3 0 0 3

Course Objectives (COs):

- To give room for a natural acquisition of Basic English Grammar through ample listening, reading and writing inputs.
- To specifically focus on speaking and conversation skills with an aim to increase speaking ability.
- To improve Spelling and Pronunciation by offering rigorous practice and exercises.

Course Outcome (CO):

1. Communicate better with improved fluency, vocabulary and pronunciation.

Unit I **7.5 Hours**

Module	Vocabulary/ Grammar	Skills Sets	Skill Sets
31	Difference between Present Continuous and Simple Present tense.	Calling for help in an emergency	Reporting an event- journalistic style
32	Verbs ‘have’ and ‘have got’	Describing animals	Asking for and giving directions
33	Simple Past Tense	Inviting people, accepting and declining invitations	Self- enquiry and offering one’s opinion on a given topic.
34	Spelling rules & table of Irregular Verbs	Refusing an invitation	Reading and practicing pre-written dialogues
35	Unit Test I		

Unit II **7.5 Hours**

Module	Vocabulary/ Grammar	Skills Sets	Skill Sets
36	Questions and the negative form of the simple past tense	Apologizing and responding to an apology	(Reading) conversation practice
37	Asking questions in the simple past tense	Reading comprehension	Seeking, granting and refusing permission
38	Past continuous tense	Paying compliments and responding to them	Pair work: writing dialogues and presenting them
39	Difference between simple past and past continuous- when and where to use each	Describing daily routines	Reading and comprehension skills
40	Unit Test II		

Unit III **7.5 Hours**

Module	Vocabulary/ Grammar	Skills Sets	Skill Sets
41	Simple future tense	Talking about the weather	Making plans- applying grammar theory to written work
42	Simple future tense- more aspects, possessive pronouns	Talking about possessions	Opening up and expressing one's emotions
43	Future continuous tense	Talking about current activities	Listening comprehension
44	Revision of future tense- simple and continuous forms, prepositions used with time and date	Asking for the time and date	Discussion- analyzing and debating a given topic
45	Unit Test III		

Unit IV **7.5 Hours**

Module	Vocabulary/ Grammar	Skills Sets	Skill Sets
46	Articles a/an	Writing, speaking and presentation skills	Transcribing dictation
47	Singular- Plural (usage of a/an)	Reading practice- independent and shared reading	Comprehension –logical analysis, process analysis and subjective expression
48	Countable and uncountable nouns-	Listening	Vocabulary: using context

	a/an and some	comprehension	tools to decipher meaning
49	Articles- the	Sequencing sentences in a paragraph	Listening to a poem being recited, answer questions on it and practice reciting the same
50	Unit Test IV		

Unit V **7.5 Hours**

Module	Vocabulary/ Grammar	Skills Sets	Skill Sets
51	Articles- the: usage and avoidance	Speaking: sharing stories about family, village/town, childhood, etc. 10 students	Listening: comprehend and follow multiple step instructions read out by the teacher
52	Articles- the: usage and avoidance with like and hate	Speaking: sharing stories about family, village/town, childhood, etc. 10 students	Reading: make inferences from the story about the plot, setting and characters
53	Articles- the: usage and avoidance with names of places	Speaking: sharing stories about family, village/town, childhood, etc. 10 students	Comprehension passage
54	This/ that/ these and those	Writing a notice-announcement	Speaking: Debate
55	Unit Test V		

Unit VI **7.5 Hours**

Module	Vocabulary/ Grammar	Skills Sets	Skill Sets
56	One and ones	Collaborative learning- problem solving	Writing short answers to questions based on reading
57	Capitalization and punctuation	Controlled writing	Listen to a story and respond to its main elements
58	Syntax and sentence construction-rearrange jumbled sentences	Guided writing	Listen to a poem and discuss its elements
59	Cloze	Free writing	Frame simple yet purposeful questions about a given passage
60	Unit Test VI		

Total: 45 Hours

Reference(s)

1. Basic English Module, L&L Education Resources, Chennai, 2011.

15LE202 COMMUNICATIVE ENGLISH II

3 0 0 3

Course Objectives

- To acquire skills for using English in workplace effectively.
- To communicate for essential business needs.
- To prepare students for taking BEC Vantage level examination which is an International Benchmark for English language proficiency of Cambridge English Language Assessment (CELA).
- To enhance the communicative ability from Intermediate to Upper Intermediate level.

Course Outcomes (COs)

1. Get International recognition for work and study.
2. Use English confidently in the International business environments.
3. Take part in business discussion, read company literature, write formal and informal business correspondences and listen and understand business conversations.

UNIT I **9 Hours**

GRAMMAR AND VOCABULARY

Simple, compound and complex sentences - Direct and indirect speech - Conditionals - Business vocabulary - Collocations -Discourse markers

UNIT II **9 Hours**

LISTENING

Listening to identify topic, content, function - Sentence stress - Rhythm - Intonation

UNIT III **9 Hours**

READING

Reading graphs and charts - Skimming and scanning texts - Job advertisements - Read business articles for specific information - Understanding the structure of a text - Error identification

UNIT IV **9 Hours**

WRITING

Formal and Informal English - Longer Documents: writing individual paragraphs to longer text, Business Correspondence, Reports and Proposals - Transcoding

UNIT V **9 Hours**

SPEAKING

Collaborative task - Turn taking (initiating and responding appropriately) - Negotiating - Exchanging information - Language Functions: suggesting - comparing and contrasting - expressing - Finding out facts, attitudes and opinions - Commonly mispronounced words

FOR FURTHER READING

Reading Novels (The Monk Who Sold His Ferrari by Robin Sharma; Three Mistakes of my Life by Chetan Bhagat; The Fountainhead by Ayn Rand)

Total: 45 Hours

Reference(s)

1. Jeremy Comfort, Pamela Rogerson, Trish Stott, and Derek Utley, Speaking Effectively Developing Speaking Skills for Business English, Cambridge: Cambridge University Press, 2002.
2. Eric H. Glendinning and Beverly Holmstrom, Study Reading: A Course In Reading for Academic Purposes.United Kingdom: Cambridge University Press, 2004.

15LC203 CHINESE **3 0 0 3**

Course Objectives (COs):

- To help students acquire the basics of Chinese language.
- To teach them how to converse in Chinese in various occasions.
- To teach the students the Chinese cultural facets and social etiquettes.

Course Outcomes (COs):

An ability to communicate effectively

1. Improve fluency in Chinese.
2. Clarity on the basic sounds of the Chinese Language.

Unit I **9 Hours**

Nǐ hǎo - 你好

Xuéhuì wènhòu de jīběn biǎodá yòngyǔ - 学会问候的基本表达用语 ; Xuéhuì jièshào zìjǐ de xìngmíng, guójí - 学会介绍自己的姓名，国际 ; Xuéhuì hànyǔ pīnyīn de shèngmǔ - 学会汉语拼音的圣母 ; yùnmǔ hé shēngdiào - 韵母和声调 ; Pīn dú hé shēngdiào liànxí - 拼读和声调练习

Unit II **9 Hours**

Xiànzài jǐ diǎn - 现在几点

Xuéhuì shíjiān, rìqí de biǎodá - 学会时间，日期的表达 ; Rèshēn - 热身 ; Shēngcí - 生词 ; Jùzi - 句子 ; Huìhuà - 会话 ;Huódòng - 活动 ; Kàn tú wánchéng huìhuà - 看图完成会话 ; Xué cíyǔ shuō shíjiān ; Tìhuàn liànxí - 替换练习Dú yī dú ránhòu lián xiàn - 读一读然后连线 ; Bǎ xiàmiàn de cí àn zhèngquè de shùnxù páiliè chéngjù - 把下面的词按正确的顺序排列成句

Unit III **9 Hours**

Nà jiàn máoyī zěnme mài? - 那件毛衣怎么卖？

Xúnwèn jiàqián jí qián de biǎodá - 询问价钱及钱的表达 ; Tǎojiàhuánjià - 讨价还价 ; Tíchū duì suǒ mǎi dōngxī dàxiǎo, yánsè děng děng jùtǐ yāoqiú - 提出对所买东西大小，颜色等等具体要求 ; Shēngcí Huódòng - 活动 ; Kàn tú wánchéng huìhuà - 看图完成会话 ; Xué cíyǔ shuō shíjiān ;Dú yī dú ránhòu lián xiàn - 读一读然后连线 ;Tīng lùyīn xuǎnzé zhèngquè dá'àn - 听录音选择正确答案 ; Bǔchōng cíyǔ biǎo - 补充词语表

Unit IV **9 Hours**

Xuéhuì xúnwèn jiātíng qíngkuàng, zhíyè hé niánlíng - 学会询问家庭情况，职业和年龄

Xuéhuì diǎn cài tí yāoqiú jiézhàng - 学会点菜提要求结账 ; Shēngcí - 生词 ; Jùzi - 句子 ; Huìhuà - 会话 ;Huódòng - 活动 ; Kàn tú wánchéng huìhuà - 看图完成会话 ; Xué cíyǔ shuō shíjiān ;Dú yī dú ránhòu lián xiàn - 读一读然后连线 ;Tīng lùyīn xuǎnzé zhèngquè dá'àn - 听录音选择正确答案 ; Bǔchōng cíyǔ biǎo - 补充词语表Juésè bànyǎn - 角色扮演 ; Tīng lùyīn pànduàn duì cuò - 听录音判断对错

Unit V **9 Hours**

Nǐ zài nǎ'er gōngzuò -你在哪儿工作

Xuéhuì xúnwèn jiātíng qíngkuàng, zhíyè hé niánlíng - 学会询问家庭情况，职业和年龄 Shēngcí - 生词 ; Jùzi - 句子 ; Huìhuà - 会话 ; Huódòng - 活动 ; Kàn tú wánchéng huìhuà - 看图完成会话 ;Tīng lùyīn xuǎnzé zhèngquè dá'à n - 听录音选择正确答案 ; Bǔchōng cíyǔ biǎo - 补充词语表 - Tīng lùyīn xuǎnzé zhèngquè dá'àn - 听录音选择正确答案 ; Bǔchōng cíyǔ biǎo - 补充词语表

Total: 45 Hours

Reference(s)

1. Tiyan Hanyu Shenghuo Pian "*Experiencing Chinese*" Ying Yu Ban Di 1 Ban. Beijing: Higher Education Press: Gao deng jiao hu chu ban she. 2011
2. Mandarine Day - *Hancel Don :* Chinese learning Software
3. My Chinese Classroom - *David J. White*

Websites:

www.chinesexp.com.cn
www.yiwen.com.cn

15LF203 FRENCH

3 0 0 3

Course Objectives

- To help students acquire the basics of French language.
- To teach them how to converse in French in various occasions.

Course Outcomes (COs)

1. The students will become familiar with the basics of French language and start conversing in French.

UNIT I **6 Hours**

Alphabet Français (alphabets) - Les Accents Français (the accents in French) - aigu - grave - circonflexe - tréma cédille - écrire son nom dans le français (spellingone-sname in French) - Les noms de jours de la semaine (Days of the week)

UNIT II **6 Hours**

Les noms de mois de l'année (Months) - Numéro 1 à 100 (Numbers 1 to 100) GRAMMAIRE :Conjugaison

UNIT III **10 Hours**

Moyens de transport (Transport) - Noms de Professions (Professions) - Noms d'endroits communs (Places) - Nationalités (Nationalities) ECOUTER : (Listening) Écouter l- alphabet associéà des prénoms français - Écouter et répondre PARLER (Speaking)Présntation - même /Présentez- Vous (Introducingoneself)LIRE :Lireles phrases simples

UNIT IV **12 Hours**

Pronoms (Pronouns) - Noms communs masculins et de femme (Common masculine and Femininenouns) - Verbes communs (Common verbs)COUTER :couter et crier les prnoms - Observer les dessins et couter les dialogues LIRE : Lire les profils d'utilisateurs d'interlingua (alter ego)PARLER :Parler de sa ville - Parler de sa profession

UNIT V **11 Hours**

Narration de son nom et l'endroit où on vit - Son âge et date de naissance - Numéro de téléphone et'dresse - Narration du temps - La France en Europe PARLER :Conversation entre deux amis - Jouer la scène ÉCOUTER :Ecouter les conversations (CD alter ego)ÉCRIRE :Écrireune carte postale

Total: 45 Hours

Reference(s)

1. Alter ego+ Niveau a1 ,Catherine Hugot,, HACHETTE LIVRE 2012
2. Cahier alter ego+
3. Grammaire Progressive du Français, CLE international, 2010
4. Collins Easy Learning French Verbs& Practice, Harpercollins, 2012
5. Barron's Learn French, 3rd edition
6. FrançaisLinguaphone, Linguaphone Institute Ltd., London, 2000. FrançaisI.Harrisonburg: The Rosetta Stone: Fairfield Language Technologies, 2001.

15LG203 GERMAN 3 0 0 3

Course Objectives

- To help students acquire the basics of German language.
- To teach them how to converse in German in various occasions.

Course Outcomes (COs)

1. Clarity on the basic sounds of the German language.
2. Improved fluency in German Proper vocabulary.

UNIT I **9 Hours**

GRAMMAR

Introduction to German language: Alphabets, Numbers - Nouns - Pronouns Verbs and Conjugations - definite and indefinite article - Negation - Working with Dictionary - Nominative - Accusative and dative case - propositions - adjectives - modal auxiliaries - Imperative case - Possessive articles.

UNIT II **9 Hours**

LISTENING

Listening to CD supplied with the books, paying special attention to pronunciation: Includes all lessons in the book - Greetings - talking about name - country - studies - nationalities - ordering in restaurants - travel office - Interaction with correction of pronunciation.

UNIT III **9 Hours**

SPEAKING

Speaking about oneself - about family - studies - questions and answers - dialogue and group conversation on topics in textbooks - talks on chosen topics.

UNIT IV **9 Hours**

READING

Reading lessons and exercises in the class - pronunciation exercises: Alphabet : name, country, people, profession, family, shopping, travel, numbers, friends, restaurant,studies - festivals

UNIT V **9 Hours**

WRITING

Alphabets, numbers - words and sentences - Exercises in the books - control exercises - writing on chosen topics such as one self, family,studies - country.

Total: 45 Hours

Reference(s)

1. Grundkurs DEUTSCH A Short Modern German Grammar Workbook and Glossary, VERLAG FUR DEUTSCH, Munichen, 2007.
2. Grundkurs, DEUTSCH Lehrbuch Hueber Munichen, 2007.
3. Cassel Language Guides - German: Christine Eckhard, Black & Ruth Whittle, Continuum, London / New York, 1992.

15LH203 HINDI 3 0 0 3

Course Objectives

- To help students to acquire the basics of Hindi.
- To teach them how to converse in Hindi on various occasions.
- To help learners acquire the ability to understand a simple technical text in Hindi.

Course Outcomes (COs)

1. An ability to communicate effectively with: (a) Improved fluency in Hindi (b) Clarity on the basic sounds of the Hindi language Proper vocabulary.

UNIT I **9 Hours**

HINDI ALPHABET

Introduction - Vowels - Consonants - Plosives - Fricatives - Nasal sounds - Vowel Signs - Chandra Bindu&Visarg -Table of Alphabet -Vocabulary.

UNIT II **9 Hours**

NOUNS IN HINDI

Genders (Masculine & Feminine Nouns ending in a, e, i, o, u,) - Masculine & Feminine - Reading Exercises.

UNIT III **9 Hours**

PRONOUNS AND TENSES

Categories of Pronouns - Personal Pronouns - Second person (you & honorific) - Definite & Indefinite pronouns - Relative pronouns - Present tense - Past tense - Future tense - Assertive & Negative Sentences - Interrogative Sentences.

UNIT IV **9 Hours**

CLASSIFIED VOCABULARY

Parts of body - Relatives - Spices- Eatables- Fruit & Vegetables - Clothes - Directions-Seasons - Professions.

UNIT V **9 Hours**

SPEAKING

Model Sentences - Speaking practice for various occasions.

Total: 45 Hours

Reference(s)

1. B. R. Kishore, Self Hindi Teacher for Non-Hindi Speaking People, Vee Kumar Publications Ltd., New Delhi, 2009.
2. Syed, PrayojanMulak Hindi, RahamathullahVaniPrakasan, New Delhi, 2002.
3. Ramdev, VyakaranPradeep, SaraswathiPrakasan, Varanasi, 2004.

15LJ203 JAPANESE 3 0 0 3

Course Objectives

- To help students acquire the basics of Japanese language.
- To teach them how to converse in Japanese in various occasions.
- To teach the students the Japanese cultural facets and social etiquettes.

Course Outcomes (COs)

1. An ability to communicate effectively with: (a) Improved fluency in Japanese (b) Clarity on the basic sounds of the Japanese language Proper vocabulary.

UNIT I **9 Hours**

Introduction to Japanese - Japanese script - Pronunciation of Japanese (Hiragana) - Long vowels - Pronunciation of in,tsu,ga - Letters combined with ya,yu,yo - Daily Greetings and Expressions - Numerals. N1 wa N2 des - N1 wa N2 ja arimasen - S ka - N1mo - N1 no N2 - .san - Kanji - Technical Japanese Vocabulary (25 Numbers) - Phonetic and semantic resemblances between Tamil and Japanese

UNIT II **9 Hours**

Introduction - Kore - Sore - are - Kono N1 - Sono N1 - ano N1 - so des - so ja arimasen - S1 ka - S2 ka - N1 no N1 - so des ka ' koko - soko - asoko - kochira - sochira - achira - N1 wa N2 (Place) des - dhoko-N1 no N2 - Kanji-10 - ima-.ji-fun des - Introduction of verb - V mas - V masen - V mashitha - V masen deshitha - N1(Time) ne V - N1 kara N2 des - N1 tho N2 / S ne Kanji-10 - Technical Japanese Vocabulary (25 Numbers) - Dictionary Usage.

UNIT III **9 Hours**

- N1(Place) ye ikimas - ki mas - kayerimasu - Dhoko ye mo ikimasen - ikimasendheshitha - N1(vehicle) de ikimasu - kimasu - kayerimasu - N1(Personal or Animal) tho V ithsu - S yo. - N1 wo V (Transitive) - N1 wo shimus - Nani wo shimasu ka - Nan & Nani - N1(Place) de V - V masen ka - V masho - Oo. Kanji-10 , N1(tool - means) de V - Word / Sentence wa go nan des ka - N1(Person) ne agemus - N1(Person) ne moraimus - mo V shimashitha - , Kanji-10 - Japanese Typewriting using JWPCE Software, Technical Japanese Vocabulary (25 Numbers)

UNIT IV **9 Hours**

Introduction to Adjectives - N1wanaadj des. N1 wa ii adj des - naadjna N1 - ii adj ii N1 - Thothemo - amari - N1 wadho des ka - N1 wadhonna N2 des ka - S1 ka S2 - dhore - N1 gaarimasu - wakarimasu - N1 ga suki masu - N1 gakiraimasu - jozu des - hetha des - dhonna N1 - Usages of yoku - dhaithai - thakusan - sukoshi - amari - zenzen - S1 kara S2 - dhoshithe, N1 gaarimasu - imasu - N1(Place) ne N2 gaarimasu - iimasu - N1 wa N2(Place) ne arimasu - iimasu - N1(Person,Place,or Thing) no N2 (Position) - N1 ya N2, Kanji-10 - Japanese Dictionary usage using JWPCE Software, Technical Japanese Vocabulary (25 Numbers)

UNIT V **9 Hours**

Saying Numbers , Counter Suffixes , Usages of Quantifiers -Interrogatives - Dhonokurai - gurai - Quantifier-(Period) ne -.kai V - Quantifier dhake / N1 dhake Kanji - Past tense of Noun sentences and na Adjective sentences - Past tense of ii-adj sentences - N1 wa N2 yoriadj des - N1 tho N2 tho Dhochiragaadj des ka and its answering method - N1 [no naka] de {nani/dhoko/dhare/ithsu} ga ichiban adj des ka - answering -N1 gahoshi des - V1 mas form dhake mas - N1 (Place) ye V masu form ne ikimasu/kimasu/kayerimasu - N1 ne V/N1 wo V - Dhokoka - Nanika - gojumo - Technical Japanese Vocabulary (25 Numbers)

Total: 45 Hours

Reference(s)

1. Japanese for Everyone: Elementary Main Textbook1-1, Goyal Publishers and Distributors Pvt. Ltd., Delhi, 2007.
2. Japanese for Everyone: Elementary Main Textbook 1-2, Goyal Publishers and Distributors Pvt. Ltd., Delhi, 2007.
3. Software 1. Nihongo Shogo-1 2. Nihongo Shogo-2 3. JWPCE Software
4. 1. www.japaneselifestyle.com 2. www.learn-japanese.info/ 3. www.kanjisite.com/ 4. www.learn-hiragana-katakana.com/typing-hiragana-characters/

PHYSICS ELECTIVES

15PH201 PHYSICS OF MATERIALS 3 0 2 4

Course Objectives

- To understand the physical properties of conductors, semiconductors and superconductors.
- To recognize the basic principles of interaction of light with matter and working of optical devices.
- To classify the types of dielectric, magnetic materials and polarization mechanisms with their properties.

Course Outcomes (COs)

1. Exemplify the physical properties of conductors, superconductors and semiconductors with applications.
2. Identify the suitable semiconducting material for solar cell applications.
3. Select the suitable materials for insulating and dielectric applications.
4. Compare the optical properties of display devices.
5. Analyze the properties of magnetic materials for practical applications.

UNIT I **9 Hours**

CONDUCTING AND SUPERCONDUCTING MATERIALS

Electrical and thermal conductivity of metals - Wiedemann Franz law - band theory of metals - density of states. Superconductors: properties - types - High Tc superconductors- applications.

UNIT II **10 Hours**

SEMICONDUCTORS

Elemental and compound semiconductors - intrinsic semiconductors: carrier concentration - electrical conductivity- band gap. Extrinsic semiconductors: carrier concentration - variation of Fermi level. Hall Effect: theory and experimental determination -applications: Solar cells

UNIT III **9 Hours**

DIELECTRIC MATERIALS

Types of polarization: electronic, ionic, orientation and space charge polarization mechanisms - Langevin-Debye equation - frequency and temperature effects on polarization - dielectric strength and loss -dielectric breakdown mechanisms - active dielectric materials: pizo, pyro and ferroelectricity - applications.

UNIT IV **9 Hours**

OPTICAL MATERIALS

Interaction of light with materials - optical absorption - transmission - Luminescence in solids - Fluorescence and Phosphorescence - Optical band gap - LED ,LCD.

UNIT V **8 Hours**

MAGNETIC MATERIALS

Classification and properties - domain theory - hard and soft magnetic materials - anti-ferro and ferri magnetic materials - applications: magnetic recording and memories.

FOR FURTHER READING
Photonic crystals - LIFI

2 Hours

INTRODUCTION
Exposure to Engineering Physics Laboratory and precautionary measures

4 Hours

EXPERIMENT 1
Using Lees disc apparatus, determine the coefficient of thermal conductivity of a bad conductor.

4 Hours

EXPERIMENT 2
Find the band gap value of the given semiconductor diode. Based on the band gap value, identify the given semiconductor.

4 Hours

EXPERIMENT 3
With the aid of travelling microscope, find the refractive index of a transparent solid and liquid material.

4 Hours

EXPERIMENT 4
Determine the wavelength of polychromatic source in the visible region using spectrometer.

4 Hours

EXPERIMENT 5
Based on Hall Effect, calculate the charge carrier density of a given semiconductor and identify the nature of the semiconductor.

4 Hours

EXPERIMENT 6
Draw the B-H curve of a ferromagnetic material subjected to external magnetic field and hence identify the nature of the material.

4 Hours

EXPERIMENT 7
Determine the V-I characteristics of a solar cell.

Total: 45+30= 75 Hours

Reference(s)

1. Saxena, Gupta, Saxena, Mandal, Solid State Physics, Pragati Prakashan Educational Publishers, 13th revised edition, Meerut, India, 2013.
2. M.N. Avadhanulu and P.G. Kshirsagar, A Text Book of Engineering Physics, S. Chand & Company Ltd., New Delhi, 2011.
3. S. O. Pillai, Solid State Physics, New Age International Publications, New Delhi, 2010.
4. M.A. Wahab, N.K. Mehta, Solid state physics-structure and properties of materials, Narosa publishing house Pvt. Ltd, 6th edition, 2010.
5. Semiconductor Physics and Devices, Donald A. Neamen, Mc Graw-Hill, 2011.
6. P.K. Palanisamy, Materials Science, Scitech Publications India Pvt. Ltd, 2014.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	4	2		1	4	2		1	2			1	1											20
2	2		2		2		4		5	3			4												22
3	1	2	1		3	4			3	4			2												20
4	2	2			2	5			2	5			2												20
5	1	3			3	2	3		3	1			2												18
																								Total	100

Assessment Questions

Remember

1. State Meissner effect.
2. List six properties of superconducting materials.
3. Define photovoltaic effect.
4. List the six common applications of dielectric materials.
5. Retrieve optical absorption in metals.
6. Reproduce the principle of LCD in display devices.
7. Recall the term hysteresis in ferromagnetic materials.
8. List four applications of magnetic materials.
9. Recognize the need of optical band gap in differentiating the materials.
10. Reproduce five applications of hard magnetic materials in day to day life.

Understand

1. Explain the principle, construction and working of LED.
2. Classify the three types of materials based on band gap energy.
3. Interpret the working mechanism and characteristics of a solar cell.
4. Illustrate Hall effect EXPERIMENT used to find the concentration of charge carriers in n- type semiconductors and hence explain the necessary theory.
5. Summarize the various dielectric breakdown mechanisms observed in dielectric materials.
6. Infer the principle involved in working of magnetic levitation.
7. Classify the two types of luminescence in solids with appropriate energy level diagrams.
8. Subsume the four types of polarization mechanisms involved in dielectric materials.
9. Illustrate the V-I characteristics of a solar cell.
10. Extrapolate the Clausius Mosotti equation for the dielectric material which is subjected to external electric field.

Apply

1. Free electron density of aluminum is 18.10x1028 m-3. Calculate its Fermi energy at 0K. Planck's constant and mass of free electron are 6.62x10-34 Js and 9.1x10-31 Kg.
2. Compute the relation between Remanence and Coercivity.
3. Demonstrate the domain theory of ferromagnetism.
4. Derive the expressions for electrical and thermal conductivity of metals and hence compute the Wiedemann Frantz law.
5. Compute the carrier concentration in intrinsic and extrinsic semiconductors.
6. Calculate the number of free electrons per unit volume in a metal in terms of Fermi energy.
7. Assess the Magnetic levitation and SQUIDS in day to day life.
8. Show the importance of dielectric breakdown mechanisms in dielectrics.

9. Implement the applications of dielectric materials in real world problems.
10. Compute the relation between polarization vector and electric field (E).

Analyse

1. Differentiate Phosphorescence and Fluorescence.
2. Can we increase the orientation polarization with increase in temperature? Justify.
3. Justify the principle, construction, working, advantages and disadvantages of LCD.
4. Compare hard and soft magnetic materials.
5. Differentiate the ferromagnetic and anti-ferromagnetic materials with examples.
6. Compare dia, para and ferromagnetic materials.
7. Distinguish between polarization and polarizability.
8. Differentiate elemental and compound semiconductors.
9. Compare type I and type II superconductors.
10. Compare LED and LCD.

15PH202 APPLIED PHYSICS 3 0 2 4

Course Objectives

- To understand conducting, semiconducting, dielectric and magnetic properties of materials and exemplify their applications.
- To analyze the basic concepts of thermodynamics and heat transfer with illustrations.
- To gain knowledge about acoustical standards of buildings.

Course Outcomes (COs)

1. Differentiate the materials based on their properties and suit them for appropriate applications.
2. Select the suitable materials for insulating and dielectric applications.
3. Investigate the working mechanisms and efficiency of heat engines by applying the laws of thermodynamics.
4. Compare the different heat transfer mechanisms and its applications.
5. Choose the proper acoustic materials for the construction of buildings.

UNIT I 11 Hours

CONDUCTORS AND SEMICONDUCTORS

Conductors: Classical free electron theory - electrical and thermal conductivity- Wiedemann - Franz law - merits and demerits of classical free electron theory - band theory - density of states. Semiconductors: Elemental and compound semiconductors - intrinsic semiconductors -Fermi level and electrical conductivity - band gap energy - extrinsic semiconductors - n-type and p-type semiconductors: variation of Fermi level with temperature (qualitative) - Hall effect - applications.

UNIT II 9 Hours

DIELECTRIC AND MAGNETIC MATERIALS

Dielectrics: Fundamental terminologies - electronic and ionic polarizations - orientation polarization mechanism (qualitative) - space charge polarization - Langevin -Debye equation - dielectric loss - applications of dielectric and insulating materials.
Magnetic Materials: Properties of dia, para and ferromagnetic materials - domain theory of ferromagnetism - hysteresis curve - hard and soft magnetic materials - applications

UNIT III **9 Hours**

THERMODYNAMICS

Zeroth law of thermodynamics - Heat - equilibrium and quasistatic process - path functions -comparison between heat and work - internal energy - first law of thermodynamics - isothermal and adiabatic process - work done - reversible and irreversible process - second law of thermodynamics - entropy - enthalpy - Carnot ideal engine and its efficiency - Carnot's theorem-actual heat engine: Diesel engine and its efficiency

UNIT IV **9 Hours**

HEAT TRANSFER

Modes of heat transfer - thermal conductivity - heat capacity and diffusivity - rectilinear flow of heat - conduction through bodies in series and parallel - determination of thermal conductivity: good conductor: Searle's method - bad conductor: Lee's disc method - applications of heat transfer: formation of ice in ponds - conductivity of earth's crust and age of earth - practical applications

UNIT V **7 Hours**

ACOUSTICS

Classification of sound based on frequency - characteristics of audible sound - reverberation time: Sabine's formula - determination of absorption coefficient - Erying's formula (qualitative). Sound insulation - sound absorbing materials - factors affecting the acoustics of building - remedies

FOR FURTHER READING

Nanomaterials and its applications

2 Hours

INTRODUCTION

Exposure to Engineering Physics Laboratory and precautionary measures

4 Hours

EXPERIMENT 1

Using Lees disc apparatus, determine the coefficient of thermal conductivity of a bad conductor.

4 Hours

EXPERIMENT 2

Find the band gap value of the given semiconductor diode. Based on the band gap value, identify the given semiconductor.

4 Hours

EXPERIMENT 3

With the aid of traveling microscope, find the refractive index of a transparent solid and liquid material

4 Hours

EXPERIMENT 4

Determine the wavelength of polychromatic source in the visible region using spectrometer

4 Hours

EXPERIMENT 5

Based on Hall Effect, calculate the charge carrier density of a given semiconductor and identify the nature of the semiconductor.

4 Hours

EXPERIMENT 6

Draw the B-H curve of a ferromagnetic material subjected to external magnetic field and hence identify the nature of the material.

4 Hours

EXPERIMENT 7

Determine the V-I characteristics of a solar cell.

Total: 45+30= 75 Hours

Reference(s)

1. William D. Callister, Materials Science and Engineering an Introduction, John Wiley and Sons,Inc, 2010
2. BrijLal, N. Subrahmanyam and P. S. Hemne, Heat, Thermodynamics & Statistical Physics, S. Chand & Company Ltd., New Delhi, 2012
3. Saxena, Gupta, Saxena, Mandal, Solid State Physics, Pragati Prakashan Educational Publishers, 13threvised edition, Meerut, India, 2013
4. P.K. Mittal, Applied Physics, I.K. International Publishing House Pvt. Ltd, 2008
5. Donald A. Neamen, Semiconductor Physics and Devices,McGraw-Hill, 2011

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	3	4				3				4	4			2					4						24
2	2	2				4	2			2	4			4											20
3	2	4				4	2			4	2			2											20
4	2	2				4	2			2	4			4											20
5	2	2				2	2			4					4										16
																								Total	100

Assessment Questions

Remember

1. State Ohm's law.
2. Define drift velocity.
3. List the two drawbacks of classical free electron theory.
4. State Wiedemann-Franz law.
5. Mention the practical unit used for electron's magnetic moment.
6. Recall the term hysteresis in ferromagnetic materials.
7. List the four uses of magnetic materials.
8. State Zeroth law of thermodynamics.
9. State the Kelvin's statement of second law of thermodynamics.
10. Name the three modes of heat transfer.
11. State Echelon effect.

Understand

1. Illustrate the significance of Fermi energy.
2. Why indirect gap semiconductors are preferred in fabricating transistors?
3. Classify the types of magnetic materials.
4. Outline the term retentivity and coercivity.
5. Compare dia, para and ferro magnetic materials.
6. Point out the ideal conditions required for diesel cycle.
7. Sketch the isothermal and adiabatic processes in P-V diagram.
8. Is it possible for a practical engine to have 100% efficiency? Justify.
9. Ice kept in saw dust or wrapper in a blanket will not melt. Why?
10. Classify the types of sound waves.

11. Explain the three characteristics of musical sound.

Apply

1. The average energy of a conduction electron in copper at 300 K is 4.23 eV. Calculate the Fermi energy of copper at 300 K.
2. Determine the carrier concentration of *p*-type semiconductor whose hall coefficient is 3.6610-4 m3/C.
3. Compute the efficiency of Carnot's engine operating between the temperatures 3270C and 270C.
4. Point out practical applications of heat conduction.
5. Compute the efficiency of Carnot's engine working the steam point and the ice point.
6. Assess the reason for the formation ice on pond surface.
7. The intensity of sound produced by thunder is 0.1 Wm-2.Calculate the intensity level in decibels.
8. Calculate Sabine's mathematical relation for reverberation time of the hall.
9. Compute the minimum wavelength of audible sound at zero degree centigrade.

Analyse

1. Distinguish between relaxation time and collision time.
2. Differentiate between electrical and thermal conductivity.
3. List the various applications of soft and hard magnetic materials for day to day life.
4. Analysis the six properties of hard and soft magnetic materials.
5. If the system and surrounding are in thermal equilibrium, is it necessary they are in same state? Comment the statement.
6. Differentiate isothermal and adiabatic process.
7. Entropy remains constant in an adiabatic process. Justify the statement.
8. Compare Carnot's cycle and diesel cycle.
9. Distinguish between loudness and intensity of sound.
10. Compare reverberation and echo.
11. How do you maintain optimum reverberation in a hall? Justify.

15PH203 MATERIALS SCIENCE 3 0 2 4

Course Objectives

- To explain the properties of conducting, semiconducting and dielectric materials.
- To impart fundamental knowledge in optical materials.
- To understand the nature and applications of different magnetic materials.

Course Outcomes (COs)

1. Distinguish electrical properties of different kinds of conducting materials.
2. Identify the different types of semiconductors and its applications.
3. Categorize the various polarization mechanisms in dielectrics.
4. Choose the suitable material for the construction of display devices.
5. Select appropriate magnetic materials for magnetic storage devices.

UNIT I **8 Hours**

ELECTRICAL PROPERTIES OF METALS

Quantum free electron theory: Fermi-Dirac distribution function - Fermi energy and its variation with temperature - density of energy states - calculation of density of electrons and fermi energy at 0K - mean energy of electrons at 0K - problems.

UNIT II **10 Hours**

SEMICONDUCTING MATERIALS

Introduction - elemental and compound semiconductors - intrinsic semiconductors: expressions for number of electrons and holes - determination of carrier concentration and position of Fermi energy - electrical conductivity - band gap energy determination - carrier concentration in extrinsic semiconductors. Hall Effect: theory and experimental determination - uses - problems.

UNIT III **9 Hours**

DIELECTRICS

Introduction - fundamental definitions in dielectrics - expressions for electronic and ionic polarizations - orientation polarization (qualitative) - space charge polarization - Langevin - Debye equation - frequency and temperature effects on polarization - internal field - expression for internal field (cubic structure) - Clausius-Mosotti equation and its importance - applications of dielectric materials - problems.

UNIT IV **9 Hours**

OPTICAL MATERIALS

Introduction - optical absorption in metals, semiconductors and insulators. Fluorescence and phosphorescence. Light emitting diode: principle, construction, working and applications. Liquid crystal display: general properties - dynamic scattering display - twisted nematic display - applications - comparison between LED and LCD. Blue ray disc - principle - working.

UNIT V **9 Hours**

MAGNETIC MATERIALS

Introduction - orbital and spin magnetic moments - Bohr magneton - basic definitions - classification of magnetic materials - domain theory of ferromagnetism - process of domain magnetization - explanation of hysteresis curve based on domain theory - hard and soft magnetic materials.

FOR FURTHER READING

Optical data storage and Giant magnetoresistance

2 Hours

INTRODUCTION

Exposure to Engineering Physics Laboratory and precautionary measures

4 Hours

EXPERIMENT 1

Using Lees disc apparatus, determine the coefficient of thermal conductivity of a bad conductor.

4 Hours

EXPERIMENT 2

Find the band gap value of the given semiconductor diode. Based on the band gap value, identify the given semiconductor.

4 Hours

EXPERIMENT 3

With the aid of traveling microscope, find the refractive index of a transparent solid and liquid material.

4 Hours

EXPERIMENT 4

Determine the wavelength of polychromatic source in the visible region using spectrometer.

4 Hours

EXPERIMENT 5

Based on Hall Effect, calculate the charge carrier density of a given semiconductor and identify the nature of the semiconductor.

4 Hours

EXPERIMENT 6

Draw the B-H curve of a ferromagnetic material subjected to external magnetic field and hence identify the nature of the material.

4 Hours

EXPERIMENT 7

Determine the V-I characteristics of a solar cell.

Total: 45+30= 75 Hours

Reference(s)

1. William D. Callister, Materials Science and Engineering an Introduction, John Wiley and Sons, Inc, 2010.
2. S.O. Pillai, Solid State Physics, New Age International Publications, New Delhi, 2014.
3. M.N. Avadhanulu and P.G. Kshirsagar, A Text Book of Engineering Physics, S. Chand & Company Ltd., New Delhi, 2011.
4. P.K. Palanisamy, Physics For Engineers, Scitech Publications (India) Pvt. Ltd., Chennai, 2010.
5. V. Raghavan, Materials Science and Engineering, Prentice Hall of India, New Delhi, 2010.
6. R.K.Gaur and S.L.Gupta, Engineering Physics, Dhanpat Rai publications, New Delhi, 2010.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	5	2		1	5	2		1																18
2	2		2		2	3	2		5		2		4												22
3	1	2	1		3	3			3	5			2												20
4	2	3			3	3			2	5			2												20
5	1	3			3	2	5		3	1			2												20
																								Total	100

Assessment Questions

Remember

1. Define density of electron energy states in metals.
2. Recall Fermi energy.
3. State Hall Effect.
4. List out the four advantages of semiconductors.
5. Define dielectric constant
6. Recall electric polarization.
7. Define Fluorescence.

8. Recognize hard and soft magnetic materials.
9. State the working principle of LED.
10. Define Bohr magnetron.

Understand

1. Classify three types of free electron theory
2. Represent the variation of Fermi level with temperature
3. Explain Clausius-Mosotti relation.
4. Compare element and compound type semiconductors.
5. Illustrate the variation of Fermi level with temperature in n-type semiconductors.
6. Distinguish between a dielectric and insulator.
7. Mention the technique to increase the emission time in phosphorescence.
8. Exemplify hysteresis on the basis of domain theory of ferromagnetism.
9. Identify four examples for hard magnetic materials.
10. Identify four properties of ferromagnetic materials.

Apply

1. Compute the Fermi direc function for energy kT above the Fermi energy.
2. Asses the Fermi-Dirac distribution function.
3. Energy level of p-type and n-type semiconductors and justify the results
4. Compute the carrier concentration of intrinsic semiconductors
5. Explain the principle, construction and working of Hall Effect
6. Show that electronic and ionic polarizabilities are independent of temperature.
7. Calculate the polarization of an atom above value five.
8. Differentiate the dia, para and ferromagnetic materials.
9. Compute the B-H Hysteresis curve on the basis of domain theory.

Analyse

1. Discriminate drift velocity and thermal velocity of an electron
2. Difference between p-type and n-type semiconductors.
3. Obtain the expression for concentration of charge carriers in p-type semiconductor.
4. In practical dielectrics, the current does not exactly lead the voltage by 90? Justify.
5. Local field is the space and time average of the electric field acting on a particular molecule Justify the result.
6. Justify the special features of magnetic blue ray disks.
7. Analyze the role of energies in the domain growth.
8. Explain the roll of activators in optical materials
9. Describe the working of twisted pneumatic display device.
10. Compare LED and LCD.

15PH204 PHYSICS OF ENGINEERING MATERIALS 3 0 2 4

Course Objectives

- To familiarize with the physical properties of materials.
- To gain practical applications of modern spectroscopy and microscopy techniques.
- To understand the preparation of bio and nanomaterials.

Course Outcomes (COs)

1. Identify the electrical and thermal properties of conducting and semiconducting materials.
2. Analyze the various polarization mechanisms in dielectrics.
3. Choose specific materials for optical and magnetic data storage devices.
4. Investigate the specimen with the aid of suitable spectroscopic techniques.
5. Realize the methods adopted for preparing nano materials

UNIT I **10 Hours**

CONDUCTING AND SEMICONDUCTING PROPERTIES

Quantum free electron theory - Fermi-Dirac distribution function - effect of temperature on Fermi function - density of energy states - calculation of density of electrons and Fermi energy at 0 K. Intrinsic semiconductors: expressions for density of electrons and holes - intrinsic carrier concentration - band gap energy. Extrinsic semiconductors: carrier concentration in n-type and p-type semiconductors - variation of Fermi level with temperature and impurity concentration - problems.

UNIT II **9 Hours**

DIELECTRIC PROPERTIES

Introduction: fundamental definitions in dielectrics - types of polarization - expressions for electronic and ionic polarization mechanisms - orientation polarization (qualitative) - Langevin-Debye equation - frequency and temperature effects on polarization - dielectric loss - dielectric breakdown mechanisms - active dielectric materials - applications of dielectric materials - problems.

UNIT III **10 Hours**

OPTICAL AND MAGNETIC PROPERTIES

Optical properties: introduction - light interaction with solids - atomic and electronic interactions - optical properties of metals, semiconductors and insulators - reflection - refraction - absorption - transmission - luminescence and photoconductivity. Magnetic properties: introduction - origin of magnetic moment - properties of dia, para and ferro magnetic materials - domain theory and hysteresis effect - hard and soft magnetic materials - problems.

UNIT IV **8 Hours**

SPECTROSCOPY AND MICROSCOPY TECHNIQUES

Introduction: different types of spectroscopy techniques - basic principle of FTIR spectroscopy and X-ray Photoelectron Spectroscopy (XPS). Basic principle and working mechanisms of Scanning Electron Microscope (SEM) - Transmission Electron Microscope (TEM) - Atomic Force Microscope (AFM).

UNIT V **8 Hours**

BIO AND NANO MATERIALS

Biomaterials: classification of biomaterials - development of biomaterials - applications. Nanomaterials: properties - synthesis of nanomaterials - top-down approach: ball milling technique - bottom-up approach: Chemical Vapour Deposition (CVD) - uses of nanomaterials. Carbon nanotubes: properties and applications.

FOR FURTHER READING

Health and environmental impacts

2 Hours

INTRODUCTION
Exposure to Engineering Physics Laboratory and precautionary measures

4 Hours

EXPERIMENT 1
Using Lees disc apparatus, determine the coefficient of thermal conductivity of a bad conductor.

4 Hours

EXPERIMENT 2
Find the band gap value of the given semiconductor diode. Based on the band gap value, identify the given semiconductor.

4 Hours

EXPERIMENT 3
With the aid of traveling microscope, find the refractive index of a transparent solid and liquid material.

4 Hours

EXPERIMENT 4
Determine the wavelength of polychromatic source in the visible region using spectrometer.

4 Hours

EXPERIMENT 5
Based on Hall effect, calculate the charge carrier density of a given semiconductor and identify the nature of the semiconductor.

4 Hours

EXPERIMENT 6
Draw the B-H curve of a ferromagnetic material subjected to external magnetic field and hence identify the nature of the material.

4 Hours

EXPERIMENT 7
Determine the V-I characteristics of a solar cell.

Total: 45+30= 75 Hours

Reference(s)

1. William D. Callister, Materials Science and Engineering An Introduction, John Wiley and Sons, Inc, 2010.
2. Halliday and Resnick, Fundamentals of Physics, John Wiley and Sons, Inc, 2011.
3. Jacob Milliman, Christos Halkias, Satyabrata JIT, Electronic Devices and Circuits, McGraw Hill Education (India) Private Limited, New Delhi, 2014.
4. S. O. Pillai, Solid State Physics, New Age International Publications, New Delhi, 2010.
5. Subbiah Pillai, Nanobiotechnology, MJP Publishers, 2010.
6. Yang Leng, Materials Characterization: Introduction to Microscopic and Spectroscopic Methods, Wiley-VCH, 2013.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	1	4	2		2	5	2		2	2			1	1											22
2	2		2		2		2		5	3			4												20
3	2		2		3	3	2		3	3			2	2											22
4	1	2	1		3	3			3	3			2												18
5	2	2			3	2	3		2				2	2											18
																								Total	100

Assessment Questions

Remember

1. Recall the merits of quantum free electron theory over classical free electron theory
2. Define carrier concentration
3. Recall Fermi energy
4. List the four types of polarization mechanisms.
5. Recognize polar and non-polar molecules
6. Define Bohr magneton
7. Recall coercivity and retentivity
8. Point out the four salient features of biomaterials
9. Define bioactive materials
10. State the working principle of FTIR spectroscopy

Understand

1. Classify three types of materials based on bandgap energy
2. Explain fermi-distribution function and effect of temperature on Fermi function
3. Represent the variation of Fermi level with temperature
4. Explain intrinsic and thermal breakdown mechanisms
5. Infer the importance of Fermi level in a semiconductor
6. Illustrate the phenomenon of B-H hysteresis on the basis of domain theory
7. Classify four types of biomaterials
8. Represent the scanning electron microscope to determine the grain size of the nanomaterials
9. Explain the principle, construction and working of Scanning electron microscope
10. Explain the principle and working mechanism of X – ray photoelectron spectroscopy (XPS)

Apply

1. Find the variation of Fermi level with temperature and impurity concentration in n-type semiconductors
2. Show that electronic and ionic polarizabilities are independent of temperature
3. Show that the position of Fermi level is exactly at the midpoint of forbidden energy gap in intrinsic semiconductor
4. Compute the relationship between polarizability and electric flux density.
5. Assess the properties of dia, para and ferromagnetic materials
6. Show that top down method is inferior to bottom up method
7. Construct B-H Hysteresis curve on the basis of domain theory
8. Design the principle, construction and working of chemical vapour deposition.
9. Show that the electronic polarizability is directly propotional to the volume of an atom
10. Compute the expression for carrier concentration in intrinsic semiconductors

Analyse

1. Extrinsic semiconductors possess high electrical conductivity than intrinsic semiconductors. Justify

2. Silver is the best conductor of electricity. But gold is used in high-end electronic connectors. Justify.
3. Identify the role of impurity concentration in the variation of Fermi level in the case of p-type semiconductors.
4. Compare polar dielectrics with non-polar dielectrics.
5. Analyse the features of hard and soft magnetic materials.
6. Compare the six properties of dia, para and ferro magnetic materials
7. Differentiate top down approach from bottom up approach.
8. Select the four important features of TEM
9. Justify the electronic polarizability of Argon is much greater than that of Helium.
10. Intrinsic semiconductors are insulators at 0K. Justify.

15PH205 SOLID STATE PHYSICS 3 0 2 4

Course Objectives

- To explain the properties of conducting, semiconducting and dielectric materials.
- To understand the working mechanism of junction diodes.
- To impart knowledge in optical and magnetic materials.

Course Outcomes (COs)

1. Identify different types of emission of electrons and significance of Fermi function.
2. Explore the carrier concentration and its variation with temperature of different semiconducting materials.
3. Analyze the I-V characteristics of a junction diode.
4. Investigate the various polarization mechanisms in dielectrics.
5. Select appropriate optical and magnetic materials for data storage devices.

UNIT I **10 Hours**

EMISSION PROPERTIES AND QUANTUM THEORY OF SOLIDS

Emission of electrons: types thermionic emission-principle- Richardson equation- secondary emission-principle- work function- Fermi-Dirac distribution function and its temperature dependence significance of Fermi energy- density of energy states- calculation of density of electrons and Fermi energy at 0K- average energy of electrons at 0K problems.

UNIT II **9 Hours**

SEMICONDUCTOR PHYSICS

Intrinsic semiconductors: the law of mass action - expressions for density of electrons and holes - determination of carrier concentration - band gap energy. Extrinsic semiconductors: carrier concentration in p-type and n-type semiconductors. Hall effect: theory - experimental determination of Hall voltage - applications - problems.

UNIT III **9 Hours**

JUNCTION DIODE CHARACTERISTICS

Introduction - pn junction diode - volt-ampere characteristics - diode current equation - static and dynamic resistances - space charge - diffusion capacitance - junction diode switching times. Diode circuit with DC voltage source. Applications: full wave rectifier - capacitor filters - clamper circuits.

UNIT IV **9 Hours**

DIELECTRICS

Introduction: fundamental definitions in dielectrics - expressions for electronic and ionic polarizations - orientation polarization (qualitative) - space charge polarization - Langevin Debye equation - frequency and temperature effects on polarization - expression for internal field (cubic structure) - Clausius-Mosotti equation - dielectric loss - applications of dielectrics - problems.

UNIT V **8 Hours**

OPTOELECTRONICS AND MAGNETIC MATERIALS

Principle, working and characteristics of LED and LCD - blue ray disc. Magnetic materials: basic definitions - properties of dia, para and ferro magnetic materials - explanation of hysteresis curve based on domain theory - hard and soft magnetic materials. Magnetic storage device: principle - working - giant magnetoresistance.

FOR FURTHER READING

Motion of an electron in uniform and non-uniform magnetic fields - electric and magnetic fields in a crossed configuration.

2 Hours

INTRODUCTION

Exposure to Engineering Physics Laboratory and precautionary measures

4 Hours

EXPERIMENT 1

Using Lees disc apparatus, determine the coefficient of thermal conductivity of a bad conductor.

4 Hours

EXPERIMENT 2

Find the band gap value of the given semiconductor diode. Based on the band gap value, identify the given semiconductor.

4 Hours

EXPERIMENT 3

With the aid of traveling microscope, find the refractive index of a transparent solid and liquid material.

4 Hours

EXPERIMENT 4

Determine the wavelength of polychromatic source in the visible region using spectrometer.

4 Hours

EXPERIMENT 5

Based on Hall Effect, calculate the charge carrier density of a given semiconductor and identify the nature of the semiconductor.

4 Hours

EXPERIMENT 6

Draw the B-H curve of a ferromagnetic material subjected to external magnetic field and hence identify the nature of the material.

4 Hours

EXPERIMENT 7

Determine the V-I characteristics of a solar cell.

Total: 45+30= 75 Hours

Reference(s)

1. Jacob Millman, Christos Halkias and Satyabrata JIT, Electronic Devices and Circuits, McGraw Hill Education (India) Private Limited, New Delhi, 2014.
2. William D. Callister, Materials Science and Engineering an Introduction, John Wiley and sons, Inc, 2010.
3. Halliday and Resnick, Fundamentals of Physics, John Wiley and Sons, Inc, 2011.
4. R. S. Sedha, A textbook of Applied Electronics, S. Chand & Company Ltd., New Delhi, 2010.
5. S. O. Pillai, Solid State Physics, New Age International Publications, New Delhi, 2010
6. M. N. Avadhanulu and P.G. Kshirsagar, A Text Book of Engineering Physics, S. Chand & Company Ltd., New Delhi, 2011.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	1	2	2		2	4	2		2	5			2												22
2	2	2			2		3		2	3					6										20
3	2		1		3		2		5				2	2				3							20
4	2	2	2		2	3			2	5			2												20
5	2	2			3	2	2		2				5												18
																								Total	100

Assessment Questions

Remember

1. Recall the Richardson equation.
2. Define dynamic resistance.
3. State the law of mass action.
4. Define Hall Effect.
5. List the three practical applications of p-n junction diode.
6. List the three practical applications of p-n junction diode.
7. List the four types of polarizations in dielectrics
8. Reproduce the expressions for electronic and ionic polarization.
9. State the working principle of LED.
10. Define retentivity and coercivity.

Understand

1. Explain the variation of Fermi-Dirac distribution function with temperature.
2. Indicate the importance of Fermi level.
3. Indicate the reason for preferring extrinsic semiconductors over intrinsic semiconductors.
4. Represent four applications of Hall Effect.
5. Represent the switching action of a diode.
6. Interpret the relation between polarization and polarisability in dielectrics.
7. All the dielectrics are insulators but all the insulators are not dielectrics. Illustrate with examples.
8. Interpret the relation between the dielectric constant and electric susceptibility.
9. Explain the phenomenon of electroluminescence in LED.
10. Summarize the working principle of giant magnetoresistance.

Apply

1. Find the expression for density of electrons and Fermi energy at 0 K.
2. Using the Fermi function, compute the temperature at which there is 1% probability that an electron in a solid will have energy 0.5 eV above EF of 5 eV.

3. Explain how phosphorous atoms donate electrons to the conduction band.
4. Apply the law of mass action to determine the carrier concentration of intrinsic semiconductors.
5. Construct a circuit using p-n junction diode and execute its V-I characteristics.
6. Construct a diode circuit with DC voltage source and demonstrate its working conditions.
7. Show that electronic polarizability is independent of temperature.
8. Explain frequency dependence of dielectrics with a neat sketch.
9. Apply the domain theory to the hysteresis effect observed in ferromagnetic materials.
10. Compute the wavelength of light emitted by an LED with band gap energy of 1.8 eV.

Analyse

1. The average energy of electrons at 0 K depends on Fermi level. Justify.
2. Differentiate p-type and n-type semiconductors.
3. Outline the working principle of full wave bridge rectifier.
4. At optical frequencies the total polarization is less. Justify.
5. Outline the causes for dielectric loss in dielectric materials.
6. Analyze the magnetic behavior of dia, para and ferromagnetic materials.
7. Compare the properties of LED and LCD.
8. Outline the difference between hard and soft magnetic materials.

Evaluate

1. Evaluate the resistance value using V-I characteristics of a p-n junction diode.
2. Evaluate the value of Fermi distribution function for an energy kT above the Fermi energy at that temperature and comment on the answer.

CHEMISTRY ELECTIVES

3 0 2 4

15CH201 ENGINEERING CHEMISTRY

Course Objectives

- Recall the terminologies of electrochemistry and explain the function of batteries and fuel cells with its electrochemical reactions.
- Understand the fundamentals of corrosion, its types and polymers with its applications.
- Choose appropriate instrumentation technique for interpreting analytical data.

Course Outcomes (COs)

1. Construct an electrochemical cell and measure its potential.
2. Identify the components and processes in batteries and infer the selection criteria for commercial battery systems with respect to different applications.
3. Utilize electrochemical data to formulate an electrochemical half-cell and cell reactions for corrosion control processes.
4. Differentiate the polymers used in day to day life based on its source, properties and applications.
5. Identify the applications of analytical methods for the estimation of elements in aqueous media.

UNIT I **10 Hours**

INTRODUCTION TO ELECTROCHEMISTRY

Types of electrodes - electrode potential - salt bridge - cell reaction - cell representation - silver-silver chloride electrode - calomel electrode - determination of single electrode potential - electrochemical series and its importance. Ion-selective electrode: glass electrode - measurement of pH using glass electrode. Concentration cells (electrode and electrolyte). Potentiometry - potentiometric titrations (redox titration). difference between electrochemical and electrolytic cells

UNIT II **9 Hours**

ENERGY STORAGE DEVICES

Batteries - characteristics of battery - types of batteries. construction, working and applications: Primary (alkaline) and secondary (lead-acid and nickel-cadmium) - Modern batteries (zinc air battery and lithium batteries) - precautions for battery maintenance. Comparison with conventional galvanic cells. Fuel cells - Types of fuel cells: solid polymer electrolyte fuel cell - solid oxide fuel cells - microbial fuel cell. Hydrogen-oxygen fuel cell - construction, working, advantages and limitations

UNIT III **8 Hours**

CORROSION SCIENCE

Corrosion: definition - types of corrosion: chemical and electrochemical corrosion - Pilling-Bedworth ratio - types of oxide layer (stable, unstable, volatile, porous) - hydrogen evolution and oxygen absorption mechanism for electrochemical corrosion - mechanism for rusting of iron. Types of electrochemical corrosion: Galvanic corrosion - differential aeration corrosion (pitting, waterline and pipeline). Galvanic series - applications. Factors influencing corrosion: nature of metal and environment. Corrosion control methods: sacrificial anode method - impressed current cathodic protection method - electroplating - electroless plating

UNIT IV **10 Hours**

POLYMERS AND ITS PROCESSING

Advantages of polymers over metals. Monomers - polymers - polymerization - functionality - degree of polymerization - classification of polymers based on source and applications - Molecular weight determination. Types of polymerization: addition, condensation and copolymerization - mechanism of free radical polymerization. Preparation, properties and applications of thermosetting (epoxy resin and bakelite) and thermoplastics (polyvinyl chloride and polytetrafluoroethylene). Compounding of plastics - injection and extrusion moulding methods

UNIT V **8 Hours**

INSTRUMENTATION TECHNIQUES FOR CHEMICAL ANALYSIS

Beer - Lamberts law. Principle, instrumentation (block diagram only) and applications: Ultra violet spectroscopy - Atomic absorption spectroscopy - Colorimetry (estimation of a transition metal) - Flame photometry (estimation of an alkali metal).

FOR FURTHER READING

Nobel prize winners in chemistry over past 5 years

2 Hours

EXPERIMENT 1

General instructions to students - Handling reagents and safety precautions

4 Hours

EXPERIMENT 2

Determination of amount of hydrochloric acid present in the given sample using pH meter

4 Hours

EXPERIMENT 3

Determination of strength of a commercial mineral acid by conductometric titration.

4 Hours

EXPERIMENT 4

Conductometric titration of mixture of acids

4 Hours

EXPERIMENT 5

Electro analytical determination of strength of iron in the given sample by potentiometric method using saturated calomel electrode.

4 Hours

EXPERIMENT 6

Measurement of rate of corrosion on zinc/mild steel in aerated neutral/acidic/alkaline solution by weight loss measurements / Tafel polarization method

4 Hours

EXPERIMENT 7

Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.

4 Hours

EXPERIMENT 8

Estimation of iron (thiocyanate method) in the given solution by spectrophotometric method

Total: 45+30= 75 Hours

Reference(s)

1. M. Munjal and S.M. Gupta, Wiley Engineering Chemistry, Second edition, Wiley India Pvt. Ltd, New Delhi, 2013.
2. A. Pahari and B.Chauhan, Engineering Chemistry, Infinity Science press LLC, New Delhi, 2010.
3. P.H. Rieger, Electrochemistry, Springer, Netherland, Second Edition (Reprint) 2012.
4. Fred W. Billmeyer JR, Textbook of polymer science, John Wiley & sons, Third edition, 2008.
5. Willard Merritt and Dean Settle, Instrumental methods of analysis, CBS publishers, Seventh edition, 2012.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	1	1	1		3	4	2			4	4				1			2							23
2	1	1	1		4	4	3		1	2				1	2										20
3	1	1	1		2	2	1			2	2			2	1			1				1			17
4	5	3	2		3	1	1		1				1	2	2		1	1							23
5	1					3					3				7			2				1			17
																								Total	100

Assessment Questions

Remember

1. List any four significances of EMF series.
2. Define the term single electrode potential.
3. Recall the four advantages of H2-O2 fuel cell.
4. Define the term functionality of a monomer.
5. State Pilling-Bedworth rule.
6. Name two monomers used for the preparation of epoxy resin.
7. Label the parts and charge carried by electrodes in electrochemical and electrolytic cells.
8. List any two significances of monomer functionality.
9. State Beer - Lamberts law.
10. Define concentration cell.

Understand

1. Classify two types of polymers based on source.
2. Compare electrochemical cell and electrolytic cell with suitable diagrams.
3. Illustrate the mechanism involved in electrochemical corrosion.
4. Explain the principle and five components of UV-visible spectrophotometer.
5. Outline the mechanism for the synthesis of –(CF2-CF2)n– polymer.
6. Identify any two analytical methods to estimate sodium present in aqueous media.
7. Illustrate the injection molding process with a necessary explanation and two advantages.
8. Indicate any two importance of salt bridge in an electrochemical cell.
9. Illustrate the route to synthesis epoxy resin from its two monomers.
10. Summarize any four advantages of polymers over metals in everyday life.

Apply

1. Calculate the single electrode potential value zinc half-cell dipped in a 0.01M ZnSO4Â solution at 25°C? E° Zn/Zn 2+ = 0.763 V, R=8.314 JK -1 Mol -1 , F= 96500 Coulombs.
2. Identify the two advantages of degree of polymerization.
3. Find the concentration of given solution using spectrophotometer, if %T, bath length and molar adsorption coefficient are 18, 1 cm and 6000 L/mol. cm.
4. Derive an equation for determination pH of unknown solution using glass electrode.

5. Elaborate the six applications of electrochemical series.
6. Select and explain suitable potentiometric titration to estimate the amount of ferrous ion in the given solution.
7. Discuss the construction and working of electrolyte concentration cell with suitable example.
8. Assess the significances of monomer functionality in the properties and structure of polymer.

Analyse

1. Outline any two methods for preventing chemical and electrochemical corrosion.
2. Compare the advantages and limitations of electro and electroless plating of nickel.
3. The statement "prevention is better than cure" is not suitable for corrosion science and engineering-Justify the answer in your own words.
4. Differentiate addition and condensation polymers based on its synthesis.
5. Arrange the following polymer based on the increasing order of resistance towards chemical
   1. poly(ethylene) 2. Starch 3.Baklite 4.Teflon

Evaluate

1. Calculate the electrode potential of zinc metal if EMF of the cell is 1.10 V (Sat. Calomel electrode was usedÂ for complete cell formation.
2. Electrode potentials of A and B are E 0 A/A+ = +0.76 V and E 0 B/B+ = -0.34 V respectively. Choose the appropriate anode half-cell and cathode half-cell by giving the cell representation
3. Find out the degree of polymerization for a low density polytetrafluoroethylene with a molecular weight of 10002 amu. (Atomic weights of F=18.9; C=12)
4. The standard reduction potentials of metals Ag, Fe, Cu and Zn are +0.80v,-0.44v, +0.34v and -0.76v respectively. Arrange the metals in the increasing order of their ability to undergo corrosion.

Create

1. A ship hull in ocean is safe against corrosion under any circumstance - Argue.
2. Derive the probable reason and possible solution for the following:
   i. Stainless steel should not be used to build ship hull.
   ii. Small anodic area results in intense corrosion.
   iii. Metal under water drop undergoes accelerated corrosion.

15CH202 APPLIED CHEMISTRY 3 0 2 4

Course Objectives

- Understand the necessity of water softening processes.
- Recognize the fundamentals of corrosion, alloys, phase rule and fuels with its applications.
- Characterize the chemical compounds using analytical techniques.

Course Outcomes (COs)

1. Identify the internal and external treatment methods for the removal of hardness in water for domestic and industrial applications.
2. Understand the type of corrosion and its mechanism which will help to develop the corrosion control methods.
3. Apply the applications of alloying and phase rule in the field of metallurgy.
4. Analyse the three types of fuels based on calorific value for selected applications.
5. Recognize the applications of analytical methods in characterizing the chemical compounds.

UNIT I **10 Hours**

WATER PURIFICATION

Hardness of water - classification of hardness (temporary and permanent) - units of hardness (ppm, mg/l, degree Clark, degree French) - expression of hardness in terms of calcium carbonate equivalence - estimation of hardness by EDTA Method - Uses of water for industrial purpose - requirements of boiler feed water - disadvantages of using hard water in industrial boilers: scale - sludge - priming - foaming - caustic embrittlement. Removal of dissolved salts from hard water: Internal conditioning (phosphate, carbonate, calgon and colloidal methods) - external conditioning: ion exchange process, reverse osmosis, electrodialysis. Uses of water for domestic purpose - municipal water purification (screening, aeration, coagulation, sedimentation, filtration and disinfection of water- break point chlorination).

UNIT II **8 Hours**

CORROSION SCIENCE

Corrosion - chemical and electro chemical corrosion -Pilling Bedworth rule - Mechanism (type of oxide layer, oxygen absorption - hydrogen evolution) - Galvanic series - types of electrochemical corrosion: galvanic corrosion - differential aeration corrosion (pitting, pipeline and waterline corrosion) - Factors influencing corrosion (nature of metal & environment). Corrosion control: sacrificial anode - impressed current method. Protective coatings - paints - constituents and functions.

UNIT III **9 Hours**

ALLOYS AND PHASE RULE

Alloys: purpose of alloying - function and effects of alloying elements -properties of alloys - classification of alloys. Ferrous alloys: nichrome and stainless steel. Non-ferrous alloys: brass and bronze. Heat treatment of steel (Annealing, hardening, tempering, normalising, carburizing and nitriding). Phase rule: Phase - component - degree of freedom - phase rule - phase diagram - Applications - one component system (water system). Reduced phase rule - two component system (lead and silver system).

UNIT IV **10 Hours**

FUELS

Classification - characteristics - calorific value - solid fuel - coal - types - analysis of coal (proximate and ultimate analysis) - processing of coal to coke - carbonization - types (low temperature and high temperature carbonization) - manufacture of metallurgical coke (Otto Hoffmann method). Liquid fuels - petroleum - refining of crude oil - knocking - octane number - cetane number. Liquid fuel from coal (Bergius process). Gaseous fuels - natural gas (CNG) - coal gas - producer gas - syn gas - shale gas.

UNIT V **8 Hours**

INSTRUMENTAL METHODS

Beer - Lamberts law. Principle, instrumentation (block diagram only) and applications: Ultra violet spectroscopy - Infrared spectroscopy - Atomic absorption spectroscopy - Colorimetry (estimation of transition metal) - Flame photometry (estimation of alkali metal).

FOR FURTHER READING

Synthesis and applications of bio-fuels.

2 Hours

EXPERIMENT 1

General instructions to students - Handling reagents and safety precautions

4 Hours

EXPERIMENT 2
Water quality of BIT campus - River - Bore well water with respect to hardness, TDS and pH.

4 Hours

EXPERIMENT 3
Conductometric titration of mixture of acids.

4 Hours

EXPERIMENT 4
Determination of strength of hydrochloric acid in a given solution using pH meter.

4 Hours

EXPERIMENT 5
Determination of the strength of Fe(II) in the given sample by potentiometric method.

4 Hours

EXPERIMENT 6
Measurement of rate of corrosion on mild steel in aerated, neutral, acidic and alkaline medium by Tafel polarization method/ weight loss method.

4 Hours

EXPERIMENT 7
Estimation of copper content in brass by EDTA method.

4 Hours

EXPERIMENT 8
Estimation of iron (thiocyanate method) in the given solution by spectrophotometric method.

Total: 45+30= 75 Hours

Reference(s)

1. A. Pahari and B.Chauhan, Engineering Chemistry, Infinity Science press LLC, New Delhi, 2010.
2. M. Munjal et.al., Wiley Engineering Chemistry, Second edition, Wiley India Pvt. Ltd, New Delhi, 2013.
3. Willard Merritt and Dean Settle, Instrumental methods of analysis, CBS publishers, Seventh edition, 2012.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	1	1	1		3	4	2		1	4	4				1			1				1			23
2	1	1	1		2	2	1		1	2	2			2	1			1				1			17
3	1	1	1		4	4	3		1	2					2							1			20
4	5	3	2		3	1	1		1	1			1	2	1		1	1				1			23
5	1					3					3				7			2				1			17
																								Total	100

Assessment Questions

Remember

1. Define the term hardness of water.
2. List any two internal conditioning methods to convert hard water to soft water.
3. List the two types of electrochemical corrosion.
4. Recall any two reasons for galvanic corrosion.
5. List the four major objectives of alloying steel.
6. State Gibbs phase rule.
7. Retrieve any two significances of proximate analysis.
8. Define octane number.
9. State Beer-Lambert's law.
10. Recall any four applications of colorimetry.

Understand

1. Compare temporary and permanent hardness of water.
2. Illustrate the estimation of carbonate, non-carbonate and total hardness by EDTA method.
3. Identify the needs of corrosion control methods with suitable examples.
4. Indicte the two suitable conditions for electrochemical corrosion to occur.
5. Classify the three types of alloys based on metal composition.
6. For one component water system, the triple point is an invariant point. Reason out.
7. Distinguish between syn gas and coal gas.
8. With a neat diagram, explain the processes involved in Bergius process to get synthetic petrol.
9. Differentiate chromophore and auxochrome with an example.
10. Infer the role of ammonium thiocyanate in the colorimetric estimation of iron.

Apply

1. Illustrate the necessary steps involved in municipal water treatment.
2. Suggest a suitable laboratory method to estimate carbonate, non-carbonate and total hardness of water.
3. Sketch a suitable protection method to prevent ship's hull made of iron from corrosion.
4. Assess the effects of alloying elements.
5. Apply Gibbs phase rule for one component water system with a neat diagram.
6. Find the combusted products of the following components.
   (i) 2H2 (ii) CH4
7. Find the application of colorimetry for the estimation of iron.
8. Calculate the number of the modes of vibrations for the following molecules.
   (i) C6H6 (ii) CO2

Analyse

1. How can the effect of caustic embrittlement in boiler be resolved?
2. Identify the problems created in boilers if priming and foaming takes place.
3. Increase in temperature increases corrosion rate. Justify.
4. Zinc is more corroded when coupled with copper than lead – Reason out.
5. Distinguish ferrous and non-ferrous alloys with examples.
6. Arrange the following materials based on their increasing calorific value.
   peat, lignite, bituminous, wood, anthracite and sub-bituminous.

Evaluate

1. Bolt and nut made of the same metal is preferred in practice.Give Reason.
2. Support the statement "Coke is better fuel than coal".
3. Calculate the absorbance if 10% of light is transmitted.
4. Determine the effect of pH of the conducting medium on corrosion.
5. Determine the number of phases present in the following systems.
   (i) Two miscible liquids (alcohol & water)
   (ii) Two immiscible liquids (benzene & water)

Create

1. Derive the probable reason and possible solution for the following:
   i) Stainless steel should not be used to build ship hull.
   ii) Small anodic area results in intense corrosion.
   iii) Metal under water drop undergoes accelerated corrosion.
2. AAS is a better method for environmental analysis than calorimetric analysis. Justify.

15CH203 APPLIED ELECTROCHEMISTRY

3 0 2 4

Course Objectives

- Understanding the basic concepts of electrochemistry and their application
- Expanding knowledge about corrosion and methods of control
- Gaining information regarding principle, working and application of batteries and fuel cells

Course Outcomes (COs)

1. Construct an electrochemical cell and measure its potential.
2. Measure the emf of a cell using different electrodes.
3. Identify the components and processes in batteries and infer the selection criteria for commercial battery systems with respect to different applications.
4. Differentiate types of corrosion and its prevention by suitable techniques.
5. Recognize the importance of fuel cells and solar battery.

UNIT I **9 Hours**

FUNDAMENTALS OF ELECTROCHEMISTRY

Introduction - electrical conductance in solution - electrical double layer - electrode potential - importance of electrode potential. Electrochemical cell - standard cell: Weston cadmium cell - Concentration cell: electrode and electrolyte - applications. Applications of electrolytic cells: electrolysis of water, electrolysis of brine and electroplating of copper and gold

UNIT II **9 Hours**

REFERENCE ELECTRODES

Primary and secondary reference electrodes - metal-metal ion electrode, metal-metal insoluble salt electrodes: silver-silver chloride electrode, calomel electrode - ion-selective electrode: glass electrode - measurement of pH of a solution using glass electrode. Quinhydrone electrode: construction - advantages - limitations. Applications of EMF measurements: Potentiometric titrations: acid-base titration - oxidation-reduction titration - precipitation titration

UNIT III **10 Hours**

ENERGY STORING DEVICES

Types of batteries - alkaline, lead-acid, nickel-cadmium and lithium batteries - construction, working and commercial applications. Electrochemical sensors. Decomposition potential: variation of decomposition potential for different metals - importance of decomposition potential. Over voltage: factors affecting over voltage value. Maintenance and precautions in battery handling

UNIT IV **10 Hours**

CORROSION SCIENCE

Corrosion - causes - dry and wet corrosion - Pilling-Bedworth rule - mechanism (hydrogen evolution and oxygen absorption) - rusting of iron. Galvanic series - applications. Galvanic corrosion - differential aeration corrosion (pitting, waterline and stress) - factors influencing corrosion. Corrosion control - sacrificial anode and impressed current cathodic protection methods - Metallic coatings: chromium plating - nickel plating - galvanizing and tinning

UNIT V **7 Hours**

FUEL CELL AND SOLAR BATTERY

Introduction - types of fuel cell: low, medium and high temperature fuel cell. Hydrogen-Oxygen fuel cell - advantages. Solid polymer electrolyte fuel cell, solid oxide fuel cells, biochemical fuel cell. Solar battery - domestic, industrial and commercial applications. Environmental and safety issues

FOR FURTHER READING

Document the various batteries with its characteristics used in mobile phones and laptops Maintenance free batteries, Battery recycling

2 Hours

EXPERIMENT 1

General instructions to students - Handling reagents and safety precautions.

4 Hours

EXPERIMENT 2

Determination of strength of a commercial mineral acid by conductometric titration.

4 Hours

EXPERIMENT 3

Electroplating of copper onto a stainless steel object.

4 Hours

EXPERIMENT 4

Determination of strength of iron in a given solution by potentiometric method.

4 Hours

EXPERIMENT 5

Determination of amount of hydrochloric acid present in the given sample using pH meter.

4 Hours

EXPERIMENT 6

Conductometric titration of mixture of acids.

4 Hours

EXPERIMENT 7

Determination of corrosion inhibition on mild steel using natural inhibitors.

4 Hours

EXPERIMENT 8

Estimation of barium by precipitation titration.

Total: 45+30= 75 Hours

Reference(s)

1. J. C. Kuriacose and J. Rajaram, Chemistry in Engineering & Technology, Vol. 1&2, Tata McGraw-Hill, New Delhi, 2010.
2. B. S. Chauhan, Engineering Chemistry, 3rd Edition, Laxmi Publication Ltd, New Delhi, 2010.
3. B. R. Puri, L. R. Sharma and Madan S Pathania, Principles of physical chemistry, 46th Edition, Vishal publishing Ltd, New Delhi, 2013.
4. B. S. Bahl, G. D. Tuli and Arun Bahl, Essentials of Physical Chemistry, 5th Edition, S. Chand & Company, New Delhi, 2012.
5. S. Vairam, Engineering Chemistry, 1st Edition, John -Willy, India private limited, New Delhi, 2014.
6. Sashi Chawla, Text Book of Engineering Chemistry, Dhanpat Rai Publications, New Delhi, 2010.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	2			2	1	1			2	1		1	1	2			2	1			1	1		20
2	1	4			2	4	1			2			1	2				1	2						20
3		1	1		4	5			2	4			2	1			1	2							23
4	2	1			2	5	1			3				2			2	2				2			22
5	2	2			1	4			2	1			1	1				1							15
																								Total	100

Assessment Questions

Remember

1. List any two advantages of hydrogen oxygen fuel cells.
2. Name any two secondary batteries used in electronic appliances.
3. State pilling bedworth rule.
4. List any two applications of lithium battery.
5. Define overvoltage.
6. Recall the two limitations of quinhydrone electrode.
7. List the three major applications of galvanic series.
8. Recall the term redox reaction.
9. Define standard electrode potential.

Understand

1. Identify any two factors affecting the rate of corrosion based on the nature of metal.
2. Compare solar battery with lead acid-battery with respect to cell reactions, advantages and limitations.
3. Explain the working of hydrogen-oxygen fuel cell with necessary diagram and cell reactions. Mention its two advantages and limitations.
4. Explain the difference between galvanic and differential aeration corrosion with an example each.
5. Summarize any five factors that affect overvoltage value of a cell.
6. Differentiate cell from battery.
7. Sketch and explain the construction and working of saturated calomel electrode with necessary cell reactions.
8. With a neat sketch explain the working of a silver – silver chloride electrode.

9. Elucidate the working principle of Weston cadmium cell with suitable cell reactions.
10. Distinguish galvanic and electrolytic cells based on cell reactions.

Apply

1. Assess the six advantages of solid polymer electrolyte fuel cell.
2. Many metals form oxide layer when exposed to atmospheric conditions due to corrosion. Predict the four types of metal oxide layers formed with two examples each.
3. An iron pipe line buried under soil is used to carry natural gas, suggest any two corrosion control techniques that can be employed to minimize/control corrosion.
4. Predict the type of corrosion taking place when a piece of iron rod is exposed to moisture and explain the mechanism of rust formation.
5. Illustrate the construction of 6V lead-acid battery and explain its functioning during discharging and charging process.
6. Select a suitable secondary storage battery used in mobile phones. Explain its reactions during charging and discharging process.
7. Find the electrode potential of zinc rod using saturated calomel electrode as reference electrode (Ecell value is 1.10 V).
8. Apply the principle of ion selective electrode to find the pH of HCl solution using glass electrode with necessary equations.
9. Can we use KCl salt bridge to construct a cell using Ag and Pb half-cell. Give reason.
10. Identify a suitable technique to achieve copper coating on stainless steel object with a neat diagram.

Analyse

1. Can you store zinc sulphate solution in a copper container? Give reason if your answer is yes/no.
2. Predict why copper cannot displace hydrogen from mineral acid solution.
3. Compare a deep cycle battery and a starting battery based on its application.
4. Zinc corrodes at a faster rate when coupled with copper than lead. Give reason.
5. Does the water exhaust from hydrogen - oxygen fuel cell is drinkable? Give reasons if Yes/No.

Evaluate

1. Electrode potentials of A and B are E0A/A+ = +0.76 V and E0B/B+ = -0.34 V respectively. Choose the appropriate anode half-cell and cathode half-cell by giving the cell representation.
2. Glass electrode cannot be used in solutions having pH greater than 9.0. Give reason.
3. Represent diagrammatically an electrochemical cell that produces 1.1 volt as an output. Write the half-cell reactions responsible for that.
4. The standard reduction potentials of metals Ag, Fe, Cu and Zn are +0.80v,-0.44v, +0.34v and -0.76v respectively. Arrange the metals in the increasing order of their ability to undergo corrosion.
5. Identify any two advantages of microbial fuel cell over lead acid battery.

Create

1. Derive the probable reason and possible solution for the following:
   i) Stainless steel should not be used to build ship hull.
   ii) Small anodic area results in intense corrosion.
   iii) Metal under water drop undergoes accelerated corrosion.
2. As an engineer, which type of metal oxide forming metal you will choose for your design? Reason out.

15CH204 INDUSTRIAL CHEMISTRY 3 0 2 4

Course Objectives

- Impart knowledge on the principles of water characterization, treatment methods and industrial applications.
- Understand the principles and application of electrochemistry, fuels and combustion.
- Recognizing the fundamentals of polymers, nano chemistry and analytical techniques.

Course Outcomes (COs)

1. Identify the internal and external treatment methods for the removal of hardness in water for domestic and industrial applications.
2. Utilize the concepts of electrochemistry in real time applications.
3. Realise the importance of fuel chemistry in day to day life.
4. Differentiate the polymers used in day to day life based on its source, properties and applications
5. Familiarize with the synthesis and characterization techniques of nanomaterials.

UNIT I **10 Hours**

WATER PURIFICATION TECHNOLOGY: SOFTENING AND DESALINATION

Hardness of water: Equivalents of calcium carbonate - Units of hardness - Degree of hardness and estimation (EDTA method). Use of water for industrial purposes: Boiler feed water-scale-sludge -priming and foaming -caustic embrittlement. Softening of hard water: External conditioning - ion exchange methods - Internal conditioning - trisodium, dihydrogen, trihydrogen phosphate and sodium hexameta phosphate- carbonate- colloidal methods. Desalination: Reverse osmosis - electrodialysis. Domestic water treatment - Disinfection of water - break point chlorination

UNIT II **10 Hours**

ELECTROCHEMISTRY

Introduction - EMF - Single electrode potential -Calomel electrode - Glass electrode -pH measurement using glass electrode - Electrochemical series. Cells: Electrochemical cells - Cell reactions- Reversible cells and irreversible cells. Batteries - characteristics of battery - types of batteries, construction, working and applications: Primary (alkaline) and secondary (lead-acid and nickel-cadmium) - Modern batteries (zinc air battery and lithium batteries) - precautions for battery maintenance. Fuel cell: Hydrogen - Oxygen fuel cell.Electroplating of copper and electroless plating of nickel

UNIT III **8 Hours**

FUELS AND COMBUSTION

Fuel: Introduction - classification of fuels - calorific value - higher and lower calorific values - analysis of coal (proximate and ultimate) - carbonization - manufacture of synthetic petrol (Bergius process) - knocking - octane number - cetane number - natural gas - Compressed Natural Gas (CNG)- Liquefied Petroleum Gases (LPG) - producer gas - water gas. Combustion of fuels: introduction- theoretical calculation of calorific value - calculation of stoichiometry of fuel and air ratio - ignition temperature

UNIT IV **9 Hours**

POLYMER AND COMPOSITES

Monomers - functionality - degree of polymerizations - classification of polymers based on source and applications; porosity - tortuosity - molecular weight determination by Ostwald method - polymerization methods: addition, condensation and copolymerization - mechanism of free radical polymerization -

thermosetting and thermoplastics. Polymer blends - composites, significance, blending-miscible and immiscible blends, phase morphology, fibre reinforced plastics, long and short fibre reinforced composites

UNIT V **8 Hours**

NANOMATERIALS

Types of Nanomaterials - Nano particles - nanoclusters - nano rod - nanowire -nano tube. Synthesis: Top down process: laser ablation - electrodeposition - chemical vapor deposition. Bottom up process: Precipitation - thermolysis - hydrothermal - solvothermal process. Carbon nanotubes: Types - production - properties - applications. Working principle and applications - Scanning Electron Microscope (SEM) - Transmission Electron Microscope (TEM) - UV-Visible spectrophotometer

FOR FURTHER READING

Application of nanomaterials in medicine, environment, energy, information and communication sectors

2 Hours

EXPERIMENT 1

General instructions to students - Handling reagents and safety precautions

4 Hours

EXPERIMENT 2

Water quality of BIT campus - River - Bore well water with respect to hardness, TDS and pH

4 Hours

EXPERIMENT 3

Determination of strength of hydrochloric acid in a given solution using pH meter

4 Hours

EXPERIMENT 4

Determination of strength of a commercial mineral acid by conductometric titration

4 Hours

EXPERIMENT 5

Conductometric titration of mixture of acids

4 Hours

EXPERIMENT 6

Determination of the strength of iron in the given sample by potentiometric method

4 Hours

EXPERIMENT 7

Determination of molecular weight of polyvinyl alcohol by Ostwald viscometry method

4 Hours

EXPERIMENT 8

Estimation of iron (thiocyanate method) in the given solution by spectrophotometric method

Total: 45+30= 75 Hours

Reference(s)

1. M. Munjal and S.M. Gupta, Wiley Engineering Chemistry, Second edition, Wiley India Pvt. Ltd, New Delhi, 2013
2. A. Pahari and B.Chauhan, Engineering Chemistry, Infinity Science press LLC, New Delhi, 2010
3. P.H. Rieger, Electrochemistry, Springer, Netherland, Second Edition (Reprint) 2012
4. Fred W. Billmeyer JR, Textbook of polymer science, John Wiley & sons, Third edition, 2008
5. G. Cao, Ying Wang, Nanostructures and Nanomaterials: Synthesis, Properties, and Applications, World Scientific, New Jersey, 2011
6. S. Sarkar, Fuels and combustion, 3rd edition, Orient Longman Ltd. New Delhi, 2010

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	1	1	1		2	4	3			1	3		1		3				1						21
2	2	1	2		2	5	2		1	1	3				1				1						21
3	1	2	2		1	3	3			2	2			1	1				1						19
4	1	1	1		3	4	1		1	1	3			1	2				1						20
5	1	1	1		1	2	2			2	3			2	2				2						19
																								Total	100

Assessment Questions

Remember

1. Define the term break point chlorination.
2. Name a method to prevent the scale formation in the industrial boilers.
3. Define single electrode potential of an electrode.
4. List any two advantages of H2-O2 fuel cell.
5. Define functionality of a monomer.
6. Name any two thermoplastic and thermosetting polymers.
7. List any two applications of SEM.
8. Recall any two application of X-Ray diffractometer.
9. List three factors which affects the standard electrode potential of cell.

Understand

1. Illustrate any three applications of electrochemical series.
2. Summarize the four applications of calorimeter.
3. Explain the components of TEM with a neat sketch.
4. Compare bottom up approach with top down approach of nanoparticle synthesis.
5. Distinguish between alkaline and non alkaline hardness.
6. Differentiate between thermoplastic and thermosetting plastics
7. Why copper cannot displace hydrogen from mineral acid solution?
8. Identify two significances of RO method in water treatment.
9. Indicate any two advantages of water gas over producer gas.
10. Compare nanocluster with nanocrystal.
11. Identify the reasons for change of properties of materials at nanoscale.

Apply

1. A water sample contains 204 mgs of CaSO4 and 73 mgs of Mg(HCO3)2 per litre. Calculate the total hardness in terms of CaCO3 equivalence.
2. 100 ml of sample water has hardness equivalent to 12.5ml of 0.08N MgSO4. Calculate hardness in ppm.
3. Find out the single electrode potential of a half cell of zinc electrode dipped in a 0.01M ZnSO4 solution at 25°C? E° Zn/Zn 2+ = 0.763 V, R=8.314 JK-1Mol-1, F= 96500 Coulombs.
4. Calculate the reduction potential of Cu2+/Cu=0.5M at 25°C. E° Cu 2+/ Cu= +0.337V.
5. Find out the weight and volume of air required for the complete combustion of 1 kg of coke.
6. A sample of coal containing 60% C, 6% H, 33% O, 0.5 % S, 0.2% N and 0.3% of ash. Find the gross and net calorific value of coal.
7. Calculate the degree of polymerization of polypropylene having molecular weight of 25200.
8. Apply the principle of ion selective electrode to determine the pH of HCl solution using glass electrode with equations.

Analyse

1. Calgon conditioning is advantageous over phosphate conditioning- reason out.
2. Soft water is not demineralized water whereas demineralized water is a soft water- Jusify.
3. Hydrogen electrode is not generally used for pH measurements – Why?
4. Zinc reacts with dil.H2SO4 to give hydrogen but silver doesn't liberate hydrogen. Give reasons.
5. Good fuel should have low ash content- Give reasons.
6. Sugar is an example of non-electrolyte - Reason out.

Evaluate / Create

1. Hydrogen fuel is an ideal fuel for the future among all other fuels- Justify.
2. Choose the best method for water purification and explain their components.

15CH205 WATER TECHNOLOGY AND GREEN CHEMISTRY

3 0 2 4

Course Objectives

- Imparting the knowledge on the principles of water technology and green chemistry.
- Understanding the principles and applications of green technology in water treatments.
- Infer the engineering applications of green chemistry in dyes, corrosion engineering and nanotechnology.

Course Outcomes (COs)

1. Understand the importance of green chemistry with its emergence and development.
2. Realize the designing of safer methodologies for green technology to meet the objectives of green engineering.
3. Exemplify the type of corrosion and its mechanism which will help to develop the corrosion control methods.
4. Identify suitable technique to extract natural dye from its source.
5. Familiarize with the synthesis and characterization techniques of nanomaterials.

UNIT I **9 Hours**

WATER TREATMENT

Water quality parameters - Hardness of water - Disadvantages of hard water - Degree of hardness and its estimation (EDTA method) - Boiler feed water - Boiler troubles: Priming, foaming and caustic embrittlement - Softening of hard water: Internal conditioning: Sodium hexameta phosphate - Phosphate methods; External conditioning: Ion exchange method - Desalination: Reverse osmosis - Electrodialysis. Domestic water treatment - Disinfection of water - Break point chlorination.

UNIT II **8 Hours**

WASTE WATER ANALYSIS

Basic principles and concept of green chemistry - Need of green chemistry in day-to-day life - Scientific areas for practical applications of green chemistry - Industrial effluents - Waste water analysis: Concept of chemical oxygen demand (COD) and biological oxygen demand (BOD) - Removal of trace pollutants in waste water: Membrane Bioreactor (MBR) technology - Wet oxidation method.

UNIT III **10 Hours**

CHEMISTRY OF CORROSION

Corrosion: Mechanism of corrosion - chemical and electrochemical - Pilling-Bedworth rule - oxygen absorption - hydrogen evolution - galvanic series. Types of corrosion: Galvanic corrosion - differential aeration corrosion (pitting, pipeline, water line and wire fence corrosion) - factors influencing corrosion. Methods of corrosion control: choice of metals and alloys - proper designing - cathodic protection (Sacrificial anode method, impressed current method)-modifying the environment. Protective coatings: Concept of electroplating: electroplating (gold and copper) - electroless plating (nickel and copper).

UNIT IV **9 Hours**

NATURAL DYES

Introduction - definition - classification of natural dyes - concept of chromophores and auxochromes - Extraction process of colour component from natural dyes: Aqueous extraction, non-aqueous extraction - Purification of natural dyes: Chromatography techniques - Types - Column chromatography - thin layer chromatography - Qualitative analysis: UV-Visible spectroscopic study - Mordant: Metallic and non-metallic mordant - advantages and disadvantages of natural dyes.

UNIT V **9 Hours**

NANOMATERIALS

Types of Nanomaterials - Nano particles - nanoclusters - nano rod - nanowire - nano tube. Synthesis: Top down process: laser ablation - electrodeposition - chemical vapor deposition. Bottom up process: Precipitation - thermolysis - hydrothermal - solvothermal process. Carbon nanotubes: Types - production - properties - applications. Working principle and applications: Scanning Electron Microscope (SEM) - Transmission Electron Microscope (TEM) - UV- Visible spectrophotometer. Synthesis of Au and Ag nanoparticles using plant extract - Advantages.

FOR FURTHER READING

Protection of metals in concrete against corrosion
Microwave technology on green chemistry

2 Hours

EXPERIMENT 1

General instructions to students - Handling reagents and safety precautions

4 Hours

EXPERIMENT 2

Water quality- river/bore well water with respect to hardness and TDS

4 Hours

EXPERIMENT 3

Determination of strength of hydrochloric acid in a given solution using pH meter

4 Hours

EXPERIMENT 4

Estimation of strength of iron by potentiometric method using calomel electrode

4 Hours

EXPERIMENT 5

Extraction of a natural dye by aqueous extraction method

4 Hours

EXPERIMENT 6

Measurement of rate of corrosion of mild steel in aerated neutral/acidic/alkaline solution by weight loss measurements/Tafel polarization method

4 Hours

EXPERIMENT 7

Determination of dye concentration in a given sample by using UV-Visible spectroscopic method

4 Hours

EXPERIMENT 8

Estimation of iron (thiocyanate method) in the given solution by spectrophotometric method

Total: 45+30= 75 Hours

Reference(s)

1. M. Munjal and S.M. Gupta, Wiley Engineering Chemistry, Second edition, Wiley India Pvt. Ltd, New Delhi, 2013
2. V K Ahluwalia, Green Chemistry - Environmentally Benign Reactions, Ane Books Pvt. Ltd., New Delhi, 2nd Edition, 2012
3. Giusy Lofrano, Green Technologies for Wastewater Treatment - Energy Recovery and Emerging Compounds Removal, Springer Dordrecht Heidelberg, New York, London, 2012
4. Ashis Kumar Samanta and Adwaita Konar, Natural Dyes - Dyeing of Textiles with Natural Dyes, Dr.Emriye Akcakoca Kumbasar (Ed.), InTech Publisher, New Delhi, 2011
5. J. C. Kuriacose and J. Rajaram, Chemistry in Engineering & Technology, Vol. 1&2, Tata McGraw-Hill, New Delhi, 2010
6. David Pozo perez, Nanotechnology and Nanomaterials, InTech Publishers, NewDelhi, 2010

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	2			3	3				3	3			2	1							1			20
2	2				3	4				2	2			2	1			1							17
3	1	2	1		4	3	3			1	3			1	2			2							23
4	1	2			6	6				3												2			20
5	3	2	2		3	6	2		2																20
																							Total		100

Assessment Questions

Remember

1. List out any four water quality parameters.
2. Name the salts responsible for temporary hardness of water.
3. Recall any two practical applications of green chemistry.
4. Define wet oxidation in waste water treatment.
5. State Pilling Bed-worth's rule.
6. Recall any two examples for differential aeration corrosion.
7. Name any two natural dyes.
8. Recall the role of auxochromes in dyes.
9. Name the four methods of nanomaterial synthesis.
10. Name any two plant extracts used in silver nanoparticles synthesis.

Understand

1. Hardness of water is always expressed in terms of CaCO3 equivalent. Reason out.
2. Soft water is not demineralized water whereas demineralized water is soft water - Justify.
3. Represent the need of green chemistry in waste water treatment.
4. Indicate the importance of MBR technology in waste water treatment.
5. Express the mechanism of wet corrosion.

6. Bolt and nut made from same metal is preferred in practice. Reason out.
7. Classify the types of natural dyes based on their chemical structure.
8. Compare the properties of metallic and non-metallic mordents.
9. Infer any two important needs of green chemistry in nanotechnology sector.
10. Identify the physicochemical and engineering properties of nanomaterials.

Apply

1. A sample of water contains 180 mgs of $MgSO_4$ per litre. Calculate the hardness in terms of $CaCO_3$ equivalents. (Molecular weight of $MgSO_4$ is 120).
2. Calculate the non-carbonate hardness of a sample of water containing the dissolved salts as given below in mg/l $Mg(HCO_3)_2$ = 7.3; $Ca(HCO_3)_2$ = 40.5 and NaCl =50.
3. Select the scientific areas for the practical applications of green chemistry.
4. Predict the significance of sacrificial anode in the prevention of corrosion.
5. Outline the principle of electro-deposition to achieve copper coating on stainless steel object with a neat diagram.
6. Select a suitable technique used for the purification of natural dye.
7. Assess the role of Scanning Electron Microscope (SEM) in nano-materials characterization.

Analyse

1. Distinguish between scale and sludge.
2. Identify the four reasons for boiler troubles.
3. Differentiate between BOD and COD.
4. The rate of corrosion increases with increase in temperature. Give reason.
5. Outline the effect of pH of the conducting medium on corrosion.
6. Differentiate chromophores & auxochromes in dyes.

Evaluate

1. Substantiate the statement that nature of the environment affects corrosion.
2. Choose and explain any two best methods to synthesis nanoparticles.

Create

1. Plan and execute a method to get pure water from waste water using available low coast material in your area.
2. Relate the characteristic properties of natural with synthetic dyes.

DISCIPLINE ELECTIVES

15CS001 DISTRIBUTED COMPUTING 3 0 0 3

Course Objectives

- Understand the basic client server communication.
- Design and implement a distributed system over other networks.
- Diagnose the cause of defects in the deadlocks.

Course Outcomes (COs)

1. Recognize the various distributed computing system strategies.
2. Illustrate the concepts of inter process communication and distributed objects.
3. Explain the distributed transactions and concurrency control mechanisms.
4. Explore the resource management techniques.
5. Implement the distributed file system and name services.

UNIT I **8 Hours**

BASIC CONCEPTS

Characterization of Distributed Systems - Examples - Resource Sharing and the Web - Challenges - System Models - Architectural and Fundamental Models - Networking and Internetworking - Types of Networks - Network Principles-Internet Protocols.

UNIT II **10 Hours**

INTERPROCESS COMMUNICATION AND DISTRIBUTED OBJECTS

Interprocess Communication - The API for the Internet Protocols - External Data Representation and Marshalling - Client - Server Communication - Group Communication - Case Study - Distributed Objects and Remote Invocation - Communication Between Distributed Objects - Remote Procedure Call - Events and Notifications.

UNIT III **9 Hours**

DISTRIBUTED TRANSACTIONS AND CONCURRENCY CONTROL

Transactions - Locks - Optimistic Concurrency Control - Timestamp Ordering - Comparison - Flat and Nested - Distributed Transactions - Atomic Commit Protocols - Concurrency Control in Distributed Transactions - Distributed Deadlocks - Transaction Recovery.

UNIT IV **9 Hours**

RESOURCE MANAGEMENT

Time and Global States-Introduction - Clocks, Events and Process states - Synchronizing physical clocks - Logical time and logical clocks - Global states-Distributed debugging - Coordination and Agreement-Introduction - Distributed mutual exclusion - Elections Algorithm - Multicast communication - Consensus and related problems.

UNIT V **9 Hours**

DISTRIBUTED FILE SYSTEM AND NAME SERVICES

Distributed File Systems - Introduction - File service architecture - Network File System- Name Services and the Domain Name System - Directory Services.

FOR FURTHER READING

Ethernet and WiFi - Interprocess Communication in UNIX and Java RMI - Transactions with Replicated Data - Amoeba- Mach - Sun Network File System - Global Name Service

Total: 45 Hours

Reference(s)

1. George Coulouris, Jean Dollimore and Tim Kindberg, Distributed Systems Concepts and Design, Pearson Education, 2012.
2. Andrew S. Tanenbaum, Maartenvan Steen, Distibuted Systems, Principles and Paradigms, Pearson Education, 2007.
3. Mugesh Singhal, Niranjan G Shivaratri, Advanced Concepts in Operating Systems, Tata McGraw Hill Edition, 2008.
4. M. L. Liu, Distributed Computing Principles and Applications, Pearson Education, 2004.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	4	4			4	4																			16
2	2				2	4				6				2				2				2			20
3	2				2					6			2	6	3										21
4		2			2					6			2	6	3										21
5	2	6				2				6				6											22
																								Total	100

Assessment Questions

Remember

1. Define distributed systems.
2. List the types of transparencies.
3. Define inter process Communication.
4. Illustrate the implementation of thin clients.
5. Define domain name.
6. List the different types of distributed file system available.
7. Define directory services.
8. Define global State.
9. List the layers present in name space distribution.
10. What is the principle of server management?

Understand

1. Compare intranet and internet.
2. Explain in detail about marshalling.
3. How process allocation strategies can be divided?
4. Exemplify Remote Procedure call.
5. Describe the principles involved in group communication.
6. Explain about file server architecture.
7. Explain distributed mutual exclusion and elections.
8. Exemplify Lock Management in distributed DBMS.
9. Illustrate the implementation of capture step.
10. Explain several refinements suggested by the observations made by Two-Phase commit protocol.

Apply

1. Find the various ways of doing caching in client memory.

2. Illustrate the trends in DFS.
3. Assess the three basic observations made by Two-Phase commit protocol.
4. Find the reasons to implement Gateway Protocol.
5. Predict the characteristic of network hidden by stream abstraction.
6. Explain the election algorithm.
7. Explain the algorithm of mutual exclusion.
8. Explain briefly about multicast communication.
9. Explain Time stamp ordering with an example.
10. Explain about distributed debugging.

Analyse

1. Differentiate networking and internetworking.
2. Differentiate RMI and RPC.
3. Justify the potential bottlenecks that should be avoided in very large distributed systems.
4. Differentiate monolithic and micro kernels.
5. Justify the generation of stub.
6. Conclude the elements involved in the implementation of RPC.
7. Classify marshalling and unmarshalling.

Evaluate

1. Criticize buffered and unbuffered primitives.
2. Explain the different types of addressing used in a client server model.
3. Compare flat and nested transactions.

Create

1. Conclude the conditions that we can assign time to all the events in a Distributed Systems.
2. Contribute your comments on granularity and page replacement issues in the design of distributed shared memory systems.

15CS002 DATA WAREHOUSING AND DATA MINING 3 0 0 3

Course Objectives

- Understand the basic concepts of data mining.
- Familiarize with the data mining functionalities.
- Assess the strengths and weaknesses of various data mining techniques.

Course Outcomes (COs)

1. Implement the data warehouse architecture.
2. Explain the functionalities of data mining.
3. Explore the different data preprocessing techniques.
4. Identify the association rules using frequent itemset mining algorithms.
5. Describe the classification and clustering techniques.

UNIT I **7 Hours**

DATA WAREHOUSING

Introduction- Data Warehouse - Multidimensional data model - Data warehouse architecture - Steps for the design and construction of data warehouses, Three-tier data warehouse architecture, Data warehouse back-end tools and utilities, Metadata Repository - Types of OLAP Servers - Data warehouse implementation

UNIT II **9 Hours**

INTRODUCTION TO DATA MINING

Introduction - The evolution of database system technology - Steps in knowledge discovery from database process - Architecture of a data mining systems - Data mining on different kinds of data - Different kinds of pattern - Technologies used - Applications - Major issues in data mining - Classification of data mining systems - Data mining task primitives - Integration of a data mining system with a database or data warehouse system

UNIT III **10 Hours**

DATA PREPROCESSING

Data Objects and attribute types - Basic statistical description of data - Data visualization - Measuring data similarity and dissimilarity - Data cleaning - Integration - Data reduction - Data transformation and data discretization

UNIT IV **9 Hours**

ASSOCIATION RULE MINING

Basic concepts - Frequent itemset mining methods - Apriori algorithm, a pattern growth approach, Vertical data format, Closed and max patterns - Pattern mining in multilevel and multidimensional space - Constraint based frequent pattern mining

UNIT V **10 Hours**

CLASSIFICATION AND CLUSTERING

General approach to classification - Decision tree induction - Bayes classification methods-Rule Based Classification- Metrics for evaluating classifier performance - Prediction - Cluster Analysis - Partitioning methods - Hierarchical methods

FOR FURTHER READING

Applications of data mining-Social impacts of data mining-Tools

Total: 45 Hours

Reference(s)

1. Jiawei Han, Micheline Kamber and Jian Pai, Data Mining: Concepts and Techniques, Morgan Kauffman, 2013
2. Alex Berson and Stephen J Smith, Data Warehousing, Data Mining, and OLAP, Mcgraw-Hill, 1997
3. David Hand, Heikki Manila, Padhraic Symth, Principles of Data Mining, MIT Press, 2001
4. Margaret H.Dunham, Data Mining: Introductory and Advanced Topics, Pearson Education 2003

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1		4				4								8											16
2		4				16								4											24
3						4	4			4	4														16
4						4				12				4											20
5		4				4	8								8										24
																								Total	100

Assessment Questions

Remember

1. Define Data Mining.
2. Define Knowldege discovery in database.
3. List the classification of data mining system.
4. List the steps in the data mining process.
5. List out the major components of a typical data mining system.
6. State constraint based association mining.
7. List the two data structures in cluster analysis.
8. Define Bayes theorem.
9. List any four data mining tools.
10. State the cluster hypothesis.
11. List the performance measures of classification technique.
12. Define smoothing.
13. Define Datamart.
14. List the three different schema in data warehousing.

Understand

1. Illustrate the architecture of data mining with neat diagram.
2. Explain the knowledge discovery in databases with neat diagram.
3. Indicate the decision tree induction algorithm steps along with an example.
4. Exemplify the three-tier architecture of data warehouse with diagram.
5. Explain the k-means algorithm.
6. Illustrate the Bayesian belief networks with an example.
7. Exemplify the linear and non-linear regression.
8. Compare pre pruning and post pruning.
9. Interpret closed frequent itemset.
10. Explain the data cleaning methods.

Apply

1. Given the following measurements for the variable age 18,22,25,42,28,43,33,35,56,28 standardize the variable by mean absolute deviation of age and z-score for the first four measurements.
2. Assess the different classes of schemas that are used for modeling data warehouses.
3. Given minimum support as 40% and minimum confidence as 80%. Find out the frequent item sets and strong association rules for the given below using Apriori

Transaction Id	Items
1	1,3,4,6
2	2,3,5,7
3	1,2,3,5,8
4	2,5,9,10
5	1,4

4. A database have five transactions. Let min_sup = 60% min_con = 80%. Find all frequent itemsets using FP-Growth

TID	Items bought
1	{M,O,N,K,E,Y}
2	{D,O,N,K,E,Y}
3	{M,A,K,E}
4	{M,U,C,K,Y}
5	{C,O,O,K,I,E}

5. The following table shows the midterm and final exam grades obtained for students in a database course.
   Midterm exam Final exam
   72 84
   50 63
   81 77
   74 78
   94 90
   86 75
   59 49
   83 79
   65 77
   33 52
   88 74
   81 90
   Predict the final exam grade of a student who received an 86 on the midterm exam.
6. A data warehouse consists of the three dimensions time, doctor, and patient, and the two measures count and charge, where charge is the fee that a doctor charges a patient for a visit.
   a) Draw a star schema for the above data warehouse.
   b) Starting with the base cuboid [day; doctor; patient], what specific OLAP operations should be performed in order to list the total fee collected by each doctor in 2004?
7. A data warehouse for Big University consists of the following four dimensions: student, course, semester, and instructor, and two measures count and avg grade. When at the lowest conceptual level (e.g., for a given student, course, semester, and instructor combination), the avg grade measure stores the actual course grade of the student. At higher conceptual levels, avg grade stores the average grade for the given combination. Draw a snowflake schema diagram for the above data warehouse.
8. Suppose that the data mining task is to cluster the following eight points into three clusters : A1(2,10), A2(2,5), A3(8,4), B1(5,8), B2(7,5), B3(6,4),C1(1,2), C2(4,9). The distance function is Manhattan distance. Suppose initially A1, B1 and C1 as the center of each cluster respectively. Use the k-means algorithm to show only
   The three cluster centers after the first round execution
   The three clusters after third iteration
9. Given two objects represented by the tuple (22,1,42,10) and (20,0,36,8)
   Compute the Euclidean distance between the two objects
   Compute the Manhattan distance between the two objects
   Compute the Minkowski distance between the two objects
10. The age values for the data tuples are 13, 15, 16, 16, 19, 20, 20, 21, 22, 22, 25, 25, using smooth by bin median by bin depth of 3.
11. Suppose a group of 12 sales price records has been sorted as follows: 5, 10, 11, 13, 15, 35, and 50,55,72,92,204,215, Partition them into three bins using equidepth.

12. The age values for the data tuples are 13, 15, 16, 16, 19, 20, 20, 21, 22, 22, 25, 25, using smooth by bin boundary bin depth of 3.
13. Use the min-max normalization to transform the value 350 using the following group of data 200,300,400,600, 1000 onto the range[0.0, 1.0]

Analyse

1. Differentiate Data Warehouse and Data mart.
2. Distinguish between data warehouse and database.
3. Compare the approaches for the integration of a data mining system with a database or data warehouse system. State which approach is the most popular and why?
4. Resolve how the evolution of database technology led to data mining.
5. Differentiate OLAP and OLTP.
6. Differentiate Data warehouse and operational DBMS.
7. Differentiate supervised and unsupervised learning scheme.
8. Differentiate discrimination and classification
9. Distinguish between agglomerative clustering and divisive clustering.
10. Differentiate lossy and lossless compression.

15CS003 BIG DATA ANALYTICS 3 0 0 3

Course Objectives

- Understand the basic ideas of Big Data.
- Analyze the data analytics life cycle and methodology.
- Design unstructured data analytics.

Course Outcomes (COs)

1. Identify the concepts and applications of big data.
2. Manage data using NoSQL databases.
3. Explain the basic idea of the Hadoop and HDFS.
4. Implement programs using Map reduce concepts.
5. Design machine learning techniques to resolve the issue by Hadoop related tools.

UNIT I **10 Hours**

UNDERSTANDING BIG DATA

Data Storage and Analysis, Comparison with Other Systems, Rational Database Management System, Grid Computing, Volunteer Computing- unstructured data - industry examples of big data- web analytics- big data and marketing -fraud and big data - risk and big data - credit risk management- big data and algorithmic trading - big data and healthcare - big data in medicine- advertising and big data - big data technologies -introduction to Hadoop - open source technologies

UNIT II **7 Hours**

NOSQL DATA MANAGEMENT

Introduction to NoSQL- aggregate data models- aggregates -key-value and document data models - relationships- graph databases-schema less databases-materialized views-distribution models -sharding - version - Map reduce- partitioning and combining -composing map-reduce calculations

UNIT III **8 Hours**

BASICS OF HADOOP

Data format - analyzing data with Hadoop-scaling out-Hadoop streaming- Hadoop pipes- design of Hadoop distributed file system (HDFS) - HDFS concepts-Java interface- data flow-Hadoop I/O -data integrity -compression-serialization

UNIT IV **10 Hours**

MAP REDUCE APPLICATIONS

MapReduce workflows - unit tests with MR Unit -test data and local tests - anatomy of MapReduce job run - classic Map-reduce - YARN- failures in classic Map-reduce and YARN - job scheduling -shuffle and sort - task execution - MapReduce types -input formats -output formats

UNIT V **10 Hours**

HADOOP RELATED TOOLS

Hbase- data model and implementations- Hbase clients - Hbase examples -praxis. Cassandra-cassandra data model- Cassandra examples- Cassandra clients -Hadoop integration. Pig - Grunt - pigdata model- Pig Latin -developing and testing Pig Latin scripts. Hive - data types and file formats -HiveQL data definition- HiveQL data manipulation -HiveQL queries.

FOR FURTHER READING

Cloud and big data - mobile business intelligence - Crowd sourcing analytics - inter and Trans firewall analytics

Total: 45 Hours

Reference(s)

1. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'Reilley, 2012.
2. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.
3. Vignesh Prajapati, Big data analytics with R and Hadoop, SPD 2013.
4. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
5. Alan Gates, "Programming Pig", O'Reilley, 2011.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	4				8								6					4						24
2	2					6									4				4						16
3		2									12												6		20
4		2					6				6				6				4						24
5	2						4			4				6											16
																							Total		100

Assessment Questions

Remember

1. Define Data anlytics.
2. Explian the concept of Massively Parallel Processing (MPP) Platforms architecture in detail.
3. Define the drivers for Big Data-Velocity, Variety, and Veraity.
4. Describe the four Big Data Analytics Applications in detail.
5. Classify Unstructured Data Analytics. Elaborate on Context-Sensitive and Domain-Specific Searches.
6. Elucidate Real-Time Architecture for Conversations in detail.
7. Enlighten about Big Data Governance. How Big Data can be integrated with MDM?
8. Explicate Map-reduce framework in detail.
9. Define HDFS. Explain HDFS in detail.
10. What is Complexity Theory for Map-Reduce?

Understand

1. How Big Data Analytics is implemented? Explain.
2. What is Reducer Size and Replication Rate?
3. What do you mean by Lower Bounds on Replication Rate?
4. Elucidate the data models relationships and databases types.
5. Write a brief note on composing map-reduce calculations.
6. Enlighten the aggregate data models with an example?
7. Write about design of Hadoop distributed file system (HDFS)?
8. Explain about the Hadoop Input and Output and write a note on data integrity.
9. Elucidate the concept of Hbase with data model and implementations?
10. Analyze the features of Cassandra data model with an example?
11. Explicate in details about the Hive data manipulation, queries, and data definition and data types?

Apply

1. What is Hbase? Discuss in detail the data model and Implementation Aspect.
2. Explain Pig data Model in detail and discuss how it will help for effective data flow.
3. Explain Cassandra data model in detail and discuss how it will help for effective data flow.
4. How to implement Pig data Model in detail and discuss how it will help for effective data flow?
5. Discuss in detail about Mapreduce suffie and sort in detail.
6. How to read and write data in HADOOP Using Java Interface?
7. Write the code for Hadoop straming.
8. Implement the concept of Map reduce job scheduling in detail with neat diagram.
9. Implement the concept of Master slave and peer-peer replication in in detail.

Analyse

1. Why we need to analyze Bigdata?
2. Compare NoSql with relational database.
3. How to handle the aggragate oriented database?
4. How cloud and big data related to each other?
5. Show how tha client performs read and write in HDFS.
6. Compre HBASE data model and pig data model.
7. How to insert a document in Hive with minimum error.
8. Analyze the features of Hive Data Defenition.
9. Evaluvate the tools to test the perfomanace of data model.
10. Compare data aggregation and data relation.

Evaluate

1. Evaluate the performance of Casenndra Data model with an example.
2. Analyze the factors of YARN (Mapreduce 2) in detail with failures in classic Map-reduce.

Create

1. Design the parameters for complete Bigdata in terms of volume, variety and velocity.
2. Create the three dimesional big data for healthcare and medicine.

15CS004 ADVANCED C PROGRAMMING 3 0 0 3

Course Objectives

- Revisit the basics of C Programming.
- Understand the concept of Pointers.
- Impart knowledge in the advanced features in arrays, function, files and structures.

Course Outcomes (COs)

1. Recall the fundamentals of C programming.
2. Develop efficient programs using functions.
3. Apply the concept of pointers for effective memory access.
4. Understand the concepts of structures to real world problems.
5. Use the knowledge of files to develop solutions.

UNIT I **8 Hours**

C BASICS

Overview of C Fundamentals - Input and Output - Decision Making and Branching and Looping - Jumps in Loops - Arrays - Character Arrays and Strings.

UNIT II **10 Hours**

FUNCTIONS

Introduction to user defined functions - Category of functions - Functions that return multiple values - nesting of functions - Passing arrays to functions - passing strings to functions - recursive functions - types - recursion verses iteration - efficiency of recursion

UNIT III **10 Hours**

POINTERS

Pointers - Introduction - Pointers to Pointers -Arithmetic operations with pointers - Pointers and Arrays - Pointers and Character strings - Array of Pointers - Dynamic memory allocation - Pointers as function arguments - functions returning pointers - pointers to functions

UNIT IV **9 Hours**

STRUCTURES

User defined data type (typedef) - Enumerated Types - Introduction to Structure - Array of Structures - Arrays within structures - Structures within Structures - Structures and Functions - Structures and Pointers - Self Referential Structures

UNIT V **8 Hours**

FILE MANAGEMENT

Introduction -Text versus Binary Streams - State of a file - Defining and Opening a File - Closing a File - Input/output Operations on files - Error handling during I/O Operations - Standard Library Functions for files - Random access to files - File Program Examples.

FOR FURTHER READING

Bitwise Operators - Logical Bitwise Operators - Shift Operators - Masking - bitwise assignment operators - bit fields - Preprocessor Commands - File Inclusion - Macro Definition - Conditional Compilation - Other Commands. Command Line Arguments: Defining and Using Command Line Arguments

Total: 45 Hours

Reference(s)

1. Stephen G. Kochan Programming in C, Addison Wesley publishing, 2014.
2. Herbert Schildt, C -The complete Reference, Tata McGraw-Hill, 2013
3. Yashavant Kanetkar, Understanding Pointer in C, BPB Publication, 2013.
4. E Balagurusamy, Programming in ANSI C, Tata McGraw Hill, 2012.
5. Byron Gottfried, Programming with C Schaums Outlines Series, McGraw Hill 2011.
6. Al Kelley and Ira Pohl, A Book on C: Programming in C, Pearson Edition, 2001

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	2			4	4																			12
2	2	2			2	4				6				2				2				2			22
3	2				2					6	2			2	3							6			23
4		2			2					6				2	3							6			21
5		2				2				6				6								6			22
																								Total	100

Assessment Questions

Remember

1. State the associativity property of an operator.
2. What is use of return statement?
3. Define a string literal. Give example.
4. Give the syntax for opening File and closing file.
5. What is the use of rewind () and fseek?
6. What is purpose of the keyword void?
7. List the three different file modes in C.
8. Give the general syntax to declare two dimensional array.
9. Give an example for pointer to pointer variable.
10. Given the syntax for malloc () memory allocation functions.

11. Give an example for structure within structure.

Understand

1. What is the difference between = and = = Operators?
2. State the uses of fopen() and fclose().
3. Name the advantages of user defined functions.
4. Give the advantage and disadvantage of an array.
5. What is pointer? Describe how to access variable using pointer with example.
6. What is the difference between single character constant and string constant?
7. Compare malloc and calloc() functions.
8. Given an example for nested structure.
9. Mention the difference between fscanf () and scanf () function.
10. What is the difference between the array of pointer and pointer to the array?
11. How structure different from array?
12. What is the difference between call by value and call by reference?

Apply

1. Write a program to read the content of the file and copy it to another file.
2. Write a program to perform swapping of two numbers using pointers.

Analyse

1. Write a C program to remove all characters in a string except alphabets.
2. Justify the need for Type Casting over Type Conversion.
3. Explain how recursive functions affect the run time efficiency.
4. Compare looping and branching.
5. Differentiate between Structure and Union.

Evaluate

1. Determine the output of the following code.

```
#include
int main()
{
int var = 010;
printf("%d", var);
}
```

2. Determine the value of the logical expression a>b && a
3. Determine the output of the C code

```
#include
int main()
{
int a[5] = {5, 1, 15, 20, 25};
int i, j, m;
i = ++a[1];
j = a[1]++;
m = a[i++];
printf("%d, %d, %d", i, j, m);
return 0;
}
```

4. Determine the output of this C code.

```
#include
int main()
{
int a = 10, b = 10;
if (a = 5)
b--;
```

printf("%d, %d", a, b--);
}

5. Evaluate the expression c=(a+b*(c/d)%e) with a=10, b=3, c=5, d=6 and e=1

Create

1. Generate a structure to store the following details: Rollno, Name, Mark1, Mark2, Mark3, Total, Average, Result and Class. Write a program to read Rollno, name and 3 subject marks. Find out the total, result and class as follows:
   a) Total is the addition of 3 subject marks.
   b) Result is "Pass" if all subject marks are greater than or equal to 50 else "Fail".
   c) Class will be awarded for students who have cleared 3 subjects
   i. Class "Distinction" if average >=75
   ii. Class "First" if average lies between 60 to 74 (both inclusive)
   iii. Class "Second" if average lies between 50 & 59 (both inclusive)
   d) Repeat the above program to manipulate 10 students' details and sort the structures as per rank obtained by them.
2. Create a structure that can describe the employees with the fields Eno, Ename. Basic. Write a program to calculate DA = 32% of Basic. HRA = 15% of Basic. CCA = 10% of BASIC, PF = 15% of Basic and print all details with Net pay. All processing should be using pointer notation.
   b) Result is "Pass" if all subject marks are greater than or equal to 50 else "Fail".
   c) Class will be awarded for students who have cleared 3 subjects
   i. Class "Distinction" if average >=75
   ii. Class "First" if average lies between 60 to 74 (both inclusive)
   iii. Class "Second" if average lies between 50 & 59 (both inclusive)
   d) Repeat the above program to manipulate 10 students' details and sort the structures as per rank obtained by them.

15CS005 INFORMATION STORAGE MANAGEMENT 3 0 0 3

Course Objectives

- Understand the challenges in information storage and management.
- Describe the core elements in a data center.
- Understand RAID and its various levels for data backup.

Course Outcomes (COs)

1. Explain physical and logical components of a storage infrastructure including storage subsystems, RAID and intelligent storage systems.
2. Describe storage networking technologies such as FC-SAN, IP-SAN, FCoE, NAS and object-based, and unified storage.
3. Illustrate and articulate business continuity solutions, backup and replications, along with archive for managing fixed content.
4. Explain key characteristics, services, deployment models, and infrastructure components for a cloud computing.
5. Implement the concept of security storage infrastructure management.

UNIT I **9 Hours**

STORAGE SYSTEM

Introduction to information storage, Virtualization and cloud computing, Key data center elements, Compute, application, and storage virtualization, Disk dive & flash drive components and performance, RAID, Intelligent storage system and storage provisioning (including virtual provisioning)

UNIT II **9 Hours**

STORAGE NETWORKING TECHNOLOGIES AND VIRTUALIZATION

Fibre Channel SAN components, FC protocol and operations, Block level storage virtualization, iSCL and FCIP as an IP-SAN solutions, Converged networking option FcoE, Network Attached Storage (NAS) components, protocol and operations, File level storage virtualization, Object based storage and unified storage platform.

UNIT III **9 Hours**

BACKUP, ARCHIVE AND REPLICATION

Business continuity terminologies, planning and solutions, Clustering and multipathing to avoid single points of failure, Backup and recovery methods, targets and topologies, data deduplication and backup in virtualized environment, fixed content and data archive, Local replication in classic and virtual environments, Remote replication in classic and virtual environments, Three-site remote replication and continuous data protection.

UNIT IV **9 Hours**

CLOUD COMPUTING CHARACTERISTICS AND BENEFITS

Cloud Enabling Technologies - Characteristics of Cloud Computing- Benefits of Cloud Computing-Cloud Service Models Cloud deployment models- Cloud Computing Infrastructure-Cloud Challenges, Cloud migration considerations.

UNIT V **9 Hours**

SECURING AND MANAGING STORAGE INFRASTRUCTURE

Security threats, and countermeasures in various domains, Security solutions for FC-SAN, IP-SAN and NAS environments, Security in virtualized and cloud environments, Monitoring and managing various information infrastructure components in classic and virtual environments, Information lifecycle Management (ILM) and storage tiering.

FOR FURTHER READING

EMC Infrastructure Management Tools-Parallel SCSI-SAN Design Exercises-Network Technologies for Remote Replication-Information Availability.

Total: 45 Hours

Reference(s)

1. Information Storage and Management: Storing, Managing and Protecting Digital Information in classic, Virtualized and Cloud Environments, 2nd Edition, EMC Educations Services, Wiley, May 2012.
2. Information Storage and Management: Storing, Managing, and Protecting Digital Information, EMC Education Services, Wiley, January 2010
3. Ulf Troppens, Rainer Erkens, Wolfgang Mueller-Friedt, Rainer Wolafka, Nils Haustein ,"Storage Networks Explained: Basics and Application of Fibre Channel SAN, NAS, iSCSI, InfiniBand and FCoE, 2nd Edition, Wiley, July 2009

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	4	4			4	4																			16
2	2				2	4				6				2				2				2			20
3	2	2			2					6				2	3							6			23
4		2			2					6				2	3							6			21
5						2				6				6								6			20
																								Total	100

Assessment Questions

Remember

1. Define virtualization.
2. State the working of FC protocols.
3. Recall three site remote replication.
4. List the services in cloud computing.
5. Recognize storage tiering.
6. List the key data center elements.
7. List the SAN components.
8. Define topology.
9. List the characteristics of cloud computing.
10. Recall ILM.

Understand

1. Explain RAID.
2. Classify the file storage virtualization.
3. Compare clustering and multipathing in avoiding single point of failure.
4. Exemplify cloud infrastructure components.
5. Illustrate various security threats in storage infrastructure.
6. Summarize the components of disk drive and flash drive.
7. Explain block level storage virtualization.
8. Summarize the three types of replication.
9. Explain the cloud deployment models.
10. Exemplify the security in virtualized environment.

Apply

1. Predict how to improve the performance of disk and flash drive components.
2. Implement FC protocol operations.
3. Predict the need for backup and recovery.
4. Design cloud services for a real time application.
5. Demonstrate information lifecycle management.
6. Implement intelligent storage system.
7. Execute the file level storage virtualization.
8. Predict the need for data deduplication.
9. Demonstrate the cloud migration considerations.
10. Demonstrate the security threats and countermeasures in various domains.

Analyse

1. Outline the main reasons for a storage system.
2. Conclude the process of moving from unified storage system to object based storage system.
3. Organize the difficulties faced in using cloud services.
4. Differentiate disk drive and flash drive.
5. Differentiate local and remote replication.

Evaluate

1. Criticise the need for the information storage system.
2. Determine the type of storage system needed for an educational institute.
3. Determine the challenges in cloud computing.
4. Defend the process of managing various information infrastructure components in classic and virtual environments.
5. Judge the need for block level storage virtualization process.

Create

1. Create a customized and secure storage solution for corporates.
2. Generate a security system for your college infrastructure.

15CS006 TCP/IP 3 0 0 3

Course Objectives

- Impart knowledge about the basic concepts of internetworking, internet addressing and forwarding.
- Understand the routing architecture and the protocols routers use to exchange routing information.
- Discuss application level services available in the internet.

Course Outcomes (COs)

1. Identify the internetworking architecture of networks with routers.
2. Differentiate connectionless and connection-oriented packet delivery service.
3. Determine the algorithms that routers use to exchange information.
4. Identify the technologies used for network virtualization.
5. Classify the application level protocols used in the internet.

UNIT I **9 Hours**

INTRODUCTION

The TCP/IP internet-Internet Services- Internetworking Concept and Architectural Model- TCP/IP 5-Layer Reference Model - Protocol layering Principle - IP datagram -IP Forwarding algorithm - Internet addresses: Classful Addressing and Classless Addressing.

UNIT II **11 Hours**

TCP/IP PROTOCOLS

ARP message format and Implementation - RARP - The ICMP message formats - User Datagram protocol (UDP) -Reliable Stream Transport Service (TCP): Segment format, Establishing and closing TCP connections- TCP state machine- Silly window syndrome - Karn's algorithm and Timer Backoff.

UNIT III **8 Hours**

IP ROUTING

Routing Architecture: Cores, Peers, and Algorithms -Routing between Peers (BGP): Characteristics, Message header, Functionality and Message types- Routing within an Autonomous System (RIP, OSPF): RIP message format(IPv4 and IPv6)-OSPF message format-IGMP

UNIT IV **8 Hours**

SOCKET INTERFACE

Virtual Private Networks -Network Address Translation -Client-Server Model -The Socket API: Socket operations -Bootstrap and Auto configuration (DHCP) -The Domain Name System: Name Syntax and type- Mapping domain names to addresses- Domain name Resolution- Message format.

UNIT V **9 Hours**

PROTOCOLS AND FIREWALL DESIGN

Electronic Mail (SMTP, POP, IMAP, MIME) -World Wide Web HTTP) -Voice and Video Over IP(RTP, RSVP, QoS) -Network Management(SNMP): Message format- Encoded SNMP message-Security in SNMP3- IP Security- Firewalls.

FOR FURTHER READING

Internet of Things- Software Defined Networking- Multicast Routing Protocols-Other Remote Access Technologies- Proposed IPv6 Address Space Assignment

Total: 45 Hours

Reference(s)

1. Douglas E.Comer, Internetworking with TCP/IP Principles, Protocols and Architecture, 6th Edition Vol.1 PHI, 2014
2. Behrouz A.Forouzan, TCP/IP protocol suite, 4th edition,TMH, 2010
3. Kevin R.Fall, W. Richard Stevens, TCP/IP Illustrated, Volume 1: The Protocols, 2/EPearson Education, 2011
4. Dr.Sidnie Feit, TCP/IP, 2/Education,TMH, 2008

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	3			4	6				5															20
2	2	3			4	5							2	3				3				3			25
3	2	2				6								5											15
4	4	2			4									5											15
5	3	4			4	4							4	6											25
																								Total	100

Assessment Questions

Remember

1. Define internetworking
2. List the advantages of subnetting.
3. List the advantages of ipv6.
4. List the advantages of Karn‘s algorithm.
5. List the purpose of IP protocol.

6. Define Address Resolution Protocol.
7. Recall Reverse Address Resolution Protocol.
8. List the features of Firewall.
9. Define SNMP.

Understand

1. Identify the address class of 123.167.23.20 and 250.10.24.96.
2. Explain the ARP package design.
3. Explain the IGMP message format with a neat diagram.
4. Identify the services offered by TCP with an example.
5. Illustrate the Karn‘s algorithm to avoid the problems of ambiguous acknowledgement with an example.
6. Summarize the Dynamic Host Configuration Protocol with an example.
7. Explain the message format for IPv6 with a neat diagram.
8. Illustrate the functionlaities of UDP with a neat diagram.
9. Summarize Domain Name System with an example.

Apply

1. Demonstrate the concepts of IP subnet addressing and subnet masking, with an example.
2. The Network address is 192.168.10.0 and the Subnet mask is 255.255.255.252.
   Find the following –
   How many subnets?
   How many hosts?
3. Predict the difference between the IP addressing scheme and the U.S. telephone numbering scheme.
4. Find out how implementations of TCP solve the overlapping segment problem. The problem arises because the receiver must accept only one copy of all bytes from the data stream even if the sender transmits two segments that partially overlap one another (e.g., the first segment carries bytes 100 through 200 and the second carries bytes 150 through 250).
5. Predict the advantage and disadvantage of dividing a large, multi-national corporation into multiple autonomous systems.
6. Demonstrate slow convergence problem in RIP with the help of an example.
7. Construct a virtual private network and forwarding table with datagram sent from a computer on network 128.10.2.0 to acomputer on network 128.210.0.0.
8. Overlay technology can be used with Layer 2 as well as Layer3. Design a system that uses an overlay to form a large Ethernet VLAN that includes multiple sites.
9. Predict the difference between a document that contains HTML and a document that contains arbitrary text.
10. Predict the difference between SDN and Open flow technology.

Analyse

1. Differentiate OSI reference model and TCP/IP model.
2. Differentiate IPV4 and IPV6.
3. Compare and contrast TCP and UDP.
4. “IP is an unreliable, best-effort, connectionless protocol.”Justify the statement.
5. Compare and contrast DHCP and DNS.
6. "A single lost TCP acknowledgement does not necessarily force a retransmission". Justfiy this statement.
7. Determine an equation that expresses the maximum possible TCP througput as a function of the network bandwidth, the network delay, and the time to process a segment and generate an acknowledgement.

Evaluate

1. Determine the subnet, broadcast address and valid host range for the following:
   a. 172.16.10.5 255.255.255.128

b. 172.16.10.33 255.255.255.224
c. 172.16.10.65 255.255.255.192
d. 172.16.10.17 255.255.255.

2. Determine the CIDR mask and highest address range for the address 172.16.0.0/16.
3. Consider a fixed subnet partition of a clasB network number that will accommodate atleast 76 networks. Determine the number of hosts present on each network.

Create

1. Generate a binary trie for the following 32-bit addresses:
   00110101 00001100 00000000 00011000
   01000110 00000000 00110000 00000000
   01010110 00000000 00000000 00000000
   01100001 00001100 00000000 00011000
   10101010 01100000 00001100 00000000
2. Generate a forwarding table for an internet with 6 networks and 4 routers.

15CS007 EMBEDDED SYSTEMS 3 0 0 3

Course Objectives

- To be familiar with 8051 microcontoller.
- Understand the basic OS concepts.
- Design and develop embedded systems.

Course Outcomes (COs)

1. Explore the concepts of embedded computing with 8051 microcontroller.
2. Illustrate the memory and I/O operations.
3. Explain the processes and operating system concepts.
4. Elucidate the embedded software concepts.
5. Develop embedded systems using case studies.

UNIT I **9 Hours**

EMEDDED COMPUTING

Challenges of Embedded Systems - Embedded system design process. Embedded processors - 8051 Microcontroller, ARM processor - Architecture, Instruction sets and programming.

UNIT II **9 Hours**

MEMORY AND I/O MANAGEMENT

Programming Input and Output - Memory system mechanisms - Memory and I/O devices and interfacing - Interrupts handling.

UNIT III **9 Hours**

PROCESSES AND OPERATING SYSTEMS

Multiple tasks and processes - Context switching - Scheduling policies - Interprocess communication mechanisms - Performance issues.

UNIT IV **9 Hours**

EMBEDDED SOFTWARE

Programming embedded systems in assembly and C - Meeting real time constraints - Multi-state systems and function sequences. Embedded software development tools - Emulators and debuggers.

UNIT V **9 Hours**

EMBEDDED SYSTEM DEVELOPMENT

Design issues and techniques - Case studies - Complete design of example embedded systems.

FOR FURTHER READING

Embedded programming in C, C++ - Real time operating systems - study of Micro C/OS II.

Total: 45 Hours

Reference(s)

1. Wayne Wolf, Computers as Components: Principles of Embedded Computer System Design, Elsevier, 2008.
2. Michael J. Pont, Embedded C, Pearson Education, 2007.
3. Steve Heath, Embedded System Design, Elsevier, 2005.
4. Muhammed Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay, The 8051 Microcontroller and Embedded Systems, Pearson Education, 2nd edition, 2007.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	4					6	6		1					6			6	1			8				38
2	2		2			4			1	2	6			4	5		2				4				32
3	2	6					2			4	6				1		2				4				27
4										1							2								3
5																									0
																								Total	100

Assessment Questions

Remember

1. Define embedded computing.
2. Recall real time computing.
3. Define polling.
4. Recall interrupts.
5. Recall RTOS.
6. List the two requirements on processes.
7. Define embedded system.
8. Recall emulator.
9. List two real time examples of embedded systems.
10. List two RTOS.

Understand

1. Exemplify RTOS.
2. Summarise the design issues in embedded system development.
3. Summarise the charateristics of embedded computing applications.
4. Explain the challenges in embedded computing system design.
5. Explain the interrupt handling mechanism.
6. Exemplify the cache memory concepts.
7. Explain the scheduling policies.
8. Exemplify the preemptive RTOS.
9. Summarise the steps in developing embedded software.
10. Summarise the steps in installing keil software.

Apply

1. Implement a simple micro C program.
2. Demonstrate the OS II concepts.
3. Demonstrate the instruction set of ARM processor.
4. Implement the embedded system design process.
5. Demonstrate the memory and I/O devices interfacing.
6. Demonstrate the virtual addressing.
7. Implement a space shuttle software error.
8. Demonstrate the rate monotonic scheduling.
9. Demonstrate the steps in programming embedded C.
10. Demonstrate the embedded software development tools.

Analyse

1. Differentiate LSL and LSR instructions.
2. Differentiate data registers and status registers.
3. Differentiate process and thread.
4. Differentiate emulator and debugger.
5. Differentiate C and micro C.

Evaluate

1. Determine the value of r0 from the instruction LDR r0,[r1,#4].
2. Judge the reason for preferring to use busy wait I/O instead of interrupt driven I/O.
3. Defend the need for interprocess communications.
4. Judge the type of processor used to program embedded C.
5. Judge the need for a real time OS.

Create

1. Generate a FIR filter for ARM.
2. Plan a UML sequence diagram for a vectored interrupt driven read of a device.The diagram should include the background program, handler and the device.

15CS008 WIRELESS NETWORK TECHNOLOGIES 3 0 0 3

Course Objectives

- To impart the fundamental concepts of wireless networks.
- To understand Ad Hoc Wireless Networks and WWAN.
- To learn the working principles of Wireless PAN.

Course Outcomes (COs)

1. Explain the fundamentals of wireless communication.
2. Describe the technologies used Wireless LAN.
3. Implement the Ad Hoc wireless Networks concepts.
4. Explore the concepts of Wireless WAN.
5. Elucidate the concepts used in WPAN and Geolocation systems.

UNIT I **8 Hours**

WIRELESS COMMUNICATION PRINCIPLES AND FUNDAMENTALS

Wireless propagation characteristics and modeling-Voice coding-Multiple access for wireless system-FDMA, TDMA, CDMA, CSMA-Performance increasing techniques-Adhoc and semi adhoc concept-wireless services: circuit and packet mode.

UNIT II **9 Hours**

WIRELESS LAN

Wireless LAN application- concerns- Topologies- Physical layer-MAC layer- HYPER LAN 1 MAC sub layer, IEEE 802.11 MAC sub layer-IEEE 802.11a/ 802.11 b / 802.11g-Wireless ATM architecture.

UNIT III **9 Hours**

AD HOC WIRELESS NETWORKS

Cellular And Adhoc Wireless networks -Applications- Issues in adhoc wireless networks-medium access scheme, Routing, multicasting, QoS, Security, Energy management- Challenges in designing routing protocol for adhoc networks.

UNIT IV **10 Hours**

WIRELESS WAN

Mechanism to support a mobile environment, Communication in the infrastructure, IS-95 CDMA forward channel, IS 95 CDMA reverse channel, Pallert and frame formats in IS 95, IMT 2000; forward channel in W-CDMA and CDMA 2000, reverse channels in W-CDMA and CDMA-2000, GPRS and higher data rates.

UNIT V **9 Hours**

WPAN AND GEOLOCATION SYSTEMS

IEEE 802.15 WPAN, Home RF, Bluetooth-Architecture: Networking-Protocol stack, Security, Interface between Bluetooth and 802.11, Wireless geolocation technologies for wireless geolocation.

FOR FURTHER READING

Data delivery approach- HYPER LAN 2: an ATM compatible WLAN- On demand routing protocol-Short messaging service in GPRS mobile application protocols- Geolocation standards for E.911 service.

Total: 45 Hours

Reference(s)

1. P. Nicopolitidis, M.S.Obaidat, G.I.Papadimitriou, A.S. Pomportsis, Wireless Networks, Wiley &Sons, 2011
2. Jochen Schiller, Mobile Communications, Person Education 2011, 2nd Edition.
3. X.Wang and H.V.Poor, Wireless Communication Systems, Pearson education, 2011.
4. C. Siva Ram Murthy and B.S. Manoj, Adhoc Wireless Networks: Architectures and protocols, Prentice Hall PTR, 2014.
5. M.Mallick, Mobile and Wireless design essentials, Wiley Publishing Inc. 2011.
6. Kaveh Pahlavan, Prashant Krishnamoorthy, Principles of Wireless Networks, - A united approach - Pearson Education, 2010.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1		2	2		4	4								4											16
2		2	4			4	3							2	6										21
3		2				6	4							3	3										18
4		2				6	3							2	3							6			22
5		2				2	4			6				6								3			23
																								Total	100

Assessment Questions

Remember

1. List the types of propagation.
2. Recall the two multiple access technique.
3. Define FDMA.
4. Label the types of LAN architecture.
5. List IEEE standards.
6. Recall the advantages of TDD
7. Label the types of third generation protocols.
8. Define Handoff.
9. Define HIPERLAN.
10. Label the types of wireless LAN.

Understand

1. Classify the four categories of 2G wireless networks.
2. Explain the three major cellular standards in the United States.
3. Exemplify the difference between registration and call establishment in a cellular network
4. Explain the importance of color codes in CDPD.
5. Classify the types of data rates used in GRPS.
6. Summarize the power control mechanisms used in 802.11.
7. Compare 802.11 with 802.3 with neat diagrams.
8. Exemplify the responsibilities of the MAC management sub layer in 802.22.
9. Classify four major transmission techniques considered for WLAN standards.
10. Compare circuit switched and packet switched network with help of examples.

Apply

1. Predict the data rates that can be provided for the following cases:
   i. CS-1 where GMSK is used with a code rate of 0.49
   ii. CS-3 where GMSK is used with a code rate of 0.73

iii. PCS-3 where 8-PSK is used with a code rate of 0.6
iv. PCS-6 where 8-PSK is used with a code rate of 1

Analyse

1. Distinguish wired network and wireless networks in terms of efficiency.
2. Compare and contrast S/F/C/TDMA based on its advantages and disadvantages.
3. Differentiate Wireless LAN from Wireless WAN based on its efficiency.
4. Bring out the differences between piconet and scatternet with neat diagram.

Create

1. a. Use the equation for generation of CCK to generate the complex transmitted codes associated with the data sequence {0, 1, 0, 0, 1, 0, 1, 1}
   b. Repeat (a) for the sequence {1, 1, 0, 0, 1, 1, 0, 0} Show that the two generated sequence are orthogonal.
2. Use a software tool like mat lab to generate 1000 impulse responses of the JTC indoor residential radio channel (all 3 cases).Determine the RMS multipath delay spread for each sample and plot the cumulative distribution function.

15CS009 ADVANCED JAVA PROGRAMMING 3 0 0 3

Course Objectives

- Understand advanced Java programming concepts like interface, threads, Swings etc.
- Develop network programs in Java.
- Understand concepts needed for distributed and multi-tier applications.

Course Outcomes (COs)

1. Distinguish the basic concepts and principles of structured, object oriented and graphics programming.
2. Explain the concepts of threads and sockets.
3. Illustrate the applications of Java in distributed systems and EJB.
4. Implement programs using applets and awt.
5. Execute Java programs using swing.

UNIT I **9 Hours**

AN INTRODUCTION TO JAVA

Programming Structures: Data types - Variables - Operators - Strings -Input and output -Control Flow - Arrays.
Object oriented Programming: Objects - Classes -Using Predefined Classes - Defining Your Own Class – Inheritance-Interfaces and Inner Classes.
Graphics Programming: Swing -Creating a Frame - Positioning a Frame - Working with 2D Shapes - Using Color - Special Fonts for Text - Displaying Images

UNIT II **9 Hours**

NETWORK PROGRAMMING

Threads: Multithreading -Extending Thread Class - Implementing Runnable Interface-Inter-ThreadCommunication - Producer Consumer Problem - Inter-ProcessCommunication.
Sockets: Definition and Types - TCP Sockets- UDP Sockets - Basic Client Server Application Programming - MultiThreaded Server Applications- Unicast, Multicast and Broadcast Communications.

Communication Services: E-Mail Services - File Transfer Protocol Service - Web Content Transfer Service - Client -Side Network Programming.

UNIT III **9 Hours**

DISTRIBUTED APPLICATIONS

Distributed Systems: Object Serialization - Remote method Invocation - Remote Interface - Remote Implementation -Interface Definition language - Object Request Broker -CORBA - CORBA Component Model.

Enterprise Java Beans: Life time of a Bean - Session Bean Types- Entity Bean - Features and Applications- Steps in Developing an EJB

UNIT IV **9 Hours**

APPLETS, EVENT HANDLING AND AWT

Applet Basics: Applet Architecture - Applet Display Methods - Parameter Passing - Event Handling Mechanisms - Event Classes - Event Listener - Working with Windows , Graphics , Colors and Fonts - AWT Controls- Layout Managers and Menus -JDBC Concepts.
Using AWT Controls, Layout Managers and Menus: Adding and Removing Controls -Responding to Controls - Using Buttons - Applying Check boxes - Choice Controls - Using Lists- Handling Lists- Managing Scroll Bars - Using a Text Field - Using a Text Area - Menu Bars and Menus - Dialog Boxes.

UNIT V **9 Hours**

JAVA SWING

Swing: JApplet - Icons and Labels - Text Fields - The JButton Class -Check Boxes - Radio Buttons - Combo Boxes - Tabbed Panes - Scroll Panes - Trees -Tables - Exploring Swing.
Servlets: Life cycle of a Servlet - Using Tomcat for Servlet Development - Create and Compile the servlet source code - Start Tomcat - Start a web browser - The Servlet API - Using Cookies - Session Tracking - Security Issues

FOR FURTHER READING

New I/O, Regular Expression and Other Packages - Core Java API Packages - The New I/O Packages - NIO Fundamentals -Charset and Selectors - Using New I/O Streams - Regular Expression Processing - Pattern - Matcher - RE Syntax - RMI - A Simple Client/Server Application Using RMI - Text Formatting - Date Format Class - Simple Date Format Class

Total: 45 Hours

Reference(s)

1. Herbert Schildt, Java 2-Complete Reference, Tata Mc Graw Hill, 2011
2. Bogdan Ciubotaru & Gabriel-Miro Muntean , Advanced Network Programming Principles & Techniques, Network Application Programming with Java, Springer Verlag , 2013
3. Hortsmann & Cornell, CORE JAVA VOL I - Fundamentals, Pearson Education, 2009,8th Edition

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	4	4			4	6																			18
2	3	3			3	4				6				2				2				2			25
3	2				2					6				2	3							5			20
4		2			2					6				3	3										16
5	3									6				6								6			21
																								Total	100

Assessment Questions

Remember

1. Define class.
2. Define byte code.
3. Define Java Virtual Machine.
4. List any four built-in exceptions.
5. Define Socket.
6. List the 3 types of Enterprise Java Beans.
7. State the use of synchronization of thread in java.
8. Define Serialization.
9. Write steps to create JAR file.
10. List the two types of Applets used in Java.

Understand

1. Compare an applet and an application in terms of utilty in java.
2. Identify the steps required to add an applet to a HTML document.
3. Indicate the advantages of multithreading over multitasking.
4. Represent the components of swing in java.
5. Identify the differences in inheritance and interface in java.
6. Compare an UDP packet and a TCP packet based on socket connection.
7. Identify the reason to avoid the development of multi-threaded Corba application.
8. Identify the similarities and differences between RMI and CORBA.
9. Compare AWT and Java swing.
10. Classify the top level containers in java swing.

Apply

1. Use objects and classes to write a method to accept a number and return its cube.
2. Use interfaces to add 2 floating value and return its sum as integer.
3. Show how does thread implements their own Stack?
4. Predict in which package are most of the AWT events that support the event-delegation model defined?
5. Select a prototype of the default constructor.
   a)Test( )
   b)Test(void)
   c)public Test( )
   d)public Test(void)
6. Find any two valid constructors for implementing Thread
   a)Thread(Runnable r, String name)
   b)Thread()
   c) Thread (int priority)
   d)Thread(Runnable r, ThreadGroup g)
   e)Thread(Runnable r, int priority)

7. Use EJB components to implement EJB compliant server for any database management system.
8. Find a class name that extends an applet.
9. Use List interface to implement adding and removal of elements in an array (storage).

Analyse

1. Compare the sleep () and wait () methods in terms of thread manipulation.

Create

1. Generate an applet to display five concentric outlined rectangles of decreasing sizes.
2. Generate a Java RMI application to find the top ten songs of your favorite channel using the weightage given to the songs. The songs are stored in the database.

15CS010 ENTERPRISE COMPUTING 3 0 0 3

Course Objectives

- Understand the concepts of enterprise computing.
- Design an enterprise architecture.
- Construct and roll out the designed architecture as application.

Course Outcomes (COs)

1. Identify information systems used in the functional units of an enterprise.
2. Analyze the integrated information systems used throughout an enterprise.
3. Create and manage large-scale computing systems for an organization.
4. Demonstrate skills to understand business environment.
5. Analyze the applications of testing on the enterprise environment.

UNIT I **9 Hours**

INTRODUCTION

Enterprise Applications - Software Engineering Methodologies - Life Cycle of Raising Enterprise Applications -Three Key Determinants of Successful Enterprise Applications

UNIT II **9 Hours**

INCEPTING ENTERPRISE APPLICATIONS

Enterprise Analysis - Business Modeling - EM Bank-A Case Study - Requirement Elicitation and Analysis - Actors and Use Cases - User Prototypes - Non-Functional Requirements - Requirements Validation

UNIT III **9 Hours**

ARCHITECTING AND DESIGNING ENTERPRISE APPLICATIONS

Architecture, Views and Viewpoints - Enterprise Application - An Enterprise Architecture Perspective - Logical Architecture - Technical Architecture and Design - Data Architecture and Design - Infrastructure Architecture and Design

UNIT IV **9 Hours**

CONSTRUCTING ENTERPRISE APPLICATIONS

Construction Readiness - Introduction to Software Construction Map - Constructing the Solution Layers - Code Review - Static Code Analysis - Build Process and Unit Testing

UNIT V **9 Hours**

TESTING AND ROLLING OUT ENTERPRISE APPLICATIONS

Testing Enterprise Applications - Enterprise Application Environments -Integration Testing - System Testing - User Acceptance Testing

FOR FURTHER READING

Measuring the Success of Enterprise Applications - Planning and Estimation - Architecture and Design Documentation - Dynamic Code Analysis - Rolling out Enterprise Applications

Total: 45 Hours

Reference(s)

1. Anubhav Pradhan, B.Satheesha Nanjappa, Senthil Nallasamy and E.Veerakumar, "Raising Enterprise Applications : A Software Engineering Perspective", Wiley India Pvt Ltd, 2010
2. Paul J Perrone, Venkata S.R. Krishna R and Chayanti, "Building Java Enterprise Systems with J2EE", Techmedia, New Delhi, 2000.
3. Tom Valesky - "Enterprise Java Beans" - Addison Wesley Longman Inc. New Delhi, 2000.
4. Ed Roman - "Mastering EJB" - John Wiley & Sons, New Delhi, 2001.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	4			2	2																			10
2	2				2	6	4			6				6				2				2			30
3	2				2	5				6	4			2	3							6			30
4		2			2					6				2				2				6			20
5		2				2				6															10
																								Total	100

Assessment Questions

Remember

1. Mention a few Enterprise applications.
2. List the challenges in developing an Enterprise application.
3. What is Enterprise Analysis?
4. Define Business modeling.
5. Name the types of testing in enterprise Applications.
6. Define Demilitarized Zone (DMZ).
7. What are the advantages of Virtualization?
8. Define four domains of Enterprise Architecture.
9. What is middleware?
10. List the tools used for static & dynamic code analysis.

Understand

1. Classify the Enterprise applications.
2. Discuss a prescriptive technical architecture framework for raising a typical enterprise application.
3. Identify the various types of non functional requirements.
4. Classify the testing methodologies.
5. Describe the Usability testing.
6. Identify the steps of Planning and Estimation.
7. Classify the enterprise application environments.
8. How is enterprise service bus associated with Service Oriented Architecture (SOA)?

9. Explain the different kinds of relationship among classes.
10. How code profiling helps in tuning the performance of an application?

Apply

1. Demonstrate the layer-by-layer construction of enterprise applications.
2. Illustrate the logical architecture of loan management system.
3. Elucidate the web services testing approach.

Analyse

1. Compare the JSF and Struts components of presentation layer.
2. Examine the use case specification elements of transport system.
3. Differentiate SOAP and REST based web services.
4. Distinguish between EJB 3.0 and spring framework.

Create

1. Create use case specification for initiate loan.
2. Construct the business process modeling for loan management using its notation.
3. Design use case diagram for Airline ticket reservation system.

15CS011 SOFTWARE QUALITY ASSURANCE 3 0 0 3

Course Objectives

- Understand the standards and components of software quality assurance.
- Understand software quality assurance activities with tools and techniques.
- Study the metrics for software quality assurance.

Course Outcomes (COs)

1. Identify the quality management framework and related quality program concepts.
2. Analyze the commercial standards and the impact on quality assurance.
3. Analyze the relationship of process and product quality assurance (PPQA) to SQA.
4. Explore the quality management in information technology.
5. Elucidate Software quality metrics methodology and software quality control tools.

UNIT I **7 Hours**

ORGANIZING QUALITY MANAGEMENT

Quality management framework - Quality program concepts - Organizational aspects of quality program - Quality Program organizational relationship-Mapping quality program functions to project organizational entities

UNIT II **8 Hours**

SOFTWARE QUALITY ASSURANCE STANDARDS

Software Quality Assurance (SQA) in ISO standards-SQA in IEEE standards IEEE STD 730-2002- IEEE STD 829-1998- IEEE STD 1028-1997-ITIL standards - ANSI/EIA Standards and RTLA/DO standards

UNIT III **11 Hours**

SOFTWARE QUALITY ASSURANCE

Identifying SQA personnel needs-Characteristics of a good SQA engineer-SQA engineering staff-Pareto principle applied to SQA-Software inspections and walkthroughs-Measurements-Transition of cost to

quality - Software audit-Performing the audit - Software safety and its relation to SQA-PPQA relationship to SQA

UNIT IV **11 Hours**

QUALITY MANAGEMENT IN IT

ITSM Processes-IT best practices-ITSM standards-Process improvement models-Customer requirements-Monitoring and measuring ITSM performance - Procurement quality-IT quality professional-Cost of software quality system CoSQ system to organization

UNIT V **8 Hours**

SQA METRICS

Software quality indicators-PSM -CMMI- PSP and TSP-Six sigma - Seven quality control tools: traditional and modern tools-check sheet-Pareto diagram-Histogram-Run chart-Scatter diagram-Control chart

FOR FURTHER READING

Integrating Quality Activities in the Project Life Cycle Reviews - Software Testing Strategies - Software Testing Implementation

Total: 45 Hours

Reference(s)

1. Schulmeyer G. Gordon, Handbook of Software Quality Assurance. London: Artech House Inc, 2008
2. Daniel Galin, Software Quality Assurance from theory to implementation, Pearson Education Limited, 2009
3. Stephen H. Kan. Metrics and Models in Software Quality Engineering, Addison-Wesley Professional, 2003
4. Murali Chemuturi, Mastering Software Quality Assurance: Best Practices, Tools and Techniques for Software Developers, J. Ross Publishing Inc, 2011
5. Murali Chemuturi, Mastering Software Quality Assurance: Best Practices, Tools and Techniques for Software Developers, J. Ross Publishing Inc, 2011

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2				4	4								2	4										16
2	2	2			2	4				6				2				2							20
3			4		2					4				2	3							6			21
4		2			2					6				2	3							6			21
5		2				2				6				6								6			22
																								Total	100

Assessment Questions

Remember

1. Define software quality.
2. List the three elements of Quality program.
3. Label ISO 9000 certification.
4. State the different types of standards.
5. List the two factors appear to work against SQA.

6. What to Expect from Your SQA Engineering Staff?
7. List the any four Types of Software Audits.
8. Label any four key areas for CSQE candidate to have knowledge in IT services.
9. List the any four Software Quality Indicators.
10. State PSP and TSP.
11. Define six sigma.

Understand

1. Differenciate product and process.
2. Discuss the organizational relationships for the quality program.
3. Discuss in detail about the needs for standards.
4. Explain about SQA in IEEE Standards.
5. Differentiate Software Inspections and Walkthroughs.
6. Explain the ITSM Processes to efficient delivery in IT operational services.
7. Discuss the Process improvement models in best IT practise.
8. What are the uses of arrow diagram?
9. Illustrate the Seven quality control tools with suitable example.

Apply

1. Mention the SQA in ISO Standards.
2. When does a Software Inspection do perform?
3. What are the three main activities needed to perform the audit?
4. Demonstrate the Concept of Cost of Software Quality.
5. Construct the PSM measurement process with neat diagram.
6. Draw the Pareto diagram-Histogram to an actual Notes/Domino issue.
7. Pareto principle advocates
   A. 20-80 rule
   B. 80-20 rule
   C. 40-60 rule
   D. 60-40 rule
8. Histogram refers to
   A.Bar chart
   B.Run chart
   C.Pareto diagram
   D.Correlation diagram
9. Who of the following is NOT usually present in a technical review
   A. User
   B. Quality Engineer
   C. The programming tools supplier
   D. Specialist with knowledge of the application
10. Draw the Classic model of CoSQ.

Analyse

1. Justify the addresses of organizational considerations in the mapping of Quality Program functions in terms of the Quality Program elements.
2. What makes a good software quality assurance engineer?-Analyze
3. What Does It Take to Develop a Software Safety Assurance Program?
4. How do PPQA invoved in the CMMI? Explain in detail.
5. Why Variance is Difficult to Measure-Justify.
6. What makes a good software quality assurance engineer?-Analyze
7. Which of the following is NOT an accepted code inspection technique?
   a. Domain analysis
   b. Item-by-item paraphrasing

c. Mental code execution
d. Consistency analysis

8. Compare and contrast features of TSP and PSP.

Evaluate

1. Detemine the various Software Quality Assurance Standards.
2. Derive the Scatter diagram with an example.
3. When a company evaluates its own performance, it is conducting what type of audit?
   a. First-party
   b. Second-party
   c. Third-party
   d. Extrinsic
4. The defect density for a computer program is best defined as the
   a. ratio of failure reports received per unit of time
   b. ratio of discovered errors per size of code
   c. number of modifications made per size of code
   d. number of failures reported against the code
5. An effective software development environment consists of tools that
   a. are freestanding and free from access by other tools
   b. have different user interfaces for each tool depending on the development phase supported by each tool
   c. allow maximum flexibility while maintaining security and traceability
   d. are integrated, linked to other tools, and have common user interfaces
6. A module includes a control flow loop that can be executed 0 or more times. The test most likely to reveal loop initialization defects executes the loop body
   a. 0 times
   b. 1 time
   c. 2 times
   d. 3 times
7. How the cost of quality is applied in software industry?
8. Determine objectives of cost of software quality metrics
9. Determine the limitations of the classic CoSQ model

Create

1. Draw the Interaction of the elements of a quality program.
2. Draw the Pareto diagram-Histogram to an actual Notes/Domino issue.

15CS012 SOFTWARE TESTING 3 0 0 3

Course Objectives

- Familiarize with the various test design strategies.
- Understand the levels of testing and defect classes.
- Impart knowledge on the testing and debugging policies with the types of review.

Course Outcomes (COs)

1. Explore the fundamentals and activities in software testing.
2. Explain the various test design strategies.
3. Elucidate the levels of testing and defect classes.
4. Analyze the techniques in test management.
5. Implement the testing and debugging policies with the types of review.

UNIT I **8 Hours**

SOFTWARE TESTING FUNDAMENTALS

Testing as an Engineering Activity - Role of Process in Software Quality - Testing as a Process- The six essentials of software testing - Basic Definitions: Software Testing Principles - The role of a software tester - Origins of Defects- Defect Classes the Defect Repository

UNIT II **8 Hours**

TESTING DESIGN STRATEGIES

Introduction to Testing Design Strategies - The Smarter Tester - Test Case Design Strategies - Black Box testing - Random Testing - Equivalence Class Partitioning - Boundary Value Analysis - Cause and error graphing and state transition testing - Error Guessing - Black-box testing and COTS - White-Box testing - Test Adequacy Criteria - Coverage and Control Flow Graphs.

UNIT III **9 Hours**

LEVELS OF TESTING

The Need for Levels of Testing- Unit Test - Unit Test Planning- Designing the Unit Tests. The Class as a Testable Unit - The Test Harness - Running the Unit tests and Recording results- Integration tests- Designing Integration Tests - Integration Test Planning - System Test - Types-of system testing - Regression Testing.

UNIT IV **10 Hours**

TEST MANAGEMENT

People and organizational issues in testing - organization structures for testing teams - testing services - Test Planning - Test Plan Components - Test Plan Attachments - Locating Test Items - test management - test process - Reporting Test Results - The role of three groups in Test Planning and Policy Development - Introducing the test specialist - Skills needed by a test specialist - Building a Testing Group.

UNIT V **10 Hours**

TEST MEASUREMENTS AND REVIEWS

Defining Terms - Measurements and Milestones for Controlling and Monitoring- Status Meetings- Reports and Control Issues - Criteria for Test Completion- SCM - Types of reviews - developing a review program - Components of Review Plans- Reporting review results. Testing Tools-Case Selenium, Autoit

FOR FURTHER READING

Software test automation, skills needed for automation scope of automation, design and architecture for automation, requirements for a test tool challenges in automation.

Total: 45 Hours

Reference(s)

1. S Limaye, Software Testing Principles, Techniques and Tools, McGraw Hill, 2009.
2. Ilene Burnstein, Practical Software Testing, Springer International, 2003.
3. Boris Beiser, Software Testing Techniques, Dreamtech press, New Delhi, 2009.
4. Aditya P.Mathur, Foundations of Software Testing, Pearson Education, 2008.
5. Srinivasan Desikan and Gopalaswamy Ramesh, Software Testing, Principles and Practices, Pearson Education, 2008.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	4					4				2					4		2				2				18
2	2				2	4			2	4			4				2				2				22
3	2				4	2				2			4								2				16
4	2	4			2	2			2				2				2				2	4			22
5	4	4			2	2			2				2	2							2	2			22
																								Total	100

Assessment Questions

Remember

1. Define software testing.
2. State testing process.
3. Define unit testing.
4. List the software testing guidelines.
5. Define black box testing.
6. Define white box testing.
7. List the different levels of testing.
8. Identify challenges in the risk analysis process.

Understand

1. Identify the testing internal controls.
2. State life cycle testing.
3. Define performance testing.
4. List the challenges of risk identification process.
5. Explain the business perspective of testing.
6. Explain requirement phase testing.
7. Identify the various considerations in developing testing methodologies.
8. Explain the various white box testing techniques.

Apply

1. How to measure the overall test progress?
2. Illustrate the procedure to implement unit testing for library management system
3. Demonstrate integration testing for railway management system.
4. List the steps in software inspection.

Analyse

1. Identify project and product risks.
2. Distinguish structural and functional testing.
3. Exemplify the conditions while developing test data.
4. Compare verification and validation.
5. Distinguish between defect prevention and correction

Create

1. Summarize a testing activity to expose defects in the interfaces.
2. Derive functional testing process for bank ATMs.
3. Identify the tasks for program phase testing.
4. Derive a sample test strategy for online ticket reservation.
5. Identify the procedure for establishing software standards.

15CS013 XML AND WEB SERVICES 3 0 0 3

Course Objectives

- Understand the Web Service concepts and XML Technology.
- Study the functions of SOAP.
- Familiarize in the security in Web Service.

Course Outcomes (COs)

1. Explain the concepts of XML basics and service oriented architecture.
2. Develop simple XML applications.
3. Analyze the design principles and application of SOAP based Web Services.
4. Explicate the key technologies in web services.
5. Explain the security issues in XML

UNIT I **8 Hours**

INTRODUCTION

Role of XML - XML and the Web - XML Language Basics - SOAP - Web Services - Revolutions of XML - Service Oriented Architecture (SOA).

UNIT II **9 Hours**

XML TECHNOLOGY

XML - Name Spaces - Structuring with Schemas and DTD - Presentation Techniques - Transformation.

UNIT III **9 Hours**

SOAP

Overview of SOAP - HTTP - XML - RPC - SOAP: Protocol - Message Structure - Intermediaries - Actors - Design Patterns and Faults - SOAP with Attachments.

UNIT IV **11 Hours**

WEB SERVICES

Overview - Architecture - Key Technologies - UDDI - WSDL - ebXML - SOAP and Web Services in E-Com - Overview of .NET and J2EE.

UNIT V **8 Hours**

XML SECURITY

Security Overview - Canonicalization - XML Security Framework - XML Encryption - XML Digital Signature - XKMS Structure - Guidelines for Signing XML Documents - XML in Practice.

FOR FURTHER READING

Business process execution - BPEL Middleware infrastructure - Case studies- Introduction to Web 2.0 technologies - Enterprise Service Bus (ESB)-Enterprise Application Integration (EAI).

Total: 45 Hours

Reference(s)

1. Frank. P. Coyle, XML, Web Services and the Data Revolution, Pearson Education, 2007.
2. David Hunter, Jeff Rafter, Joe Fawcett, Eric Van der Vlist, Danny Ayers, Jon Duckett, Andrew Watt, Linda McKinnon, Begining XML , 2007, 4th Edition, Wrox publication.
3. Deitel H M, Deitel P J, Nirto T R, Lin T M, XML How to Program, Pearson Edition, 2011.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	4	4			4	4																			16
2	2				2	4				6				2				2				2			20
3	2				2					6				2	3							6			21
4		2			2					6				2	3							6			21
5		2				2				6				6								6			22
																								Total	100

Assessment Questions

Remember

1. List three characteristics of XML.
2. Why SOAP is needed?
3. Define XML tag with an example.
4. What is XML namespace?
5. Define UDDI.
6. Name two advantages of web services.
7. Write the guidelines for signing XML document.
8. Explain in detail the structure of XKMS.
9. Explain server oriented architecture.
10. Explain the SOAP message structures and illustrate SOAP with attachments.

Understand

1. Enumerate the significance of namespace in XML.
2. Discuss the architectural design patterns of SOAP.
3. Exemplify the merits and demerits of web services.
4. Elucidate Service Oriented Architecture and the role of XML in an Enterprise.
5. Explain in datail manipulating as WSDL.
6. Explain the various components of web services.
7. Describe the usage of UDDI in error recovery.
8. Discuss the elements of digital signature.
9. What is XML RPC? Explain in detail with the help of a diagram.
10. Explain the hierarchy of XML schema data types.

Apply

1. Explain the different ways to encrypt an XML document containing Credit card information.
2. Explain the creation of external DTD with example.

Analyse

1. Compare the features of .NET and J2EE
2. Differentiate B2B and B2C.

3. Distinguish CSS and XSL.

Create

1. Create a HTML document using the following tags : <p>, , <img>, hyperlink and <hr>.
2. Develop a XML document using elements, attributes and CDATA section.
3. Create an application to implement the Library Management System using HTML and XML.

15CS014 SOCIAL NETWORK ANALYSIS 3 0 0 3

Course Objectives

- Gain knowledge about the current web development and emergence of Social Web.
- Study about the modeling, aggregating and knowledge representation of Semantic Web.
- Understand the extraction and mining tools for Social networks.

Course Outcomes (COs)

1. Apply knowledge for current web development in the era of Social Web.
2. Model, aggregate and represent knowledge for Semantic Web.
3. Design extraction and mining tools for Social networks.
4. Analyze human behavior and privacy issues.
5. Develop personalized web sites and visualization for Social networks.

UNIT I **9 Hours**

INTRODUCTION TO SOCIAL NETWROK ANALYSIS

Introduction to Web - Limitations of current Web Development of Semantic Web - Emergence of the Social Web - Network analysis - Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis - Electronic discussion networks, Blogs and online communities, Web-based networks .

UNIT II **8 Hours**

MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION

Languages for the Semantic Web - RDF and OWL - Modelling and aggregating social network data - State-of-the-art in network data representation, Ontological representation of social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data, Advanced Representations.

UNIT III **9 Hours**

EXTRACTION AND MINING COMMUNITITES IN WEB SOCIAL NETWORKS

Extracting evolution of Web Community from a Series of Web Archive - Detecting Communities in Social Networks - Definition of Community - Evaluating Communities - Methods for Community Detection & Mining - Applications of Community Mining Algorithms - Tools for Detecting Communities Social Network Infrastructures and Communities - Decentralized Online Social Networks.

UNIT IV **10 Hours**

PREDICTING HUMAN BEHAVIOR AND PRIVACY ISSUES

Understanding and Predicting Human Behavior for Social Communities - User Data Management - Inference and Distribution - Enabling New Human Experiences - Reality Mining - Context Awareness - Privacy in Online Social Networks - Trust in Online Environment - Trust Models Based on Subjective

Logic - Trust Network Analysis - Trust Transitivity Analysis - Combining Trust and Reputation - Trust Derivation Based on Trust Comparisons

UNIT V **9 Hours**

VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS

Graph Theory- Centrality- Clustering - Node-Edge Diagrams, Matrix representation, Visualizing Online Social Networks - Visualizing Social Networks with Matrix-Based Representations- MatrixNode-Link Diagrams - Hybrid Representations - Applications - Covert Networks - Community Welfare - Collaboration Networks.

FOR FURTHER READING

Applications of Social Network Analysis, Multi-Relational Characterization of Dynamic Social Network Communities, Attack Spectrum and Countermeasures, Co-Citation Networks

Total: 45 Hours

Reference(s)

1. Borko Furht, -Handbook of Social Network Technologies and Applications, Springer, 1st edition, 2010.
2. Peter Mika,-Social Networks and the Semantic Web, Springer, 1st edition 2007.
3. Guandong Xu, Yanchun Zhang and Lin Li, Web Mining and Social Networking Techniques and applications, Springer, 1st edition, 2011.
4. Dion Goh and Schubert Foo, Social information retrieval systems: Emerging technologies and applications for searching the Web effectively, IGI Global snippet, 2008.
5. Max Chevalier, Christine Julien and Chantal Soul-Dupuy, Collaborative and Social Information Retrieval and Access: Techniques for Improved User Modelling, IGI Global snippet, 2009

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	4	4			4	4							2												18
2	2	6			2	4								2				2							18
3	2	6			2	6								2	3										21
4	6	2			2	6				6				2	3										27
5		2				2				6				6											16
																								Total	100

Assessment Questions

Remember

1. List the limitations of current web.
2. Mention the ways to develop the semantic web.
3. List the tools for detecting communities' social network infrastruture?
4. What is decentralized online social network?
5. State the trust in online environment.
6. Define a graph theory.
7. List the applications of visualizations.
8. Write the matrix representation.
9. Define Network analysis.
10. Define user data managenment.

Understand

1. Describe the development of semantic web.
2. Illustrate electronic sources for network analysis.
3. Exemplify ontology and their role in the semantic web.
4. What is ontology based knowledge representation?
5. Explain aggregating and reasoning with social and network data.
6. Explain extracting evolution of web community.
7. What are the methods available for community detection and data mining?
8. Describe visualizing social network with Matrix-Based Representation
9. Illustrate Social Network Infrastructures and Communities.
10. Exemplify privacy in online social networks and trust in online social environment

Apply

1. Write the matrix representation for social based network.
2. Predict human behavior for social communities.
3. Compute ontological representation of social individuals and social relationship
4. Predict the tools for detecting communities.
5. Construct trust models based on social logic.
6. Use matrix based representation to visualize the social networks.
7. Compute trust derivation based on trust comparisons.
8. Compute the measures in network analysis.
9. Predict the applications of Community Mining Algorithms.
10. Compute hybrid representation in visualizing social networks.

Analyse

1. Compare RDF and OWL.
2. Resolve prediction of human behaviour in social communities.
3. Criticise visualization of online social networks.
4. Determine relational characterization of dynamic social network.
5. Compare trust network analysis and trust transitivity analysis.
6. Distinguish Relational and Multi-Relational Characterization of Dynamic Social Network

Evaluate

1. Determine social relationship can be represented in ontological.
2. Resolve trust derivation based on trust comparisons.
3. Illustrate inference and distribution of predicting human behavior.
4. Determine the privacy in online social network.

15CS015 INTERNET OF THINGS 3 0 0 3

Course Objectives

- Learn the basic issues, policy and challenges in the Internet.
- Understand the components and the protocols in Internet.
- Understand the various modes of communications with internet.

Course Outcomes (COs)

1. Identify the components of IOT.
2. Design a portable IOT using appropriate boards.
3. Explore the IOT architecture and protocols.
4. Develop schemes for device discovery.
5. Explicate the use of cloud services for IOT.

UNIT I **9 Hours**

INTRODUCTION TO INTERNET OF THINGS

Definition and Characteristics of IoT, Physical Design of IoT -n IoT Protocols, IoT communication models, Iot Communication APIs IoT enabled Technologies - Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates.

UNIT II **11 Hours**

PROTOTYPING IOT OBJECTS USING MICROPROCESSOR/MICROCONTROLLER

Overview of Microprocessor and Microcontroller, Basics of Sensors and actuators - examples and working principles of sensors and actuators, Equivalent Microcontroller platform - Setting up the board - Programming for IOT - Reading from Sensors, Communication: Connecting microcontroller with mobile devices - communication through bluetooth, wifi, Ethernet.

UNIT III **9 Hours**

IOT ARCHITECTURE AND PROTOCOLS

Introduction, State of the art, Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model-Zigbee, RFID, BLE, NFC, BACnet, 6LowPAN, RPL, CoAP, MQTT.

UNIT IV **8 Hours**

DEVICE DISCOVERY

Device Discovery capabilities - Registering a device, De-register a device, Querying for devices. Technologies available - IBM Foundation Device Management Service, Intel IOTivitiy, XMPP Discovery extension.

UNIT V **8 Hours**

CLOUD SERVICES FOR IOT

Introduction to Cloud Storage models and communication APIs Webserver - Web server for IoT, Cloud for IoT, Python web application framework designing a RESTful web API, Amazon Web services for IOT.

FOR FURTHER READING

Integrating wireless sensor networks with the IOT - case study of intrusion of sensor networks.

Total: 45 Hours

Reference(s)

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence, 1st Edition, Academic Press, 2014.
2. Vijay Madisetti and ArshdeepBahga, Internet of Things (A Hands-on-Approach), 1stEdition, VPT, 2014.
3. Francis daCosta, Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, 1st Edition, Apress Publications, 2013
4. Olivier Hersent, David Boswarthick, Omar Elloumi , The Internet of Things Key applications and Protocols, Wiley, 2012
5. Getting Started with the Internet of Things: Connecting Sensors and Microcontrollers to the Cloud (Make: Projects) [Kindle Edition] by CunoPfister,2011
6. Designing the Internet of Things (Nov 2013) by Adrian McEwen & Hakim Cassimally

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	1	1		5	4	3			1	1				1			1							20
2	3	3	1		4	3	1			3					2			1							21
3	3	1	1		4	2	1				2			1	1		1	2							19
4	3	1	1		5	3	2		1				1				2	1							20
5	4	2	2		3	4	1				3				1										20
																								Total	100

Assessment Questions

Remember

1. Define Internet of Things.
2. List any four types of sensors used in IoT devices.
3. Mention the layers of IoT.
4. Draw a neat diagram of IoT Architecture.
5. List any five applications of IoT.

Understand

1. Explain the basic architecture of IoT network.
2. List the internal components of IoT device. Explain the components with a neat diagram.
3. Explain the four different layers of IoT device with a diagram.
4. Illustrate the functionalities of IoT protocol stack with an example.
5. Explain the wireless technologies used in IoT.
6. Illustrate the functionalities of five types of antennas used in IoT.
7. Explain any two types of sensors used in IoT applications.
8. Summarize the role of standardization activities in an IoT system.
9. Explain different layers of an IoT device.
10. Summarize the functionalities of internal components of IoT device.

Apply

1. Demonstrate the implementation procedure for creating a Smart city using IoT.
2. Demonstrate the use of wireless technologies in IoT with an example.
3. Explicate the types of antennas designed for IoT device application.

Analyse

1. Analyze the importance of Cloud computing system for a designing an IoT.
2. Conclude the design procedure of a Smart vehicle design system using IoT.
3. Analyze the advantages and disadvantages of data analytics in an IoT system.

15CS016 E-COMMERCE 3 0 0 3

Course Objectives

- Familiar with the concepts of E-Commerce.
- Understand the approaches in internet business environment.
- Understand the role of internet marketing in an organization.

Course Outcomes (COs)

1. Understand the various aspects of E-Commerce.
2. Analyze the technical backbone of internet behind in E-Commerce.
3. Develop a website for e-commerce.
4. Identify the major security issues associated with Internet.
5. Explore the issues in electronic money transactions.

UNIT I **9 Hours**

INTRODUCTION

Electronic Commerce (E-Commerce) -Marks of Maturity - Drivers - Advantages & issues in E-Commerce - Benefits & Limitations of the Internet - Role of E-Strategy- Value chain, integration and business model in E-Commerce- World Wide Web: Making of the WWW- ISP- Web fundamentals.

UNIT II **7 Hours**

TECHNOLOGY OF E-COMMERCE

Internet Architecture: Network-Information Transfer-Network Hardware - Design considerations-Issues Intranets and Extranets: Technical Infrastructure -Planning an Intranet - Email and Intranet - Hosting a Web Site: How ISPs work- ISP structure and services - Choosing an ISP- Registering a domain name.

UNIT III **10 Hours**

E- STRATEGIES AND TACTICS

Building E-Presence - Internet Marketing : Online shopping- Internet Marketing Techniques - E-Cycle of Internet Marketing -How to market Presence - Attracting and tracking customers - Customer relationship and Management - Business-to-Business Commerce.

UNIT IV **10 Hours**

SECURITY THREATS

E- Security and USA Patriot Act: Security in Cyberspace- Designing for security - Security Protection and Recovery-Encryption: Basic Algorithm - Authentication and Trust- Managing Cryptographic Keys - Internet Security Protocols and Standards.

UNIT V **9 Hours**

PAYMENT SYSTEMS AND CUSTOMER RELATED ISSUES

Getting Money: E-Money -Internet based payments - Types (Credit, Debit, Smart, Digicash, E-cash and E-wallet, EFT) - Going Online: Life Cycle Approach- Business Planning and Strategizing Phase - Hardware, Software, Security and Setup, Design, Marketing, Fulfillment, Maintenance & Enhancement Phase.

FOR FURTHER READING

Internet services and Language-, mobile commerce- Business Challenge- website evaluation and usability testing- Encryption Issues.

Total: 45 Hours

Reference(s)

1. Elias M. Awad, Electronic Commerce- From the Vision to Fulfillment, Prentice Hall of India, 2011
2. Ravi Kalakota and Andrew B.Whinston, Frontiers of E-Commerce, Pearson Education Asia, 2006
3. Kamesh K.Bajaj and Debjani Nag, E-Commerce the Cutting Edge of Business, Tata McGraw Hill, 2005

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	4				8				6															20
2	2					6					4								4						16
3		2									12								2				6		22
4		2			2		6				6				6										22
5	2						4			4				6					4						20
																				Total					100

Assessment Questions

Remember

1. Define Search Engine Optimization.
2. Recall the five components of an effective business model.
3. List the two EDI standards used in E-Commerce.
4. List the two components of I-way.
5. Define E-Business.
6. Define internet service provider.
7. State the generic business strategies required for achieving profitable business.
8. Label the reverse auction.
9. List the role of ISP in Internet.
10. Define ACID test.

Understand

1. Exemplify the role of World Wide Web in Ecommerce application.
2. Explain the primary revenue modes used by E-commerce firms.
3. Classify the different type of information that can be shared through peer to peer sites.
4. Identify the unique features of E-business technology.
5. Summarise the potential limitations of E-payment system.
6. Identify the unique features of E-commerce technology.
7. Exemplify the current and potential future impacts of E-commerce technology on industry.
8. Identify the various issues of E-commerce.
9. Explain the Customer Relationship Management and E-value.
10. Elucidate the design and implementation issues that should be addressed by a firewall design.

Apply

1. Demonstrate the supply value chain in E- Commerce with an example.
2. Demonstrate the systematic approach for developing E-commerce website.
3. Demonstrate the structure and services of ISP with a neat diagram.
4. Demonstrate the activities of Value chain with an example.
5. With a suitable example, execute RSA algorithm.
6. Show the key steps in planning an intranet.
7. Implement the concept of DES algorithm.
8. Implement the concept of 3DES algorithm.
9. Execute the concept of IDEA algorithm with a suitable example.
10. Show the security assessment life cycle.

Analyse

1. Differentiate between internal and external value chains.
2. Differentiate Spamming and flaming.
3. Differentiate e-wallet and money.
4. Differentiate Server PC and Client PC.
5. Compare disintermediation and reintermediation.

6. Differentiate browser and Web server.
7. Differentiate credit cards and Debit cards.
8. Compare Maintenance and Enhancement phase.
9. Compare Smart cards and Digi-cash.
10. Compare interorganizational and intraorganization EDI.

Evaluate

1. Evaluate the IP address: 11011101.01111100.
2. Determine the unique feature of the IP address 00000111.

Create

1. Conclude special precautions should be taken by a bank to ensure that a customer does not double spend the same electronic coins.

15CS017 R PROGRAMMING 3 0 0 3

Course Objectives

- Understand the basics of R programming.
- Gain knowledge about the data analysis and statistical models in R.
- Impart knowledge about using graphics in R.

Course Outcomes (COs)

1. Explain the basic concepts of R.
2. Illustrate exploratory data analysis with R.
3. Summarize the use of graphics in R.
4. Compare the different statistical models in R.
5. Demonstrate the use of advanced concepts in R.

UNIT I **9 Hours**

GETTING STARTED AND BASICS

Introduction to R - R Installation - Basic syntax- R as a calculator -R Libraries- Importing Data - Getting help and loading packages - Data entry and exporting data - Creating and Manipulating objects in R - Vectors - Matrices - Data Frames - Lists.

UNIT II **9 Hours**

EXPLORATORY DATA ANALYSIS WITH R

Summary statistics - Validating & Exploring Data - Manipulating Data - Summarizing - Sorting - Sub-setting - Merging.

UNIT III **9 Hours**

GRAPHICS

Basic plotting - 3D plotting- Histograms- Multi-panel plotting-Boxplots-ggplot2- Manipulating the plotting window- Advanced plotting using lattice library - Saving plots.

UNIT IV **9 Hours**

STANDARD STATISTICAL MODELS IN R

Univariate Analysis - Multivariate Analysis - Linear & Nonlinear Models - Logistic Regression and Survival Analysis in R.

UNIT V **9 Hours**

ADVANCED R

Writing R functions - Introduction to Clustering and Classification - k-Means Partitioning- Partitioning around Mediods - Introduction to Unconstrained & Constrained Ordination - Principal Components Analysis (PCA)-Redundancy Analysis (RDA).

FOR FURTHER READING

Machine learning - Natural language processing - Case studies.

Total: 45 Hours

Reference(s)

1. Jared P Lander R for Everyone, Kindle Edition, 2014.
2. Grolemund and Garrett Hands-On Programming with R, Kindle Edition, 2014.
3. Mark Gardener Beginning R: The Statistical Programming Language, 2013.
4. Norman Matloff, The Art of R Programming - A Tour of Statistical Software Design, 2011.
5. Richard F. Gilberg, and Behrouz A. Forouzan, Data Structures - A Pseudocode Approach with C, Thomson 2009
6. John E.Hopcroft, Rajeev Motwani and Jeffrey.D Ullman, Introduction to Automata Theory, Languages and Computations, Pearson Education, 3rd Edition, 2009

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	6			4	2																6			20
2					4	2				4				4								6			20
3					2	4				4				4								6			20
4	2	4			2	6							2	4											20
5	2	2			2	6				4				4											20
																								Total	100

Assessment Questions

Remember

1. Define R Programming.
2. List any four advantages of R.
3. Explain how data is aggregated in R.
4. List any four R Packages.
5. List the three ways to call a function in R.
6. Define the workspace in R.
7. State the lazy function evaluation in R.
8. List the rules to define a variable in R.
9. Identify the syntax to create a matrix in R.
10. Recall the basic syntax for creating a pie-chart using the R.
11. List the different type of sorting algorithms available in R language.
12. What is R used for?

Understand

1. In base graphics system, which function is used to add elements to a plot?
2. Explain the data structures in R.
3. Explain about the implementation of string operation.
4. Indicate the method to load and use CSV file.

5. What is R package?
6. How do you install a package in R?
7. Indicate the basic syntax for calculating mean in R.
8. Explain the steps to establish regression in R.
9. Explain the features of R programming.
10. Explain the k-means partitioning for iris dataset using R.
11. Indicate factor variable in R language.

Apply

1. Create a vector of the positive odd integers less than 100 using R.
2. How to create log linear models in R language?
3. Give the command to read a csv file in R.

Analyse

1. Differentiate array and matrix in R.
2. What is the output of runif (5) in R?
3. Differentiate the operators = and <- in R.
4. Differentiate package and library in R.
5. Differentiate with () and by () function in R.
6. Differentiate dataframe and matrix in R.
7. What do you understand by element recycling in R?
8. dplyr<- "ggplot2"
   library (dplyr).
   Which package will be loaded on executing the above command and why?

Create

1. Compute and visualize principal component analysis using R for iris dataset.
2. Create the relationship model and get the coefficients for the data set "mtcars" available in the R environment. mtcars gives differnt car models in terms of mileage per gallon (mpg), cylinder displacement("disp"), horse power("hp"), weight of the car("wt") and some more parameters. .Establish the relationship between "mpg" as a response variable with "disp","hp" and "wt" as predictor variables.
3. Merge two dataframes with columns and rows with an example.
4. Write an R program to find the matrix multiplication of given two matrices.
5. Write an R program to load the Animals dataset from the MASS package and find the correlation coefficient of brain weight and body weight in this dataset.
6. Write a function in R language to replace the missing value in a vector with the mean of that vector.

15CS018 MANAGEMENT INFORMATION SYSTEMS

3 0 0 3

Course Objectives

- Gain knowledge about the major types of information systems used in a business environment.
- Impart knowledge on the ethical, social, and security issues of information systems.
- Understand the processes of developing and implementing information systems.

Course Outcomes (COs)

1. Understand the basics of Management Information systems.
2. Formulate solutions social and ethical issues related to information technology infrastructure.
3. Apply the knowledge on database management systems to store hybrid information in a business organization.
4. Recognize the use of security mechanisms to share business information over various types of networks.
5. Explore the new IT initiatives for enhancing knowledge management information systems.

UNIT I **8 Hours**

INTRODUCTION TO INFORMATION SYSTEMS

Information Systems in Global Business Today: Role of Information Systems in Business Today - Perspectives of Information Systems - Approaches to Information Systems - Global E-Business and Collaboration: Business Process and Information Systems - Types of Information Systems Enterprise Systems

UNIT II **10 Hours**

INFORMATION TECHNOLOGY INFRASTRUCTURE

Information Systems, Organizations and Strategy: Organizations and Information Systems - Impact of Information Systems on organizations and Business Firms - Ethical and Social Issues in Information Systems: Understanding Ethical and Social Issues Related to Systems - Ethics in an information society - IT Infrastructure and Emerging Technologies: Infrastructure Components - Hardware Platform Trends - Software Platform Trends

UNIT III **8 Hours**

DATABASES AND INFORMATION MANAGEMENT

Organizing Data in Traditional File Environment - Database Approach to Data Management - Using Databases to improve Business Performance and Decision Making - Managing Data Resources

UNIT IV **9 Hours**

NETWORKS AND SECURITY

Telecommunications and Networking in todays Business Needs: Networking and Communication Trends - Key Digital Networking Technologies - Securing Information Systems: System Vulnerability - Business Value of Security and Control - Establishing Management Framework for Security and Control - Technologies and Tools for Protecting Information Resources.

UNIT V **10 Hours**

NEW IT INITIATIVES

Enterprise Applications: Enterprise Systems - Supply Chain Management Systems - Customer Relationship Management Systems - Electronic Commerce: Types of Electronic Commerce - M-Commerce Services and Applications - The Knowledge Management Landscape: Important Dimensions of Knowledge - The Knowledge Management Value Chain - Types of Knowledge Management Systems.

FOR FURTHER READING

Porters Competitive Forces Model - The Business Value Chain Model - Management Issues - Sustaining Competitive Advantage - Aligning IT with Business Objectives - Managing Strategic Transitions.

Total: 45 Hours

Reference(s)

1. Kenneth C. Laudon, Jane P. Laudon, Management Information Systems -Managing the digital firm, Pearson Education, 2012.
2. Waman S Jawadekar, Management Information Systems-Texts and Cases, the McGraw-Hill Company, 2009.
3. James O' Brien, Management Information Systems-Managing Information Technology in the E-business enterprise, McGraw-Hill Higher Education, 2011.
4. Turban, McLean and Wether, Information Technology for Management-Transforming Organisations in the Digital Economy, John Wiley, 2008.
5. Raymond McLeod and Jr. George P. Schell, Management Information Systems, Pearson Education, 2008.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1		2				6				4				6											18
2		2			2	8				4				4								2			22
3		2				4				6				2				2				2			18
4		2			2	4				4				6								2			20
5		2				6				4				2				4				4			22
																								Total	100

Assessment Questions

Remember

1. Define information system.
2. Recognise the distinct characteristics of a digital firm.
3. List out 4 functional areas of an organization.
4. List out 5 examples for malicious software.
5. State the characteristics of MIS.
6. Define business intelligence.
7. Define the terms: phishing and pharming.
8. List out the 5 types of organizational structure.
9. State the goal of enterprise applications.
10. Define normalization.

Understand

1. Represent the relationship between an organization and its environment.
2. Identify the need for customer relationship management (CRM) in an organization.
3. Classify the 3 dimensions of an information system.
4. Exemplify the role of information systems in improving today’s business processes.
5. Illustrate the socio-technical perspective on information systems.
6. Identify the technology drivers of IT infrastructure.
7. Represent the process of public key encryption.
8. Summarize the evolution of IT infrastructure with neat representations.
9. Illustrate the working of supply chain management systems.
10. Explain the business value of CRM in achieving operational excellence.

Apply

1. Execute SQL queries to create a database for an automobile company for storing organizational information.

2. Construct an ER diagram for library management system with all the database components meaningfully labelled.
3. Construct the customer loyalty management process map for a business organization.
4. Show the ER diagram for university database using Chen's notation.
5. Construct a multi-dimensional model for salesforce.com
6. Design an MIS report for pizza deleivery business organization.
7. Implement a transaction processing system for payroll processing in an organization.
8. Implement a customer relationship management system for a business organization.
9. Implement a supply chain management system for a business organization.
10. Construct a knowlege network system for an educational organization.

Analyse

1. Differentiate transaction cost theory and agency theory in terms of economic impacts on an organization.
2. Compare operational CRM and Analytical CRM of an organization.
3. Differentiate disaster recovery planning and business continuity planning.
4. Compare the elements of hardware platform trends and software platform trends.
5. Contrast the features of firewalls and intrusion detection systems in terms of unauthorized access to network.
6. Differentiate database and data warehouse in terms of information storage management.
7. Differentiate OLAP and OLTP in terms of information processing.

Evaluate

1. 'MIS is more important than TPS, DSS and ESS of any business organization'-Justify.
2. 'Internet plays a vital role in enhancing global supply chains'-Justify.
3. 'Development of E-Commerce deduces the customer relationship with the business organization'-Defend this statement.
4. Hackers and their companion viruses are an increasing problem, especially on the Internet.-Determine the most important measurers for a firm to take to protect itself from this.

Create

1. Plan a security policy that defines an acceptable use policy, authorization policies and processes for an online shopping business organization's information system.
2. Generalize the management and technology factors for a banking organization that uses software service provider for all their software needs.

15CS019 TOTAL QUALITY MANAGEMENT 3 0 0 3

Course Objectives

- Study principles and philosophies of quality management.
- Understand the different quality systems.
- Learn the tools and techniques for management.

Course Outcomes (COs)

1. Explore the TQM framework and quality statements.
2. Describe the philosophy and principles of Total Quality Management.
3. Interpret Statistical Process Control And Process Capability.
4. Implement the tools and techniques to enhance Management process.
5. Understand the Quality systems and implementation.

UNIT I **8 Hours**

INTRODUCTION TO QUALITY MANAGEMENT

Definitions - TQM framework, benefits, awareness and obstacles. Quality vision, mission and policy statements. Customer Focus -customer perception of quality, Translating needs into requirements, customer retention. Dimensions of product and service quality.

UNIT II **8 Hours**

PRINCIPLES AND PHILOSOPHIES OF QUALITY MANAGEMENT

Overview of the contributions of Deming, Juran Crosby, Masaaki Imai, Feigenbaum, Ishikawa, Taguchi techniques - introduction, loss function, parameter and tolerance design, signal to noise ratio. Concepts of Quality circle, Japanese 5S principles.

UNIT III **10 Hours**

STATISTICAL PROCESS CONTROL AND PROCESS CAPABILITY

Meaning and significance of statistical process control (SPC) -construction of control charts for variables and attributed. Process capability - meaning, significance and measurement -Six sigma concepts of process capability. Reliability concepts -definitions, reliability in series and parallel, and product life characteristics curve. Total productive maintenance (TMP)

UNIT IV **10 Hours**

TOOLS AND TECHNIQUES FOR QUALITY MANAGEMENT

Quality functions development (QFD) -Benefits, Voice of customer, information organization, House of quality (HOQ), building a HOQ, QFD process. Failure mode effect analysis (FMEA) - requirements of reliability, failure rate, FMEA stages, design, process and documentation. Seven old (statistical) tools. Seven new management tools.

UNIT V **9 Hours**

QUALITY SYSTEMS ORGANIZING AND IMPLEMENTATION

Introduction to IS/ISO 9004:2000 - quality management systems - guidelines for performance improvements. Quality Audits. TQM culture, Leadership - quality council, employee involvement, motivation, empowerment, recognition and reward

FOR FURTHER READING

Business process re-engineering (BPR) - principles, applications, reengineering process, benefits and limitations.

Total: 45 Hours

Reference(s)

1. Dale H. Besterfiled, et al, Total Quality Management, Pearson Education Asia, Third Edition, Indian Reprint (2011).
2. James R. Evans and William M. Lindsay, The Management and Control of Quality, 8th Edition, South-Western (Thomson Learning), 2011.
3. Oakland, J.S. TQM Text with Cases, Butterworth Heinemann Ltd., Oxford, 3rd Edition, 2003.
4. Suganthi,L and Anand Samuel, Total Quality Management, Prentice Hall (India) Pvt. Ltd.,2006
5. Janakiraman, B and Gopal, R.K, Total Quality Management Text and Cases, Prentice Hall (India) Pvt. Ltd., 2006.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	4			2	8								2											18
2	2	8			2	4								2											18
3	2				2				2	8				2								6			22
4	2	8				8							2	2											22
5		8				6			4					2											20
																								Total	100

Assessment Questions

Remember

1. Define quality.
2. Define Quality cost.
3. List out the 5 the factors influencing customer satisfaction.
4. Define 5S.
5. Recall the ISO 9000 Series of Standards.
6. Define Quality Audits.
7. List the 3 types of bench marking.
8. State the main purposes of FEMA.
9. Define Six Sigma.
10. List the seven tools of quality.

Understand

1. Infer the Taguchi Loss Function.
2. Explain Taguchi Quality loss function.
3. Explain the steps involved in implementing the continuous process improvement.
4. Explain the Juran Trilogy.
5. Explain the Seven Management Tools.
6. Explain the QFD process.
7. Explain the stages of FMEA.
8. Summarise the requirements of ISO 14000.
9. Summarise the implementation and documentation of Quality System.
10. Explain Deming Philosophy.

Apply

1. Find the average, median and mode for each group of members.
   50, 45, 55,55,45,50,55,45,55
2. Predict the measures to be taken by a manufacturing organization to handle customers' complaints in order to retain them

3. Based on samples of 20 IRS auditors, each handling 100 files, we find that the total number of mistakes in handling files is 220. Find the 95.45% upper and lower control limits.
4. Several samples of size have been taken from today's production of fence posts. The average post was 3 yards in length and the average sample range was 0.015 yard. Find the 99.73% upper and lower control limits.
5. Find the range and standard deviation for each group of members.
   50, 45, 57,55,60,85,51,45,59

Analyse

1. Justify the relation between employee retention and customer retention.
2. Analyse the relationship between Total quality management and Re-engineering.
3. Analyze the tools and techniques of Total Quality Management for service organization.

Create

1. Generate a check sheet for the maintenance of a piece of equipment such as a gas furnace, laboratory scale or typewriter.
2. Construct a flow diagram for the manufacture of a product or the providing of a service.

3 0 0 3

15CS020 ARTIFICIAL INTELLIGENCE

Course Objectives

- Understand the problem solving intelligent agents and searching techniques.
- Impart domain knowledge in propositional and first-order logic.
- Formulate and solve optimization challenges as planning problems.

Course Outcomes (COs)

1. Explain the characteristics of AI that make it useful to real-world problems.
2. Explicate the different searching techniques.
3. Explore the domain knowledge representation in propositional and first-order logic.
4. Recognise the planning process of various state-space search algorithms, and choose the appropriate algorithm for a problem.
5. Implement the different techniques for learning and reasoning under uncertainty.

UNIT I **9 Hours**

INTRODUCTION

Intelligent Agents - Agents and environments - Good behavior - The nature of environments - Structure of agents - Problem Solving - Problem solving agents - Uniformed search strategies - heuristic function.

UNIT II **8 Hours**

SEARCHING TECHNIQUES

Local search algorithms and optimization problems - Local search in continuous spaces - Online search agents and unknown environments - optimal Decisions in games - Constraint satisfaction problems (CSP).

UNIT III **9 Hours**

KNOWLEDGE REPRESENTATION

First order logic : Representation revisited - Syntax and semantics for first order logic - Using first order logic - Knowledge engineering in first order logic - Inference in First order logic: Prepositional versus first order logic - Unification and lifting - Forward chaining - Backward chaining.

UNIT IV **10 Hours**

PLANNING

Classical planning: Definition of Classical Planning -Algorithms for Planning as State-Space Search - Planning Graphs- Other Classical Planning Approaches - Analysis of Planning Approaches - Time, Schedules, and Resources - Hierarchical Planning - Planning and Acting in Nondeterministic Domains - Multiagent Planning

UNIT V **9 Hours**

LEARNING

Learning from examples: Forms of learning - supervised learning - Learning decision trees - Ensemble learning - A Logical formulation of learning - Knowledge in learning - Explanation based learning - Learning using relevant information.

FOR FURTHER READING

Language Models - Text Classification - Information Retrieval - Information Extraction - speech recognition.

Total: 45 Hours

Reference(s)

1. Russell, Peter Norvig, Artificial Intelligence A Modern Approach, 3rd Edition, Prentice Hall of India, 2010
2. Nils J. Nilsson, Artificial Intelligence: A new Synthesis, Harcourt Asia Pvt. Ltd., 2000
3. Elaine Rich and Kevin Knight, Artificial Intelligence, 3rd Edition, Tata McGraw-Hill, 2011
4. George F. Luger, Artificial Intelligence-Structures And Strategies For Complex Problem Solving, Pearson Education / PHI, 2002

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2					4					5				3			4				2			20
2	2					2				4								3				6			17
3		2				2					8							6				3			21
4		2					4				6				4			4				2			22
5	2						4			6								8							20
																								Total	100

Assessment Questions

Remember

1. State Artificial Intelligence.
2. Define intelligent agent.
3. List the 4 characteristics of agent environment.
4. Define heuristic search.
5. State reasoning under uncertainty.

6. List the 4 features of logic.
7. List the syntactic elements of first-Order logic.
8. List the categories useful in knowledge representation.
9. Recall the learning curve for the decision tree algorithm.
10. State the design issues that affect the learning element.

Understand

1. Classify the four basic types of agent program in any intelligent system.
2. Explain how a problem solving agent works with an example.
3. Summarize the steps involved in performing a state-space search.
4. Exemplify the Breadth First Search in intelligent system.
5. Illustrate the use of first-order logic to represent knowledge.
6. Explain the steps involved in the knowledge Engineering process.
7. Illustrate hierarchical Planning with an example.
8. Classify the 4 classical Planning Approaches.
9. Represent the decision tree learning algorithm in intelligent system.
10. Classify the 2 types of learning.

Apply

1. Select suitable search algorithm to find the solution for state space in water jug problem.
2. Demonstrate the concept of planning with state space search with an example.
3. Implement online search agent working using depth first exploration.
4. Demonstrate constraint satisfaction problem with an example.
5. Show a simple mathematical model for a neuron.

Analyse

1. Compare IDA* and A* algorithms in terms of time and space complexity.
2. Compare online and offline search.
3. Compare forward chaining and backward chaining in terms of first order logic.
4. Differentiate the two quantifiers in the logics.
5. Outline the steps involved in information extraction

Evaluate

1. Check whether hill climbing guaranteed to give solution to 8 queen's problem.

Create

1. Consider the following classroom scheduling problem: There are 4 classes, C1, C2, C3, and C4, and 3 class rooms, R1, R2, and R3. The following table shows the class schedule: In addition, there are the following restrictions:
   • Each class must use one of the 3 rooms, R1, R2, R3.
   • R3 is too small for C3.
   • R2 and R3 are too small for C4.
   One way of formulating this problem as a constraint satisfaction problem is to let each class, C1, ..., C4, be a variable, and each room, R1, R2, R3, be the possible values for these variables.

Class	**Time**
C1	8.30 – 10.30
C2	9 – 11
C3	10 – 12.30
C4	11 – 1.30

   (a) Show the initial possible values for each variable, C1, ..., C4, given the restrictions above.
   (b) Express formally all the constraints in this problem.
   Consider each pair of variables appearing in the same constraint in (b), please point out which pairs are arc-consistent for the initial values provided in (a). For those pairs that are not arc - consistent, please provide the necessary operations so that they become arc-consistent.

15CS021 NETWORK AND ROUTING PROTOCOLS 2 0 2 3

Course Objectives

- Learn the basics of networks.
- Understand the Ethernet Technologies.
- Learn the Routing Protocols.

Course Outcomes (COs)

1. Explain the basics of networks and cable media.
2. Demonstrate the TCP/IP layer.
3. Describe the subnetting IP Networks.
4. Troubleshoot VLAN and trunk configurations in a switched network.
5. Configure standard IPv4 ACLs to filter traffic according to networking requirements.

UNIT I **6 Hours**

NETWORKING FUNDAMENTALS

Exploring the Network: Globally Connected-LANs, WANs, and the Internet-The Network as a Platform-The Changing Network Environment-Configuring a Network Operating System: IOS Bootcamp-Getting Basic Addressing Schemes -Network Protocols and Communications: Rules of Communication-Network Protocols and Standards-Moving Data in the Network-Network Access.

UNIT II **5 Hours**

TCP/IP LAYER

Ethernet- Network Layer-Transport Layer: Role of the Transport Layer- Conversation Multiplexing-Transport Layer Reliability - Introducing TCP and UDP- IP Addressing: IPv4 Network Addresses-IPv6 Network Addresses- Connectivity Verification.

UNIT III **6 Hours**

SUBNETTING

Subnetting IP Networks: Subnetting an IPv4 Network-Addressing Schemes-Design Considerations for IPv6-Application Layer: Application Layer Protocols-Well-Known Application Layer Protocols and Service-The Message Heard Around the World-Introduction to Switched Networks.

UNIT IV **6 Hours**

VLAN AND ROUTING

VLANs-Routing Concepts-Inter-VLAN Routing: Inter-VLAN Routing Configuration-Troubleshooting Inter-VLAN Routing-Layer 3 Switching-Static Routing: Static Routing Implementation-Configure Static and Default Routes-Review of CIDR and VLSM-Configure Summary and Floating Static Routes-Troubleshoot Static and Default Route Issues.

UNIT V **7 Hours**

ROUTING PROTOCOLS AND ACL

Routing Dynamically-Single-Area OSP: Characteristics of OSPF-Configuring Single-area OSPFv2-Configure Single-area OSPFv3-F-Access Control Lists: IP ACL Operation-Standard IPv4 ACLs-

Extended IPv4 ACLSs-Contextual Unit: Debug with ACLs-Troubleshoot ACLs-Contextual Unit- IPv6 ACLs-DHCP: Dynamic Host Configuration Protocol v4-Dynamic Host Configuration Protocol v6--Network Address Translation for IPv4: NAT Operation-Configuring NAT-Troubleshooting NAT.

FOR FURTHER READING

Wide Area Networking Protocols - High-Level Data link control protocol- Point-to-point protocol-Integrated Services Digital Network-Dial-on-demand routing protocol.

2 Hours

EXPERIMENT 1

Simulate and navigating the IOS, Configuring Initial Switch Settings.

4 Hours

EXPERIMENT 2

Demonstrate and build a simple network.

2 Hours

EXPERIMENT 3

Build and Test an Ethernet Crossover Cable.

4 Hours

EXPERIMENT 4

Identify Wireless and Wired NIC Information in the network.

2 Hours

EXPERIMENT 5

Build and Test a Switch and Router Network.

4 Hours

EXPERIMENT 6

Identifying IPv6 Addresses in the network.

2 Hours

EXPERIMENT 7

Testing Network Connectivity with Ping and Traceroute.

4 Hours

EXPERIMENT 8

Troubleshooting IPv4 and IPv6 Addressing.

2 Hours

EXPERIMENT 9

Design and Implement a Subnetted IPv4 Addressing Scheme.

4 Hours

EXPERIMENT 10

Design and Implement a VLSM Addressing Scheme.

Total: 60 Hours

Reference(s)

1. Todd Lammle, CCNA Routing and Switching Study Guide, Wiley India Pvt Ltd 2013.
2. Todd Lammle, CCNA Cisco Certified Network Associate Study Guide, Wiley India Pvt Ltd, 7th Edition, 2011.
3. Wendell Odom, Cisco CCNA Routing and Switching 200-120 Official Cert Guide Library, Academic Edition, Cisco Systems, 2013.
4. Scott Empson, CCNA Routing and Switching Portable Command Guide, 3rd Edition, Cisco Press, 2013.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	3	3			4	4							2												16
2	2				3	4				5					2			2							18
3	3				2					5				2	3							6			21
4		2			3					4				2	4			2				6			23
5		2				3				6				6								5			22
																								Total	100

Assessment Questions

Remember

1. Define Client and Server.
2. Define Peer-peer network.
3. List the three categories of network components.
4. Give examples for end devices.
5. List the examples of intermediately devices.
6. List the different types of network media.
7. Mention two most common types of network infrastructures.
8. List the four basic characteristics of network architectures.
9. Mention the external threats to networks.
10. Mention the common methods to access the CLI.
11. Define console port.
12. Define Telnet.
13. List the Cisco IOS Modes of Operation.
14. Define IP Address.
15. Define Subnetmask.

Understand

1. Exemplify the message encoding.
2. Illustrate the message formatting and encapsulation.
3. Illustrate the OSI reference model with neat diagram.
4. Illustrate the TCP/IP reference model with neat diagram.
5. Differentiate MAC and IP Addresses.
6. Classify the physical layer standards.
7. Classify the types of physical media.
8. Identify the characteristics of copper media.
9. Identify the properties of UTP cabling.
10. Classify the types of UTP cable.

Analyze

1. Differentiate physical and logical topologies.
2. Differentiate half duplex and full duplex.
3. Differentiate LLC and MAC.
4. Compare IPV4 and IPV6.
5. Compare Router and Switch.
6. Differentiae TCP and UDP.

Apply

1. Demonstrate TCP Three-Way Handshake with neat diagram.
2. Implement the IPv6 Address Configuration.
3. Execute the Testing Connectivity to the Local LAN using Ping.

Evaluate

1. A block of addresses is granted to a small organization. We know that one of the addresses is 205.16.37.39/28. What is the first address in the block?
2. A block of addresses is granted to a small organization. We know that one of the addresses is 205.16.37.39/28. Find the last address for the block.
3. A block of addresses is granted to a small organization. We know that one of the addresses is 205.16.37.39/28. Find the number of addresses
4. Change the following IP addresses from dotted-decimal notation

a. 114.34.2.8
b. 129.14.6.8
c. 208.34.54.12
d. 238.34.2.1

5. Change the following IP addresses from binary notation to dotted-decimal

a. 01111111 11110000 01100111 01111101
b. 10101111 11000000 11111000 00011101
c. 11011111 10110000 00011111 01011101
d. 11101111 11110111 11000111 00011101

6. Find the class of the following IP addresses.

a. 208.34.54.12
b. 238.34.2.1
c. 114.34.2.8
d. 129.14.6.8

Create

1. Design a client-server chat application using TCP socket.
2. Design the Open Shortest Path First routing protocol based on the cost.

15CS022 SCALING AND CONNECTING NETWORKS 2 0 2 3

Course Objectives

- Demonstrate the concepts of hierarchical network design.
- Determine the efficiency of dynamic routing protocols.
- Design of algorithms for various routing techniques.

Course Outcomes (COs)

1. Understand the basics of scaling networks.
2. Explore the concepts of OSPF and EIGRP.
3. Describe hierarchical network design and point-to-point connections.
4. Summarize the basics of frame relay.
5. Explain securing, monitoring and troubleshooting the network.

UNIT I **7 Hours**

INTRODUCTION TO SCALING NETWORKS

Introduction - Implementing a Network Design - Selecting Network Devices - LAN Redundancy : Spanning Tree Concepts - Varieties of Spanning Tree Protocols - Spanning Tree Configuration - First-Hop Redundancy Protocols - Link Aggregation : Concepts Configuration - Wireless LANs: Concepts Operations Security - Configuration.

UNIT II **7 Hours**

OSPF AND EIGRP

Single area OSPF : Introduction - Advanced Single-Area OSPF Implementations - Troubleshooting Single-Area OSPF Implementations Multi area OSPF : Introduction Concepts - Configuring Multi area OSPF EIGRP : Characteristics - Configuring EIGRP for IPv4 Operations - Configuration of EIGRP for IPv6 - Advanced EIGRP Configurations Troubleshooting - Managing IOS System Files - IOS Licensing.

UNIT III **6 Hours**

CONNECTING NETWORKS

Hierarchical Network Design: Overview - Cisco Enterprise Architecture - Evolving Network Architectures - Connecting to the WAN: Introduction - WAN Technologies Overview - Selecting a WAN Technology - Point-to-Point Connections: Serial Point-to-Point Overview - PPP Operation - Configuring PPP - Troubleshooting WAN Connectivity.

UNIT IV **5 Hours**

FRAME RELAY

Introduction - Configuring Frame Relay - Troubleshooting Connectivity - Network Address Translation for IPv4 : NAT Operation - Configuring NAT - Troubleshooting NAT - Broadband Solutions: Introduction Teleworking - Comparing Broadband Solutions - Configuring xDSL.

UNIT V **5 Hours**

SECURING, MONITORING AND TROUBLESHOOTING THE NETWORK

VPNs - Site-to-Site GRE Tunnels - Introducing IPsec - Remote Access - Monitoring the Network : Introduction - Syslog - SNMP - NetFlow - Troubleshooting the Network : Concepts - Troubleshooting with a Systematic Approach - Network Troubleshooting.

FOR FURTHER READING

Common Security Threats - Security and Cisco Routers - Implement AAA (authentication, authorization, and accounting) on Cisco devices - Cisco Firewall Technologies.

2 Hours

EXPERIMENT 1

Configuring and Troubleshooting Basic PPP with Authentication

4 Hours

EXPERIMENT 2

Simulate and Configuring Frame Relay Point-to-Point Subinterfaces

2 Hours

EXPERIMENT 3

Implement and Configuring Dynamic and Static NAT.

4 Hours

EXPERIMENT 4
Simulate and Configuring a Router as a PPPoE Client for DSL connectivity.

2 Hours

EXPERIMENT 5
Simulate and Configuring Wireless LAN Access.

4 Hours

EXPERIMENT 6
Implement and Configuring SNMP.

2 Hours

EXPERIMENT 7
Implement and Configuring Basic Single-Area OSPFv2.

4 Hours

EXPERIMENT 8
Implement and Configuring Basic EIGRP for IPv4.

2 Hours

EXPERIMENT 9
Implement and Configuring Basic EIGRP for IPv6.

4 Hours

EXPERIMENT 10
Simulate and Troubleshooting Advanced EIGRP.

Total: 60 Hours

Reference(s)

1. Todd Lammle, CCNA Routing and Switching Study Guide, Wiley India Pvt Ltd 2013.
2. Todd Lammle, CCNA Cisco Certified Network Associate Study Guide, Wiley India Pvt Ltd, 7th Edition, 2011.
3. Wendell Odom, Cisco CCNA Routing and Switching 200-120 Official Cert Guide Library, Academic Edition, Cisco Systems, 2013.
4. Scott Empson, CCNA Routing and Switching Portable Command Guide, 3rd Edition, Cisco Press, 2013.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	3	4			3	6							2												18
2	2				2	6				6					2			2							20
3	2				2					4				2	2							6			18
4		2			2					6				2	4			2				5			23
5		2				3				6				5								5			21
																								Total	100

Assessment Questions

Remember

1. Define network.
2. What is spanning tree protocol?
3. What is EIGRP?

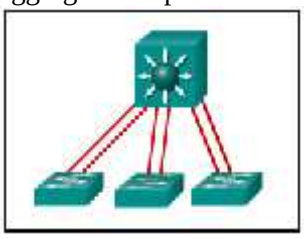
4. List the types of dynamic routing protocols.
5. Define OSPF.
6. What is multicast routing?
7. What is a DNS resource record?
8. What are the two interfaces provided by protocols?
9. What is redundancy?
10. What are the functions of MAC?
11. What is a link?
12. Define node
13. What is meant by gateway?
14. What is point-to-point link?
15. Name the factors that affect the security of the network.
16. What is protocol?
17. What are the key elements of protocols?
18. Define routing
19. What is a peer-peer process?

Understand

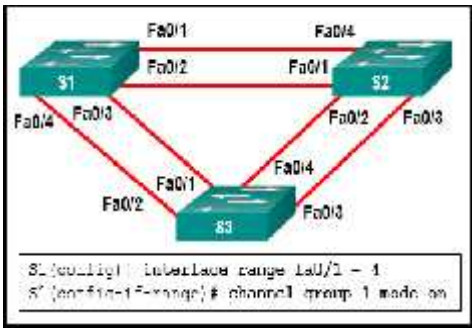
1. Identify the address class of 123.167.23.20 and 250.10.24.96. 3. Can multiple circuits share a single optical fiber in a circuit-switched network?
2. Write the subnet, broadcast address and valid host range for the following:
   a) 172.16.10.5 255.255.255.128 b) 172.16.10.33 255.255.255.224
   c) 172.16.10.65 255.255.255.192 d) 172.16.10.17 255.255.255.252
3. The Network address is 192.168.10.0 and the Subnet mask is 255.255.255.252. Find out –
   a) How many subnets?
   b) How many hosts?
4. A network engineer has manually configured the hello interval to 15 seconds on an interface of a router that is running OSPFv2. By default, how will the dead interval on the interface be affected?
5. Why do OSPF serial interfaces usually require manual bandwidth configuration?
6. Why is MD5 authentication more secure than simple authentication for OSPF updates?

Apply

1. An employee connects wirelessly to the company network using a cell phone. The employee then configures the cell phone to act as a wireless access point that will allow new employees to connect to the company network. Which type of security threat best describes this situation?
2. Refer to the exhibit. Which switching technology would allow each access layer switch link to be aggregated to provide more bandwidth between each Layer 2 switch and the Layer 3 switch?



3. Refer to the exhibit. The administrator tried to create an EtherChannel between S1 and the other two switches via the commands that are shown, but was unsuccessful. What is the problem?



Analyze

1. An EtherChannel link using LACP was formed between two switches, S1 and S2. While verifying the configuration, which mode combination could be utilized on both switches?
2. Distinguish EIGRP and OSPF.
3. Compare PPP and CHAP protocol.

Evaluate

1. Refer to the exhibit. A network administrator has attempted to implement a default route from R1 to the ISP and propagate the default route to EIGRP neighbors. Remote connectivity from the EIGRP neighbor routers to the ISP connected to R1 is failing. Based on the output from the exhibit, what is the most likely cause of the problem?

```
R1# show running-config
<output omitted>

ip classless
ip route 0.0.0.0 0.0.0.0 Serial0/0/1

R1# show ip protocols

Routing Protocol is "eigrp 55"
Redistributing: eigrp 55
  Automatic network summarization is not in effect
  Maximum path: 4
 Routing for Networks:
     192.168.254.0
     172.30.0.0
  Routing Information Sources:
    Gateway         Distance      Last Update
    192.168.254.4        90      16155
    192.168.254.6        90      191424
Distance: internal 90 external 170
```

2. Two routers, R1 and R2, share a 64 kb/s link. An administrator wants to limit the bandwidth used by EIGRP between these two routers to 48 kb/s. Which command is used on both routers to configure the new bandwidth setting?

Create

1. A company has two LANs, one in Chennai with 300 hosts and another one in Madurai with 150 hosts. Could it be possible to connect those networks to the Internet using only one Class C network addresses? Justify the answer. If the answer is positive, create a network layout, assign IP addresses to every router and to one host in the network, and specify the routing tables of all routers and the specified host.

ENTREPRENEURSHIP ELECTIVES

15GE001 ENTREPRENEURSHIP DEVELOPMENT I 3 0 0 3

Course Objectives

- Study of this subject provides an understanding of the scope of an entrepreneur, key areas of development, financial assistance by the institutions, methods of taxation and tax benefits, etc.

Course Outcomes (COs)

1. Able to gain Knowledge about entrepreneurship, motivation and business.
2. Able to develop small scale industries in different field.

UNIT I **9 Hours**

BASICS OF ENTREPRENEURSHIP

Nature, scope and types of Entrepreneurship, Entrepreneur Personality Characteristics, Entrepreneurship process. Role of entrepreneurship in economic development

UNIT II **9 Hours**

GENERATION OF IDEAS

Creativity and Innovation, Lateral Thinking, Generation of Alternatives, Fractionation, Reversal Method, Brain Storming, Analogies

UNIT III **9 Hours**

LEGAL ASPECTS OF BUSINESS

Contract act-Indian contract act, Essential elements of valid contract, classification of contracts, sale of goods act- Formation of contract of sale, negotiable instruments- promissory note, bills and cheques, partnership, limited liability partnership (LLP), companies act-kinds, formation, memorandum of association, articles of association.

UNIT IV **9 Hours**

BUSINESS FINANCE

Project evaluation and investment criteria (cases), sources of finance, financial statements, break even analysis, cash flow analysis.

UNIT V **9 Hours**

OPERATIONS MANAGEMENT

Importance- functions-deciding on the production system- facility decisions: plant location, plant layout (cases), capacity requirement planning- inventory management (cases)-lean manufacturing, Six sigma.

FOR FURTHER READING

Role of social networking sites in business

Total: 45 Hours

Reference(s)

1. Hisrich, Entrepreneurship, Tata McGraw Hill, New Delhi: 2005
2. Prasanna Chandra, Projects Planning, Analysis, Selection, Implementation and Reviews, Tata McGraw-Hill Publishing Company Limited, New Delhi: 2000.
3. Akhileshwar Pathak, Legal Aspects of Business, Tata McGraw Hill: 2006

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	3							2	2			1		2			2		2		2		4		20
2		3					2			2		2		2		2			3			4			20
3			3			2					2				2			4		3			4		20
4				3			2			2			2			3		4						4	20
5		1		2				2		2		2			2				5			4			20
																								Total	100

Assessment Questions

Remember

1. What is entrepreneurship?
2. What are the factors that motivate people to go into business?
3. Define a small-scale industry
4. Who is an intrapreneur?
5. State functions of SISI
6. What is serial entrepreneur?
7. What is Technopreneurship?
8. What is reversal method?
9. What is brainstorming?
10. What do you mean by term business idea?
11. Mention any two schemes Indian government provides to the development of entrepreneurship
12. What is a project report?
13. What is project scheduling?
14. Mention any four techniques available for project scheduling.
15. What is contract act?
16. Define MOU.
17. Mention any five external sources of finance to an entrepreneur.
18. Classify the financial needs of an organization
19. Why is motivational theories important for an entrepreneur?

Understand

1. Why is entrepreneurship important of growth of a nation?
2. Mention the essential quality required for someone to be an entrepreneur.
3. How is network analysis helpful to the development of an entrepreneur?
4. Mention the essential requirements for a virtual capital.
5. How under-capitalization affects an entrepreneur
6. Mention the causes of dissolution of a firm.
7. How important is the support of IDBI to an entrepreneur?
8. What are the salient features of New Small Enterprise Policy, 1991?
9. Why scheduling is very important for a production design?

Apply

1. If you want to become as an entrepreneur, what will be your idea?
2. Select any one of the creative idea generation method and suggest an innovation that you can implement in your business.
3. Write short notes on various legal aspects that you have to consider to run you business.
4. How will you generate your capital and other financial supports?
5. In case of getting enough financial support, plan your business and plot the various stages using any of the tools or techniques

Create

1. Draft a sample project report for your business
2. Do a network analysis using PERT and CPM for your business plan.
3. Write a brief report to apply to a financial organization for seeking financial support to your business

15GE002 ENTREPRENEURSHIP DEVELOPMENT II 3 0 0 3

Course Objectives

- Evolve the marketing mix for promoting the product / services.
- Handle the human resources and taxation.
- Understand Government industrial policies / support provided and prepare a business plan.

Course Outcomes (COs)

1. Increase in awareness of the entrepreneurship Development for engineering decisions.

UNIT I **9 Hours**

MARKETING MANAGEMENT

Marketing environment, Segmentation, Targeting and positioning, Formulating marketing strategies, Marketing research, marketing plan, marketing mix (cases)

UNIT II **9 Hours**

HUMAN RESOURCE MANAGEMENT

Human Resource Planning (Cases), Recruitment, Selection, Training and Development, HRIS, Factories Act 1948 (an over view)

UNIT III **9 Hours**

BUSINESS TAXATION

Direct taxation, Income tax, Corporate tax, MAT, Tax holidays, Wealth tax, Professional tax (Cases).Indirect taxation, Excise duty, Customs, Sales and Service tax, VAT, Octroi, GST (Cases)

UNIT IV **9 Hours**

GOVERNMENT SUPPORT

Industrial policy of Central and State Government, National Institute-NIESBUD, IIE, EDI. State Level Institutions-TIIC, CED, MSME, Financial Institutions

UNIT V **9 Hours**

BUSINESS PLAN PREPARATION

Purpose of writing a business plan, Capital outlay, Technical feasibility, Production plan, HR plan, Market survey and Marketing plan, Financial plan and Viability, Government approvals, SWOT analysis.

FOR FURTHER READING

Ethics in Entrepreneurship

Total: 45 Hours

Reference(s)

1. Hisrich, Entrepreneurship, Tata McGraw Hill, New Delhi: 2005.
2. Philip Kotler., Marketing Management, Prentice Hall of India, New Delhi: 2003
3. Aswathappa K, Human Resource and Personnel Management - Text and Cases, Tata McGraw Hill: 2007.
4. Jain P C., Handbook for New Entrepreneurs, EDII, Oxford University Press, New Delhi: 2002.
5. Akhileshwar Pathak, Legal Aspects of Business, Tata McGraw Hill: 2006.
6. http://niesbud.nic.in/agencies.htm

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	2			2	2			2	2					2	2				2				2	20
2	2									6					6							6			20
3		3				2					3			3					3		3			3	20
4			3				3			3					3		3		3				2		20
5			3				3					3			3						3	2		3	20
																								Total	100

Assessment Questions

Remember

1. Who are Fabian Entrepreneur?
2. Mention the three functions of NSIC?
3. Narrate the role of IDBI in the development of Entrepreneurship?
4. What are the stages in a Project Lifecycle?
5. Give the meaning of Feasibility Report
6. What is Motivating Training?
7. Who is a Small Scale Entrepreneur?
8. How to develop Rural Entrepreneur?
9. What are the Social Problems of Women Entrepreneur?
10. What are the types of entrepreneurs?
11. List the various qualities of entrepreneur.
12. What is entrepreneurship training?
13. State the role of NISIET.
14. List the challenges and opportunities available in SSI's?

Understand

1. What are the elements of EDP?
2. How would you Classify Projects?
3. What is the role played by commercial banks in the development of entrepreneur?
4. What are the target groups of EDP?
5. What are the major problems faced by Small Entrepreneur?
6. What are the problems & prospects for women entrepreneur in India?

Apply

1. Describe the various functions performed by Entrepreneurs?
2. Explain the role of different agencies in the development of Entrepreneur?
3. Discuss the criteria for selecting a particular project?
4. Describe the role of Entrepreneur in the Development of Country?
5. Define business idea. Elaborate the problems and opportunities for an entrepreneur.
6. Elaborate the schemes offered by commercial banks for development of entrepreneurship.
7. Explain the significant role played by DIC & SISI for the development of entrepreneurship.

Analyse

1. Differentiate between entrepreneur and entrepreneurship
2. What are the problems of Women entrepreneurs and discuss the ways to overcome these barriers?
3. Discuss the importance of small scale industries in India

Evaluate

1. Review the entrepreneurial growth by the communities of south India.
2. Critically examine the growth and development of ancillarisation in India.

Create

1. Design a short entrepreneurship development programme for farmer.
2. "All economy is the effect for which entrepreneurship is the cause"-Discuss.
3. Discuss the various sources and collection of credit information of entrepreneurs
4. Discuss the role of the government both at the Central and State level in motivating and developing entrepreneurship in India.
5. Briefly explain the recommendation and policy implication for survival of SME's.
6. Developing countries like India need imitative entrepreneurs rather than innovative entrepreneurs". Do you agree? Justify your answer with examples.
7. Discuss the "Culture of Entrepreneurship" and its role in economic development of a nation. What factors contribute to nurturing such a culture?

PHYSICAL SCIENCE ELECTIVES

15GE0P1 NANOMATERIALS SCIENCE 3 0 0 3

Course Objectives

- Understand the fundamentals of physics of nanomaterials.
- Correlate on multidisciplinary branch.
- Acquire the knowledge in nanomaterials synthesis, compile and analyze data and draw conclusions at nano level.

Course Outcomes (COs)

1. Categorize nanomaterials based on their properties.
2. Design different experimental methods for preparation of nanomaterials.
3. Infer the working mechanism of different characterization instruments as well as analyses and interpret data.
4. Know the different techniques for making nano semiconducting materials and utilize them for applications.
5. Understand the impact of nanomaterials and their applications in nanodevices.

UNIT I **9 Hours**

NANO SCALE MATERIALS

Introduction-Feynman's vision-national nanotechnology initiative (NNI) - past, present, future - classification of nanostructures,nanoscale architecture - effects of the nanometer length scale - changes to the system total energy, and the system structures- effect of nanoscale dimensions on various properties - magnetic properties of nanoscale materials -differences between bulk and nanomaterials and their physical properties.

UNIT II **9 Hours**

NANOMATERIALS SYNTHESIS METHODS

Top down processes - mechanical milling, nanolithography and types based on radiations - Bottom up process - chemical vapour deposition, plasma enhanced CVD, colloidal and sol-gel methods - template based growth of nanomaterials - ordering of nanosystems, self-assembly and self-organization - DC sputtering and RF sputtering process.

UNIT III **9 Hours**

CHARACTERIZATION TECHNIQUES

General classification of characterization methods - analytical and imaging techniques - microscopy techniques - electron microscopy, scanning electron microscopy, transmission electron microscopy, atomic force microscopy - diffraction techniques - X-ray spectroscopy - thermogravimetric analysis of nanomaterials.

UNIT IV **9 Hours**

SEMICONDUCTOR NANOSTRUCTURES

Quantum confinement in semiconductor nanostructures - quantum wells, quantum wires, quantum dots, super lattices-epitaxial growth of nanostructures-MBE, metal organic VPE, LPE - carbon nano tubes-structure, synthesis and electrical properties -applications- fuel cells - quantum efficiency of semiconductor nanomaterials.

UNIT V **9 Hours**

NANOMACHINES AND NANODEVICES

Microelectromechanical systems (MEMS) and Nanoelectromechanical systems (NEMS)-fabrication, actuators-organic FET- principle, description, requirements, integrated circuits- organic LEDâ??s - basic processes, carrier injection, excitons, optimization - organic photovoltaic cells- nano motors -bio nano particles-nano - objects - applications of nano materials in biological field.

FOR FURTHER READING

Application of graphene in various field - supercapacitors - third generation solar cell-dye sensitized solar cell (DSSC) -fuel cells.

Total: 45 Hours

Reference(s)

1. Willam A. Goddard, Donald W.Brenner, Handbook of Nanoscience, Engineering, and Technology, CRC Press, 2012.
2. Charles P. Poole Jr and. Frank J. Owens, Introduction to Nanotechnology, Wiley Interscience, 2007.
3. Guozhong Cao, Y. Wang, Nanostructures and Nanomaterials-Synthesis, Properties & Applications, Imperials College Press, 2011.
4. T. Pradeep, NANO: The Essentials Understanding Nanoscience and Nanotechnology, McGraw - Hill Education (India) Ltd, 2012.
5. Robert W. Kelsall, Ian W. Hamley, Mark Geoghegan, Nanoscale Science and Technology, John Wiley and Sons Ltd, 2006
6. Viswanathan B, AuliceScibioh M, Fuel cells: Principles and Applications, University Press, 2009.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	3	4	4		2					4				3					4						24
2	2	3	4		4	4				3				4											24
3	2	4	2			2	2				2			2											16
4		2			2	4				2				4					3						17
5	2	4				3	2				4				4										19
																								Total	100

Assessment Questions

Remember

1. Explain the term nano
2. List three types of classifications of nanomaterials.
3. Recall the principle behind lithography.
4. Define top-down and bottom-up approach.
5. Name two types of nanoarchitecture
6. Define nanocomposites.
7. Recall the principle of electron microscopy.
8. List 5 characterization techniques in nanotechnology.
9. Define quantum well and quantum wire**.**
10. Write the allotropy of carbon.

Understand

1. Explain the effect of nanometer length scale.
2. Can affect the system total energy when particle size reduced? Justify.
3. Explain plasma enhanced CVD.
4. Identify the difference between self-assembly and self-organization.
5. Name 3 synthesis process under bottom-up approach.
6. Explain contact mode in AFM.
7. Is it possible to explain the entire details of the sample by taking one characterization technique? if no, justify.

Apply

1. Find three day to day live commercial application of nanotechnology?
2. Choose two template methods used to obtain nanowire or nanorods.
3. Construct the experimental setup for organic LED.
4. Find 4 industrial applications of CNT.

Analyse

1. Differentiate between bulk and nanomaterials.
2. Identify the roll of nanoparticles in biological field.
3. Distinguish between glow discharge and RF sputtering.
4. Criticize the future challenges for nanotechnology?

Evaluate

1. Nanomaterials, do they exist in nature? If yes, identify the nanomaterials and recognize.

15GE0P2 SEMICONDUCTOR PHYSICS AND DEVICES

3 0 0 3

Course Objectives

- Impart knowledge in physical properties of semiconducting materials.
- Analyze the factors affecting the operation of semiconductor devices.
- Apply the physics of semiconductors to develop semiconductor devices.

Course Outcomes (COs)

1. Exemplify the transport properties of semiconductors.
2. Understand the physics of PN junction.
3. Analyze the factors affecting the properties of PN junction diode.
4. Demonstrate the geometry and operation of bipolar junction Transistors.
5. Summarize the optical properties and design of optoelectronic devices.

UNIT I **9 Hours**

CARRIER TRANSPORT IN SEMICONDUCTORS

Carrier drift - drift current density - mobility effects on carrier density - conductivity in semiconductor - carrier transport by diffusion - diffusion current density - total current density - breakdown phenomena - avalanche breakdown.

UNIT II **9 Hours**

PHYSICS OF P-N JUNCTION

Basic structure-Built in potential barrier, Electric field and space charge width of P-N junction under zero, forward and reverse bias- Diffusion capacitance - one sided and linearly graded junctions.

UNIT III **9 Hours**

P-N JUNCTION DIODE

Qualitative description of charge flow in p-n junction - boundary condition - minority carrier distribution - ideal p-n junction current - temperature effects - applications - the turn on transient and turn off transient.

UNIT IV **9 Hours**

BIPOLAR JUNCTION TRANSISTOR

Introduction to basic principle of operation - the modes of operation - amplification - minority carrier distribution in forward active mode - non-ideal effects - base with modulation - high injection emitter band gap narrowing - current clouding - breakdown voltage - voltage in open emitter configuration and open base configuration.

UNIT V **9 Hours**

OPTO ELECTRONIC DEVICES

Optical absorption in a semiconductor, photon absorption coefficient - electron hole pair generation - solar cell - homo junction and hetero junction - Photo transistor - laser diode, the optical cavity, optical absorption, loss and gain - threshold current.

FOR FURTHER READING

Organic semiconductors- diodes - transistors-working and applications

Total: 45 Hours

Reference(s)

1. Donald A Neamen, Semiconductor Physics and Devices, Tata McGraw Hill, 2012.
2. S. M. Sze and M. K. Lee, Semiconductor Devices, Physics and Technology, John-Wiley & Sons, 2015.
3. Ben. G. Streetman and S. K. Banerjee , Solid State Electronic Devices, Pearson Education Ltd, 2015.
4. C. Kittel, Introduction to Solid State Physics, John-Wiley & Sons, 2012.
5. J. Millman and C. Halkias, Electronic Devices and Circuits, Tata McGraw Hill, 2010.
6. Hagen Klauk, Organic Electronics: Materials, Manufacturing and Applications, Wiley-VCH, 2006.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	3	4	4		2					2				3					2						20
2	2	3	4		4	4				3				4											24
3	2	4	2		2	2					4			4											20
4		2			2	4				2				4					4						18
5	2	4				2	2				4				4										18
																								Total	100

Assessment Questions

Remember

1. Define drift current density
2. Recall diffusion capacitance
3. Write the ideal diode equation
4. List the three modes of transistor operation
5. State the principle of solar cell

Understand

1. Identify the two scattering mechanisms that affect mobility of charge carriers in semiconductors
2. Sketch the energy band diagram of a P-N junction under thermal equilibrium
3. Exemplify the boundary conditions used to calculate minority carrier distribution in a junction diode
4. Explain the base width modulation occur in transistors
5. Illustrate the working mechanism of a phototransistor

Apply

1. By applying the concept of scattering, explain the mobility of holes in a semiconductor.
2. Apply Poission equation to space charge region and hence derive the electric field under zero bias
3. Show that the minority carrier concentrations in a diode decay exponentially with distance away from the junction to their thermal-equilibrium values.
4. Derive an expression for excess minority current in the emitter region under forward action mode by applying the ambipolar transport equation.
5. Show that the minority carrier concentrations in a diode decay exponentially with distance away from the junction to their thermal-equilibrium values.

Analyse

1. Differentiate drift current and diffusion current
2. Space charge width increases upon reverse bias. Justify
3. Silicon is preferred over germanium for the manufacture of semiconductor devices. Justify
4. Compare emitter bandgap narrowing and current crowding.
5. Differentiate homojunction and heterojunction laser

15GE0P3 APPLIED LASER SCIENCE 3 0 0 3

Course Objectives

- Impart knowledge on laser science.
- Explore different strategies for producing lasers.
- Create expertise on the applications of lasers in various fields.

Course Outcomes (COs)

1. Realize the concept of stimulated emission and apply the same for laser oscillation.
2. Understand the properties laser and working of different laser systems.
3. Determine the rotation of earth, velocity and distance using lasers and apply the same for day today applications.
4. Design the different laser based instrumentation for medical field.
5. Summarize the applications of lasers in industry.

UNIT I **9 Hours**

LASER FUNDAMENTALS

Introduction - principle - Einstein's prediction - spontaneous emission - stimulated emission - Einstein's relations - A and B coefficients - population inversion - condition for large stimulated emission - spontaneous and stimulated emission in optical region - light amplification. Components of lasers: active medium - pumping - pumping mechanisms - resonant cavity.

UNIT II **9 Hours**

CHARACTERISTICS AND TYPES OF LASERS

Introduction - directionality - intensity - coherence - monochromaticity. Classification of lasers - principle, construction, working, energy level diagram and applications of CO2 laser - dye laser - excimer laser - Nd:YAG laser - semiconductor laser.

UNIT III **9 Hours**

LASERS IN SCIENCE

Harmonic generation - stimulated Raman emission - lasers in chemistry - laser in nuclear energy - lasers and gravitational waves - LIGO - rotation of the earth - measurement of distance - velocity measurement - holography.

UNIT IV **9 Hours**

LASERS IN MEDICINE AND SURGERY

Eye laser surgery - LASIK - photocoagulations - light induced biological hazards: Eye and skin - homeostasis - dentistry - laser angioplasty - laser endoscopy - different laser therapies.

UNIT V **9 Hours**

LASERS IN INDUSTRY

Applications in material processing: laser welding - hole drilling - laser cutting. Laser tracking: LIDAR. Lasers in electronics industry: ranging - information storage - bar code scanner. Lasers in defence: laser based military weapons - laser walls.

FOR FURTHER READING

Q-switching - mode locking - thermo-optic effects - astronomy lasers - fighting crime with lasers - laser engraving.

Total: 45 Hours

Reference(s)

1. K. Thiyagarajan and A. K. Ghatak, LASERS: Fundamentals and Applications, Springer, USA, 2015.
2. M. N. Avadhanulu, An Introduction to Lasers Theory and Applications, S. Chand Publisher, 2013.
3. W. Koechner, M. Bass, Solid State Lasers: a graduate text, Springer Verlag, New York, 2006.
4. K. P. R. Nair, Atoms, Molecules and Lasers, Narosa Publishing House, 2009.
5. K. R. Nambiar, Lasers: Principles Types and Applications, New Age International Publications, 2006.
6. A. Sennaroglu, Solid-State Lasers and Applications, CRC Press, 2006.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	2			2	2	1		2	3	1			2			1	2							20
2	2	2			3	2	2		2	2			1	1			1		2						20
3	3				2	2	1		2		3		2	1	1			1	2						20
4	2	2			2	1	1		2	2	1		2	2	1			1	1						20
5	2	1			1		3		2		2		2	1			1	2	3						20
																				Total					100

Assessment Questions

Remember

1. Recognise the term LASER
2. Define stimulated absorption
3. Define spontaneous emission
4. Define stimulated emission
5. Distinguish between spontaneous and stimulated emission
6. State population inversion
7. List the four characteristics of lasers
8. Mention the five medical applications of lasers
9. State the principle behind the holography
10. Recall the term resonant cavity

Understand

1. Identify the condition needed for laser action
2. Interpret the pumping of atoms
3. Exemplify the optical excitation occurs in three level laser systems
4. Explain the determination of rotation of earth using laser
5. Summarize the application of lasers in welding and cutting
6. Explain the term LASIK
7. Classify the different types of lasers based on materials
8. Illustrate the working of laser in material processing

Apply

1. Predict the condition for laser action
2. Derive the Einstein's A and B coefficients
3. Deduce the expression for large stimulated emission
4. Construct the experimental setup for distance measurement
5. Find the applications of lasers in stimulated Raman
6. Assess the wavelength of emission of GaAs semiconductor laser whose bandgap energy is 1.44 eV.

Analyse

1. Laser beam should be monochromatic, Justify?
2. Differentiate ordinary light source from laser source
3. Compare the working of gas lasers with excimer laser
4. Four level laser systems are more efficient than three level laser systems. Justiify**?**

Evaluate

1. Determine the intensity of laser beam be focused on an area equal to the square of its wavelength. For He-Ne laser wavelength is 6328 A^0 and radiates energy at the rate of 1mW.
2. Choose the appropriate lasers for the materials processing in industry

15GE0C1 CORROSION SCIENCE 3 0 0 3

Course Objectives

- Recognize the terminologies used in corrosion science.
- Impart knowledge about the various types of corrosion and its mechanism.
- Understand the various methods of corrosion control, corrosion testing and monitoring.

Course Outcomes (COs)

1. Familiarize with the fundamentals of corrosion science.
2. Understand the types of corrosion and role of chemistry behind corrosion of metals.
3. Develop their ability to identify, formulate and solve corrosion based problems.
4. Calculate the corrosion rate using different methods.
5. Analyze the analytical part of corrosion science which gives contextual knowledge to their higher research programmes.

UNIT I **9 Hours**

CORROSION

Importance of corrosion - spontaneity of corrosion - passivation - direct and indirect damage by corrosion - importance of corrosion prevention in industries - area relationship in both active and passive states of metals - Pilling Bedworth ratio and its significance - units of corrosion rate (mdd and mpy) - importance of pitting factor - Pourbaix digrams of Mg, Al and Fe and their advantages and disadvantages.

UNIT II **7 Hours**

TYPES OF CORROSION

Eight forms of corrosion: uniform, galvanic, crevice corrosion, pitting, intergranular corrosion, selective leaching, erosion corrosion and stress corrosion. High temperature oxidation, kinetics of protective film formation and catastrophic oxidation corrosion.

UNIT III **9 Hours**

MECHANISM OF CORROSION

Hydrogen embrittlement - cracking - corrosion fatigue - filliform corrosion - fretting damage and microbes induced corrosion - corrosion mechanism on steel, iron, zinc and copper metal surfaces - thick layer and thin layer scale formation - in situ corrosion scale analysis.

UNIT IV **10 Hours**

CORROSION RATE AND ITS ESTIMATION

Rate of corrosion: factors affecting corrosion - electrochemical methods of polarization - Tafel extrapolation polarization, linear polarization, impedance techniques - weight loss method - susceptibility test - testing for intergranular susceptibility and stress corrosion. Visual testing - liquid penetrant testing - magnetic particle testing - eddy current testing.

UNIT V **10 Hours**

CORROSION CONTROL METHODS

Fundamentals of cathodic protection - types of cathodic protection. Stray current corrosion problems and its prevention. Protective coatings: anodic and cathodic coatings - metal coatings: hot dipping (galvanizing, tinning and metal cladding) - natural inhibitors. Selection of sacrificial anode for corrosion control.

FOR FURTHER READING

Corrosion issues in supercritical water reactor (SCWR) systems.

Total: 45 Hours

Reference(s)

1. Mouafak A. Zaher, Introduction to Corrosion Engineering, CreateSpace Independent Publishing Platform, 2016.
2. E.McCafferty, Introduction to Corrosion Science, Springer; 2010 Edition, January 2010.
3. R. Winstone Revie and Herbert H. Uhlig, Corrosion and Corrosion Control: An Introduction to Corrosion Science and Engineering, 4th Edition, John Wiley & Science, 2008.
4. Mars G. Fontana, Corrosion Engineering, Tata McGraw Hill, Singapore, 2008.
5. David E.J. Talbot (Author), James D.R. Talbot, Corrosion Science and Technology, Second Edition (Materials Science & Technology), CRC Press; 2nd Edition, 2007.
6. http://corrosion-doctors.org/Corrosion-History/Eight.htm

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	1	2	2		1	2	1		1	1	1		1	1	2		2	1			1				20
2	1	3			2	1	1			2			1	2			1	1					1		16
3	2	1			1	4	1			3				2			2	2				2			20
4	1	1	1		2	3	1		2	2	1		2	1	1		1	2					1		22
5	1	2			1	2			2	3			2	3			1	2			1	2			22
																								Total	100

Assessment Questions

Remember

1. Define Corrosion
2. Mention the five types of corrosion
3. Define dry corrosion. Explain the mechanism.
4. What are corrosion inhibitors? Give two examples.
5. What are corrosion inhibitors? Give two examples.
6. Write the working principle of Tafel polarization techniques.
7. How polarization and impedance techniques are used to measure the corrosion products?
8. Define cathodic protection.
9. Elaborate non-electrochemical and electrochemical methods of corrosion testing and monitoring.
10. What is Tafel linear polarization?
11. What is Tafel linear polarization?

Understand

1. Explain the mechanism of electrochemical corrosion.
2. Identify the relation between the two units used to measure corrosion rate.

3. Illustrate the Pourbaix digrams of Mg/Al/Fe and their limitations.
4. List the eight forms of corrosion. Explain each type with an example.
5. What are the factors influencing the corrosion rate? Explain.
6. Discuss the Pilling-Bedworth rule.
7. Differentiate between electrochemical and dry corrosion.
8. How inhibitors are used to protect the corrosion rate of the metal? Explain.
9. What are consequences of Pilling-Bedworth ratio?
10. List the difference between filliform corrosion and pitting corrosion.

Apply

1. Area relationship between the anodic and cathodic part in galvanic corrosion. Discuss.
2. Describe alternatives to protective coatings.
3. How Tafel polarization and impedance techniques used to measure the corrosion products?

Analyse

1. Explain why corrosion rate of metal is faster in aqueous solution than atmosphere air?
2. Why pitting corrosion is localized corrosion? Explain.
3. Compare the effects of corrosion products.
4. Identify different forms of corrosion in the metal surface.
5. What are the major implications of enhanced techniques of corrosion product analysis?

15GE0C2 ENERGY STORING DEVICES AND FUEL CELLS

3 0 0 3

Course Objectives

- Understand the concept, working of different types of batteries and analyze batteries used in electric vehicles.
- Identify the types of fuel cells and to relate the factors of energy and environment.
- Analyze various energy storage devices and fuel cells.

Course Outcomes (COs)

1. Understand the knowledge of various energy storing devices.
2. Acquire the knowledge to analyze the working of different types of primary and secondary batteries.
3. Differentiate the types of fuel cells and recognize the utility of hydrogen as a fuel.
4. Realize the importance of using green fuel for sustainable development.

UNIT I **6 Hours**

BASICS OF CELLS AND BATTERIES

Components - classification - operation of a cell - theoretical cell voltage - capacity - specific energy - energy density of practical batteries - charge efficiency- charge rate - charge retention - closed circuit voltage, open circuit voltage current density - cycle life - discharge rate-over charge-over discharge.

UNIT II **10 Hours**

BATTERIES FOR PORTABLE DEVICES AND ELECTRIC VEHICLES

Primary batteries- zinc-carbon, magnesium, alkaline, manganous dioxide, mercuric oxide, silver oxide batteries - recycling/safe disposal of used cells. Secondary batteries - introduction, cell reactions, cell representations and applications - lead acid, nickel-cadmium and lithium ion batteries - rechargeable zinc alkaline battery. Reserve batteries: Zinc-silver oxide, lithium anode cell, photogalvanic cells. Battery specifications for cars and automobiles.

UNIT III **10 Hours**

TYPES OF FUEL CELLS

Importance and classification of fuel cells - description, working principle, components, applications and environmental aspects of the following types of fuel cells: alkaline fuel cells, phosphoric acid, solid oxide, molten carbonate and direct methanol fuel cells.

UNIT IV **10 Hours**

HYDROGEN AS A FUEL

Sources and production of hydrogen - electrolysis - photocatalytic water splitting - biomass pyrolysis -gas clean up - methods of hydrogen storage- high pressurized gas - liquid hydrogen type - metal hydride - hydrogen as engine fuel - features, application of hydrogen technologies in the future - limitations.

UNIT V **9 Hours**

ENERGY AND ENVIRONMENT

Future prospects of renewable energy and efficiency of renewable fuels - economy of hydrogen energy - life cycle assessment of fuel cell systems. Solar Cells: energy conversion devices, photovoltaic and photoelectrochemical cells - photobiochemical conversion cell.

FOR FURTHER READING

Energy conservation, Over utilization, Energy demanding activities.

Total: 45 Hours

Reference(s)

1. M. Aulice Scibioh and B. Viswanathan, Fuel Cells: Principles and Applications, University Press, India, 2009.
2. F. Barbir,PEM fuel cells: Theory and practice,Elsevier, Burlington, MA, Academic Press, 2013.
3. M. R. Dell Ronald and A. J. David, Understanding Batteries, Royal Society of Chemistry, 2001.
4. J. S. Newman and K. E. Thomas-Alyea, Electrochemical Systems, Wiley, Hoboken, NJ, 2012.
5. Shripad T. Revankar, Pradip Majumdar, Fuel Cells: Principles, Design, and Analysis, CRC Press, 2016.
6. Thomas B. Reddy, Linden's Handbook of Batteries, 4th Edition, McGraw Hill Professional, 2010

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	2			1	2	2			1			1	3				1							15
2	4	1			4	5	2			2			1	2				1							22
3	3				4	6	2		1	3			1	1				1							22
4	1	2			4	4	1			4			2	4											22
5	2	2			2	5				3			2	3											19
																								Total	100

Assessment Questions

Remember

1. How galvanic cell is differing from electrolytic cell?
2. How is the potential of an electrochemical cell calculated?
3. List any four characteristics of primary batteries.
4. Mention any two characteristics and applications of zinc-carbon battery.
5. Recognize any two applications and characteristics of primary magnesium batteries.
6. Identify the applications and characteristics of Zn/HgO primary batteries.
7. Indicate any two applications of Zn/alkaline/MnO_2 battery.
8. Mentioned any two applications of Zn/Ag_2O primary battery.
9. Define capacity of a cell
10. Define discharge rate of a battery.
11. Describe the construction, cell reaction and applications of zinc-carbon battery.
12. Explain the construction, chemistry, advantages and uses of mercuric oxide battery.
13. Explain the major components and reaction of direct methanol fuel cell. List two applications.
14. Explain the working principle, components and applications of alkaline fuel cells
15. Discus the conversion of sunlight into electrical power in photoelectrochemical cells.

Understand

1. Mention the five different types of energy storage devices
2. Define the term battery
3. List any two differences between battery and cell.
4. Mention the three major components of cell.
5. Classify the batteries based on their cell reversibility.
6. Define cycle Life of a cell.
7. Explain the construction, cell reaction and applications of silver oxide batteries.
8. With a neat sketch explain the construction and working of phosphoric acid fuel cell.
9. Explain the major components and reactions of direct methanol fuel cell
10. Explain the production of hydrogen photobiochemical conversion cell.

Apply

1. Specific gravity is an indicator of charge in lead acid battery – Justify.
2. Illustrate the process of water electrolysis for the production of hydrogen.
3. How is the potential of an electrochemical cell calculated?
4. How is the potential of an electrochemical cell calculated?

Analyse

1. In the mid-winter car battery is not working –reason out.
2. Discuss the hydrogen energy strategies for sustainable development.
3. How galvanic cell is differing from electrolytic cell?
4. How batteries are rated?
5. Differentiate between primary and secondary batteries.

15GE0C3 POLYMER CHEMISTRY AND PROCESSING

3 0 0 3

Course Objectives

- Impart knowledge on the basic concepts of polymers and its mechanism.
- Use the appropriate polymerization techniques to synthesize the polymers and its processing.
- Select the suitable polymers for various applications.

Course Outcomes (COs)

1. Understand the basic concepts of polymer chemistry and mechanism of polymerization reactions.
2. Acquire knowledge of polymerization techniques.
3. Identify the structural, mechanical and electrical features of polymers.
4. Apply the polymer processing techniques to design polymer products.
5. Realize the applications of specialty polymers.

UNIT I **10 Hours**

POLYMERS AND ELASTOMERS

Classification of polymers - Mechanism: Addition polymerization - free radical polymerization - cationic, anionic and co-ordination (Ziegler-Natta) polymerization, copolymerization, condensation polymerization (nylon-6,6) ring opening polymerization (nylon-6). Elastomers: Natural rubber - vulcanization - synthetic rubber: styrene -butadiene rubber (SBR), butyl, neoprene, thiocol rubbers. High performance polymers: polyethers, polyether ether ketone(PEEK), polysulphones, polyimides.

UNIT II **8 Hours**

POLYMERIZATION TECHNIQUES

Homogeneous and heterogeneous polymerization - bulk polymerization (PMMA, PVC) solution polymerization - polyacrylic acid, suspension polymerization (ion-exchange resins) - emulsion polymerization (SBR) - advantages and disadvantages of bulk and emulsion polymerization. Melt solution and interfacial poly-condensation.

UNIT III **8 Hours**

CHARACTERIZATION AND TESTING

Characterization of polymers by Infrared Spectroscopy (IR) and Nuclear Magnetic Spectroscopy (NMR) - Thermal properties by TGA and DSC, Testing tensile strength, Izod impact, Compressive strength, Rockwell hardness, Vicot softening point. Test for electrical resistance, dielectric constant, dissipation factor, arc resistance and dielectric strength - water absorption.

UNIT IV **9 Hours**

POLYMER PROCESSING

Moulding: Compression - injection - extrusion and blow mouldings. Film casting - calendering. Thermoforming and vacuum formed polystyrene - foamed polyurethanes. Fibre spinning: melt, dry and wet spinning. Fibre reinforced plactics fabrication: hand-layup - filament winding and pultrusion.

UNIT V **10 Hours**

SPECIALITY POLYMERS

Preparation and properties of heat resistant and flame retardant polymers. Polymers for electronic applications: liquid crystalline, conducting and photosensitive polymers. Polymer for biomedical applications: artificial organs, controlled drug delivery, hemodialysis and hemofiltration.

FOR FURTHER READING

Biodegradable polymers

Total: 45 Hours

Reference(s)

1. V. R. Gowarikar, N. V. Viswanathan and Jayadev Sreedhar, Polymer Science, New Age International (P) Ltd., New Delhi, 2015.
2. Joel R. Fried, Polymer Science and Technology, Prentice Hall of India (P). Ltd., 2014
3. F. W. Billmeyer, Text Book of Polymer Science, John Wiley & Sons, New York, 2007
4. Barbara H. Stuart, Polymer Analysis, John Wiley & Sons, New York, 2008
5. George Odian , Principles of Polymerization, John Wiley & Sons, New York, 2004
6. R. J. Young and P. A. Lovell, Introduction to Polymers, CRC Press, New York, 2011

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	1	1	3		2	2	3		2	2	3		1	1	1										22
2	1	1	4		1	1	3		1	1	3		1	1											18
3	1	1	1		1	1			1	2	2			2			1	1	4						18
4	1				1	2	2		3	2	2		2	2	1								2		20
5	1	1	1		2	2	1		2	2	3		2	2	3										22
																								Total	100

Assessment Questions

Remember

1. Recall two factors that govern termination of cationic polymerization.
2. Identify the monomers used in styrene -butadiene rubber.
3. Give an examples for the thermosetting and thermoplastic polymers.
4. What is copolymerization? Give an example
5. Name two synthetic polymers which are used for making textile fibres.
6. Define the role of Ziegler – Natta catalysts
7. List the examples of Ziegler – Natta catalysts.
8. Identify the four types of polymerization technique.
9. List any two disadvantages of suspension polymerization.
10. Point out the advantages of bulk polymerization technique.
11. Why does natural rubber need compounding?
12. List any four applications of injection moulding process.
13. List the various additives in processing of plastics.
14. List the two properties of heat resistant polymers.
15. Mention the application of flame retardant polymers.

Understand

1. Classify the polymers based on source
2. Discuss the addition and chain growth polymerization with example
3. Compare addition and condensation polymerization reaction with example for each type.
4. Explain homogeneous and heterogeneous polymerization.
5. Explain the mechanism involved in addition polymerization of vinylChloride
6. Explain the condensation polymerization method taking nylon 6, 6, nylon synthesis as a representative example.
7. Discuss the preparation method and any three properties of Polysulphone.
8. Summaries the salient features, advantages and disadvantages of bulk and emulsion polymerization techniques.
9. Compare the homogeneous and heterogeneous polymerization method.
10. With a neat sketch, discuss the functioning of melt, dry and wet spinning process.
11. Illustrate the compression and extrusion moulding of plastics with diagram neat diagram.
12. Explain the coordination polymerization mechanism using a sutable example.

Apply

1. Relate the various steps involved in anionic and cationic polymerisation using suitable examples.
2. Select the suitable polymerization techniques for synthesis of PMMA and SBR
3. Assess the characterisation techniques used to find the structure of polymer.
4. Find the method to process the composite materials with example.
5. Execute the filament – winding Technique for manufacturing of rocket motor bodies.

Analyse

1. Distinguish between addition and condensation polymerisation.

2. Natural rubber need vulcanization –Justify.
3. Compare the salient features, advantages and disadvantages of solution and suspension polymerization techniques.
4. Bring out the differences between thermoforming and vacuum-forming process.
5. Outline the applications of polymer in controlled drug delivery and artificial organs.

Evaluate

1. Judge the biomedical applications of polymers in Hemo dialysis and hemo filtration.
2. Choose the suitable moulding Technique for polyvinyl chloride.

OPEN ELECTIVES

15CS0YA E-LEARNING TECHNIQUES 3 0 0 3

Course Objectives

- Understand the technologies involved in e-learning.
- Gain the fundamentals of e-learning techniques.
- Determine the characteristics of Teaching-Learning Process.

Course Outcomes (COs)

1. Acquire knowledge about the basic concepts of e-learning.
2. Explain the the technology mediated communication in e-learning.
3. Exemplify the process of e-learning and content management.
4. Analyze the teaching and learning processes in e-learning environment.
5. Assess the development issues in e-learning

UNIT I **9 Hours**

INTRODUCTION

Evolution of Education - Generations of Distance Educational Technology - Role of E-Learning - Components of e-learning: CBT, WBT, Virtual Classroom - Barriers to e-Learning Roles and Responsibilities: Subject Matter Expert - Instructional Designer - Graphic Designer - Multimedia Author - Programmer - System Administrator - Web Master

UNIT II **9 Hours**

TECHNOLOGIES

Satellite Broadcasting - Interactive Television - Call Centers - Whiteboard Environment - Teleconferencing: Audio Conferencing - Video Conferencing -Computer Conferencing. Internet: E-mail, Instant Messaging, Chat, Discussion Forums, Bulletin Boards, Voice Mail, File Sharing, Streaming Audio and Video.

UNIT III **9 Hours**

MANAGEMENT

Content: E-Content, Dynamic Content, Trends - Technology: Authoring, Delivery, Collaboration - Services: Expert Service, Information Search Service, Knowledge Creation Service - Learning Objects and E-Learning Standards.Process of E-Learning: Knowledge acquisition and creation, Sharing of knowledge, Utilization of knowledge - Knowledge Management in E-Learning.

UNIT IV **9 Hours**

TEACHING-LEARNING PROCESS

Interactions: Teacher-Student - Student-Student - Student-Content - Teacher- Content - Teacher-Teacher - Content-Content Role of Teachers in E-Learning - Blended Learning -Cooperative Learning - Collaborative Learning - Multi Channel learning -Virtual University - Virtual Library.

UNIT V **9 Hours**

DEVELOPMENT ISSUES

Assessment in E-Learning - Quality in E-Learning - Tools for Development - Costs for Developing and Using E-Learning Environments - Challenges and Careers - Future of e-Learning

FOR FURTHER READING

Course delivery and evaluation: Components of an instructor led or facilitated course - Facilitating learners - activities - Using communication tools for e-learning - Course evaluation - Learning platforms - Proprietary vs. open-source LMS - Moodle and other open-source LMS solutions - Solutions for limited or no connectivity.

Total: 45 Hours

Reference(s)

1. E-Learning: An Expression of the Knowledge Economy, Gaurav Chadha, S.M. Nafay Kumail, Tata McGraw-Hill Publication, 2002.
2. E-Learning: New Trends and Innovations, P.P. Singh, Sandhir Sharma, Deep & Deep Publications, 2005.
3. Michael Allen's Guide to E-Learning, Michael W. Allen, Michael Allen, Wiley Publication, 2002.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	4	4			4	4																			16
2	2				2	4			2	3				2				2				2			19
3	2				2					6				2	3						2	4			21
4		2			2					6				2	4						2	4			22
5		2				2			2	4			2	4							2	4			22
																								Total	100

Assessment Questions

Remember

1. Define e-learning.
2. List the components of e-learning.
3. List the roles and responsibilities of e-learning.
4. List the three ways of Teleconferencing.
5. Define e-content.
6. List the Barriers to e-Learning.
7. List the merits of e-learning methods.

Understand

1. What is the role of e-learning?
2. What is satellite broadcasting?
3. What is blended learning?
4. Describe the Evolution of Education with an example.
5. Explain the Roles and Responsibilities in e-learning.
6. What is Satellite Broadcasting and how it is connected with e-learning.
7. Describe the current Trends and Technologies in e-learning.
8. Illustrate the E-Learning Process with an example.
9. How to improve the quality of e-learning?
10. Explain the challenges of e-learning.
11. Illustrate the learning environments of e-learning with an example.
12. What is open source LMS?
13. What is Proprietary LMS?

Apply

1. Apply the e-learning techniques to library management system.

2. Demonstrate the Assessment process in E-Learning with an example.
3. Demonstrate the role of teachers in E-Learning.

Analyse

1. Differentiate conventional learning method and e-learning method.
2. Analyze the e-learning process with an example.
3. Compare blended learning and Cooperative Learning.
4. Distinguish Collaborative Learning and Multi Channel learning.

Evaluate

1. Evaluate the Costs for Developing and Using E-Learning Environments.
2. Examine the Roles and Responsibilities for e-learning.

Create

1. Develop an application using e-learning technique that reflects a real world problem.

15CS0YB SOFTWARE TESTING AND QUALITY ASSURANCE 3 0 0 3

Course Objectives

- Understand the basic software testing principles.
- Understand the working principles of various testing methodologies.
- Understand the importance of quality assurance in software development process.

Course Outcomes (COs)

1. Determine the risk strategies in software testing.
2. Explain the organization and development of testing approach.
3. Exemplify the verification and validation process.
4. Differentiate pre operational and post operational testing.
5. Summarize the importance of quality assurance in software testing.

UNIT I **7 Hours**

INTRODUCTION

The cost of computer testing - Seven step software testing process - Organizing for testing - Developing Test plan - Profile the software project - Understand project risk - Select a testing technique - Unit testing and analysis - Build and Inspect Test Plan

UNIT II **11 Hours**

ORGANIZATION AND DEVELOPMENT OF TESTING APPROACH

The cost of computer testing - Seven step software testing process - Organizing for testing -Developing Test plan -Profile the software project - Understand project risk -Select a testing technique - Unit testing and analysis - Build and Inspect Test Plan

UNIT III **8 Hours**

VERIFICATION AND VALIDATION

Verification Testing: Test during requirements phase - Test during design phase -test during programming phase - Guidelines - Validation Testing: Build the test data - Execute tests - Record Test Results

UNIT IV **8 Hours**

IMPLEMENTATION

Acceptance and Operational Testing: Acceptance Testing - Pre-operational Testing - Post-Operational Testing -Develop and Test - Post Implementation Analysis - Workbenches - Procedures

UNIT V **11 Hours**

QUALITY ASSURANCE

Quality management - The role of SQA- SQA plan- SQA considerations- Establishing software standards - Basic inspection principles- Conduct of inspections- Establishing software quality program- Principles of software defect prevention- Process changes for defect prevention -Defect prevention considerations

FOR FURTHER READING

Installing Software Testing Tools- Software Development Methodologies- Testing Client/Server System - Testing COTS and Contracted Software- Configuration accounting and audit

Total: 45 Hours

Reference(s)

1. William E Perry, Effective Methods for Software Testing, John Wiley & Sons, USA, 3rd Edition 2014.
2. Watts S. Humphrey, Managing the software process, Addison Wesley, 2013.
3. Roger S Pressman, Software Engineering-A Practitioners Approach, Mc Graw Hill International, Singapore, 2010.
4. Nina S Godbole, Software Quality Assurance Principles and Practice, Narosa Publishing House Pvt. Ltd., 2010.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	4	4			4	4																			16
2	4				4	10				2															20
3	4				4	9				2				2											21
4		6			2	9				2				2											21
5		8				14																			22
																								Total	100

Assessment Questions

Remember

1. Define test factor.
2. List the four functional testing techniques.
3. Specify the causes of software defects.
4. Mention the use of risk matrix.
5. Mention the importance of requirements tracing.
6. What is desk debugging?
7. Recall the advantages of internal test team approach.
8. List the objectives of recovery testing.
9. State the rule for requirements walkthrough.
10. Define milestone and deliverables in software development.

Understand

1. Explain the steps in building a test plan with necessary examples.
2. Illustrate the process of inspecting the test plan using workbench.
3. Compare inspection and walkthrough.
4. Summarize the steps in organization of testing process with the help of workbench.
5. Identify the importance of test plan.
6. Classify the structural testing techniques in software testing.
7. Illustrate the post implementation analysis with suitable examples.
8. Compare pre and post operational testing.
9. Exemplify the principles of software defect prevention in quality assurance.
10. Illustrate the software configuaration management with necessary examples.

Apply

1. Show the process of inspecting the test plan using workbench.
2. How to compute the development and testing cost of a software?
3. Demonstrate the block box and white box testing.
4. Demonstrate the stress testing.
5. Construct a test plan for inventory control system.
6. Design test cases for library management system.
7. Show the process of generating test data for software testing.
8. Design a strategy for functional testing techniques.
9. How to predict the outcome of compliance testing?
10. Show the customization of software testing process with necessary examples.

Analyse

1. Differentiate milestones and deliverables.
2. Justify the need of test factors in software testing.
3. Differentiate inspection and walkthrough.
4. Differentiate verification and validation in terms of software debugging.
5. Compare and contrast structural testing with functional testing.
6. Justify the need of moderator in an inspection team.
7. Compare inspection with kick of meeting in terms of process analysis.
8. Differentiate requirements walthrough and design walkthrough.
9. Compare program phase testing with design phase testing in terms of debugging.
10. Justify the need of software configuaration management in software quality assurance.

15CS0YC SOFT COMPUTING 3 0 0 3

Course Objectives

- Study an overview of soft computing techniques.
- Understand the neural networks.
- Understand the applications of soft computing.

Course Outcomes (COs)

1. Demonstrate different types of artificial neural networks.
2. Explain the concept of fuzzy systems.
3. Summarize the various special networks.
4. Develop the solutions using genetic algorithms.
5. Develop application using soft computing tehniques.

UNIT I **10 Hours**

ARTIFICIAL NEURAL NETWORKS

Fundamental Concept - Basic Model of ANN - Terminologies of ANN - Supervised Learning Neural Networks: Perception Networks - Adaptive Linear Neuron - Multiple Adaptive Linear Neurons - Back Propagation Network - Unsupervised Learning Neural Networks: Kohenen self-organizing Feature Maps - Learning vector Quantization.

UNIT II **10 Hours**

FUZZY SYSTEMS

Classical sets - Fuzzy sets - Classical relation - Fuzzy relations - Defuzzification - Fuzzy rule base and approximate reasoning: Fuzzy reasoning - Fuzzy Inference Systems - Fuzzy decision making - Fuzzy logic control systems.

UNIT III **9 Hours**

SPECIAL NETWORKS

Counterpropagation Networks - Adaptive Resonance Theory Network - Simulated Annealing Network - Boltzmann Machine - Gaussian Machine - Cauchy Machine - Probabilistic Neural Net - Cascade Correlation Network.

UNIT IV **8 Hours**

GENETIC ALGORITHMS

Introduction - Basic operators and terminologies in GA - Traditional vs Genetic Algorithm - Simple GA - General Genetic Algorithm - Classification of Genetic Algorithm - Holland classifier systems - Genetic Programming.

UNIT V **8 Hours**

APPLICATIONS OF SOFT COMPUTING

Image Fusion - Neural network classification - Traveling salesman problem using Genetic algorithm - Genetic algorithm based Internet searching technique - Soft Computing Based Hybrid Fuzzy Controllers - Soft Computing Based Rocket Engine Control.

FOR FURTHER READING

Neural network implementation - Fuzzy logic implementation - Genetic algorithm implementation - MATLAB environment for Soft Computing Techniques.

Total: 45 Hours

Reference(s)

1. S.N.Sivanandam and S.N.Deepa, Principles of Soft Computing, Wiley India Ltd,2011
2. Timothy J.Ross, Fuzzy Logic with Engineering Applications, McGraw-Hill, 2000
3. Davis E.Goldberg, Genetic Algorithms: Search, Optimization and Machine Learning, Addison Wesley, N.Y., 2001
4. Jang.J.S.R.Sun.C.T.and Mizutami.E, Neuro fuzzy and Soft computing, Prentice Hall, New Jersey-2010

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	2			4	5				4												1			18
2	2				3	4				5				4				4							22
3	4	4			4	4				3															19
4		2			2					6				2	3			2							17
5		2			2	2				6				6				6							24
																								Total	100

Assessment Questions

Remember

1. Define Adaptive Linear Neuron.
2. State the Learning vector Quantization.
3. State the Defuzzification.
4. Recall Fuzzy reasoning.
5. Define Gaussian Machine.
6. List the Cascade Correlation Network.
7. Label the Holland classifier systems.
8. Recall the Basic operators in GA.
9. Retrieve the Traveling salesman problem using Genetic algorithm.
10. Define Image Fusion.

Understand

1. Classify the Terminologies of ANN.
2. Compare Adaptive Linear Neuron and Multiple Adaptive Linear Neurons.
3. Exemplify the Fuzzy logic control systems.
4. Explain Fuzzy decision making.
5. Summarize the Adaptive Resonance Theory Network.
6. Illustrate the Cascade Correlation Network.
7. Classify the Genetic Algorithm.
8. Compare Traditional vs Genetic Algorithm.
9. Explain Hybrid Fuzzy Controllers.
10. Exemplify Traveling salesman problem using Genetic algorithm.

Apply

1. Implement the basic model of ANN.
2. Show the advantages of Learning vector Quantization.
3. Demonstrate the Fuzzy Inference Systems.
4. Use of Fuzzy decision making Systems.
5. Find the Adaptive Resonance Theory Network.
6. Construct the Cauchy Machine.
7. Implement the Holland classifier systems using GA.
8. Design the Holland classifier systems with GA.
9. Implement the Traveling salesman problem using GA.
10. Show the issues of Image Fusion technique.
11. Organize the Fuzzy relations.

Analyse

1. Compare Supervised and Unsupervised Learning Neural Networks.
2. Outline the Kohenen self-organizing Feature Maps.
3. Conclude Fuzzy rule base reasoning.
4. Contrast the Simulated Annealing Network.

5. Differentiate conventional with Genetic Algorithm.
6. Outline of Genetic algorithm based Internet searching technique.
7. Evaluate the Traveling salesman problem using Genetic algorithm.

Evaluate

1. Determine the Holland classifier systems.

Create

1. Produce Counterpropagation Networks.
2. Generate the GA based algorithm to solve traveling salesman problem.

15CS0YD FREE OPEN SOURCE SOFTWARE 3 0 0 3

Course Objectives

- Understand the basics of open source software.
- Gain the knowledge of working with Linux platform and database.
- Familiar with different programming concepts in Linux.

Course Outcomes (COs)

1. Understand the fundamentals of Linux operating system.
2. Describe the working of PHP programming.
3. Elucidate the concepts of file handling and database programming in PHP.
4. Analyze the basic concepts in Python.
5. Explain the programming concepts of files and error handling using Python.

UNIT I **8 Hours**

INTRODUCTION

Introduction to open sources - Need - Advantages - Application of open sources - Open source operating systems: LINUX: Introduction - General overview - Kernel mode and user mode Process - Scheduling - Personalities Cloning Signals - Development with linux.

UNIT II **8 Hours**

PHP PROGRAMMING

Introduction - Variables types in PHP - Understanding data types - Loose typing - Testing variable - Changing variables data type - Type casting - Operators and expressions - Operator types - Operator precedence Constants - Decisions and loops - Strings- Arrays - Functions.

UNIT III **10 Hours**

FILE MANAGEMENT WITH PHP

Working with files and directories: Getting information on files - Opening and closing files - Reading and writing to files - Reading and writing strings of characters - Testing - Reading and writing entire files - Working with file permissions - Working with directories - Introduction to databases and SQL.

UNIT IV **9 Hours**

INTRODUCTION TO PYTHON

Exploring python Creating python programs Statements Building blocks Testing functions - Strings - Lists and tuples String functions - Sets - Dictionaries Combining dictionaries Making copies Zip list Loops Dynamic programming Persistent variables.

UNIT V **10 Hours**

PYTHON PROGRAMMING

Files Operating system commands Errors and exceptions - Input and output - Functions Modules Classes: Constructors Boundaries Object reference Inheritance - Types - Tests Variables Classes as dynamic records - Object oriented programming.

FOR FURTHER READING

Importance of communities in open source movement - JBoss community- Developing blog, group, forum, social network for social purpose.

Total: 45 Hours

Reference(s)

1. Remy Card, The Linux Kernel Book, Wiley Publications, 2012.
2. Timothy A Budd, Exploring Python, Tata McGrawHill, 2014.
3. Matt Doyle, Beginning PHP 5.3, Wiley Publishing, 2013.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2		4		2		4								2										14
2	2				3						4				4				4						17
3	2				2		3				2			4					4				4		21
4			3		2					6						4			6				4		25
5			3		2			4			4				4			2						4	23
																								Total	100

Assessment Questions

Remember

1. Define FOSS
2. What is a log file?
3. What is a make file?
4. What is PHP?
5. What is the purpose of php.ini file?
6. What is Python?
7. Name some of the features of Python.
8. List the supported data types in Python.

Understand

1. What are the common usages of PHP?
2. Explain the characteristics of PHP variables.
3. Explain the different types of PHP variables.
4. Write the rules for naming a PHP variable.
5. Explain the different types of errors in PHP.
6. Explain the purpose of output buffering in PHP.
7. What are the ways to write a function using call by reference?
8. Write the purpose of ** operator.
9. What are the commands that are used to copy an object in Python?
10. What is lambda in Python?

Apply

1. How to create a text file in php?
2. What will be the output of the following PHP code?

```
<?php
```

```
$op2 = "blabla";

function foo($op1)

{

echo $op1;

echo $op2;

}

foo("hello");

?>
```

Analyse

1. How will you define a constant in PHP?
2. How will you generate random numbers using PHP?
3. How will you get the browser's details using PHP?
4. How will you call member functions of a class in PHP?
5. Explain how to submit form without a submit button.
6. Explain how to execute a PHP script using command line.
7. Compare urlencode() and urldecode() used in PHP.
8. Compare include and require.
9. Compare tuples and lists in Python.
10. How will you convert a string to a set in python?
11. What is the output of L[1:] if L = [1,2,3]?
12. How will you reverse a list?
13. Compare deep and shallow copy.

Create

1. What is the output of print tuple if tuple = ('abcd', 786 , 2.23, 'john', 70.2)?
2. How will you create a dictionary in python?
3. Write a program to find out the name of an object in python.
4. Write a program to check whether the object is of a class or its subclass.
5. Write a Python program to Find Hash of File
6. Write a Python program to Find the Size (Resolution) of Image
7. Write a Python program to Merge Mails
8. Create a Python program to Count the Number of Each Vowel
9. Create a Python program to Illustrate Different Set Operations
10. Write a Python program to Check Armstrong Number
11. Write a Python program to Print the Fibonacci sequence

3 0 0 3

15CS0YE AGENT BASED INTELLIGENT SYSTEMS

Course Objectives

- Understand the problem solving intelligent agents and searching techniques.
- Represent domain knowledge in propositional and first-order logic.
- Formulate and solve optimization challenges as planning problems.

Course Outcomes (COs)

1. Explain the characteristics of AI.
2. Formulate and solve problems in the framework of constraint programming.
3. Represent domain knowledge in propositional and first-order logic.
4. Recognize the various classical planning approaches.
5. Use the different techniques for learning and reasoning under uncertainty

UNIT I **9 Hours**

INTRODUCTION

Intelligent Agents - Agents and environments - Good behavior - The nature of environments - Structure of agents - Problem Solving - Problem solving agents - Uniformed search strategies - heuristic function.

UNIT II **8 Hours**

SEARCHING TECHNIQUES

Local search algorithms and optimization problems - Local search in continuous spaces - Online search agents and unknown environments - optimal Decisions in games - Constraint satisfaction problems (CSP).

UNIT III **9 Hours**

KNOWLEDGE REPRESENTATION

First order logic : Representation revisited - Syntax and semantics for first order logic - Using first order logic - Knowledge engineering in first order logic - Inference in First order logic: Prepositional versus first order logic - Unification and lifting - Forward chaining - Backward chaining.

UNIT IV **10 Hours**

PLANNING

Classical planning: Definition of Classical Planning -Algorithms for Planning as State-Space Search - Planning Graphs- Other Classical Planning Approaches - Analysis of Planning Approaches - Time, Schedules, and Resources - Hierarchical Planning - Planning and Acting in Nondeterministic Domains - Multiagent Planning

UNIT V **9 Hours**

LEARNING

Learning from examples: Forms of learning - supervised learning - Learning decision trees - Ensemble learning - A Logical formulation of learning - Knowledge in learning - Explanation based learning - Learning using relevant information.

FOR FURTHER READING

Language Models - Text Classification - Information Retrieval - Information Extraction - speech recognition.

Total: 45 Hours

Reference(s)

1. Russell, Peter Norvig, Artificial Intelligence - A Modern Approach, 3rd Edition, Prentice Hall of India, 2010
2. Nils J. Nilsson, Artificial Intelligence: A new Synthesis, Harcourt Asia Pvt. Ltd., 2000
3. Elaine Rich and Kevin Knight, Artificial Intelligence, 3rd Edition, Tata McGraw-Hill, 2011
4. George F. Luger, Artificial Intelligence-Structures And Strategies For Complex Problem Solving, Pearson Education / PHI, 2002

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2					4					5							4				2			17
2	2					2				4					3			3				6			20
3		2				2					8							6				3			21
4		2					4				6				4			4				2			22
5	2						4			6								8							20
																								Total	100

Assessment Questions

Remember

1. State Artificial Intelligence.
2. Define intelligent agent.
3. List the 4 characteristics of agent environment.
4. Define heuristic search.
5. State reasoning under uncertainty.
6. List the 4 features of logic.
7. List the syntactic elements of first-Order logic.
8. Reproduce how the categories are useful in knowledge representation.
9. Recall the learning curve for the decision tree algorithm.
10. State the design issues that affect the learning element.

Understand

1. Classify the four basic types of agent program in any intelligent system.
2. Explain how a problem solving agent works with an example.
3. Summarize the steps involved in performing a state-space search.
4. Exemplify the Breadth First Search in intelligent system.
5. Illustrate the use of first-order logic to represent knowledge.
6. Explain the steps involved in the knowledge Engineering process.
7. Illustrate hierarchical Planning with an example
8. Classify the 4 classical Planning Approaches.
9. Represent the decision tree learning algorithm in intelligent system.
10. Classify the 2 types of learning.

Apply

1. Select suitable search algorithm to find the solution for state space in water jug problem.
2. Demonstrate the concept of planning with state space search with an example

3. Implement online search agent working using depth first exploration.
4. Demonstrate constraint satisfaction problem with an example
5. Show a simple mathematical model for a neuron

Analyse

1. Compare IDA* and A* algorithms in terms of time and space complexity.
2. Compare online and offline search.
3. Compare forward chaining and backward chaining in terms of first order logic.
4. Differentiate the two quantifiers in the logics
5. Outline the steps involved in information extraction

Evaluate

1. Check whether hill climbing guaranteed to give solution to 8 queen's problem.

Create

1. Consider the following classroom scheduling problem: There are 4 classes, C1, C2, C3, and C4, and 3 class rooms, R1, R2, and R3. The following table shows the class schedule: In addition, there are the following restrictions:
   • Each class must use one of the 3 rooms, R1, R2, R3.
   • R3 is too small for C3.
   • R2 and R3 are too small for C4.
   One way of formulating this problem as a constraint satisfaction problem is to let each class, C1, ..., C4, be a variable, and each room, R1, R2, R3, be the possible values for these variables.

Class	**Time**
C1	8.30 – 10.30
C2	9 – 11
C3	10 – 12.30
C4	11 – 1.30

   (a) Show the initial possible values for each variable, C1, ..., C4, given the restrictions above.
   (b) Express formally all the constraints in this problem.
   Consider each pair of variables appearing in the same constraint in (b), please point out which pairs are arc-consistent for the initial values provided in (a). For those pairs that are not arc - consistent, please provide the necessary operations so that they become arc-consistent.

15CS0YF NETWORK ENGINEERING AND MANAGEMENT

3 0 0 3

Course Objectives

- Understand the concepts of computer networks and to study the functions of different layers.
- Familiarized with different protocols and network components.
- Understand the implementation of network management protocol.

Course Outcomes (COs)

1. Explain the fundamentals of networking.
2. Explore the Data link Layer and Network layer.
3. Elucidate the High Performance Networks.
4. Exemplify the SNMP and Network Management.
5. Illustrate the RMON and Telecommunication Network Management.

UNIT I **9 Hours**

FOUNDATIONS OF NETWORKING

Data communication networks - Protocols and standards -OSI model - Layers in OSI -TCP/IP protocol suite - Error detection and correction: Introduction, Block coding, and Checksum - Flow control - Error control.

UNIT II **9 Hours**

DATA LINK LAYER AND NETWORK LAYER

SONET architecture -Layers - Frames - STS multiplexing -SONET networks - Frame relay-ATM-ATM LAN -Internetworking - IPv4 -IPv6- Transition from IPv4 to IPv6 -Address mapping - ICMP-ICMPv6 - Congestion control :open-loop and Closed-loop Condestion control.

UNIT III **9 Hours**

HIGH PERFORMANCE NETWORKS

Optical Networks: Optical links-WDM System-Optical cross connects-Optical LANs-Optical paths and networks-Switching: Switching performance measures-Modular switch design-packet Switching.

UNIT IV **9 Hours**

SNMP AND NETWORK MANAGEMENT

Network management standards - Network management models - Organization model-Information model - Communication model-Abstract syntax notation-Encoding structure-Internet organization and standards

UNIT V **9 Hours**

RMON AND TELECOMMUNICATION NETWORK MANAGEMENT

Remote monitoring - RMON SMI and MIB - RMON1 - RMON2-ATM Remote monitoring - TMN - TMN conceptual model-TMN architecture - TMN management service architecture - TMN integrated view

FOR FURTHER READING

Configuration management-Fault management-peformance management-Event Corelation Techniques security Management-Policy Based Management Service Level Management

Total: 45 Hours

Reference(s)

1. Behrouz A. Forouzan, "Data Communication and Networking", 4th Edition, Tata McGraw Hill, 2007.
2. Mani Subramanium , "Network Management Principles and practices",Pearson Education,2010
3. Jean Warland and Pravin Vareya, "High Performance Networks", Morgan Kauffman Publishers, 2002
4. Larry L. Peterson and Bruce S. Davie, "Computer Networks: A Systems Approach",Morgan Kaufman Publishers, 2007
5. William Stallings, "SNMP, SNMPv2, SNMPv3 and RMON1 and RMON2", Third Edition,Pearson Education,2002
6. Lakshmi G. Raman, " Fundamentals of Telecommunication Network Management ", Eastern Economy Edition IEEE Press, New Delhi, 1999

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2					2			2					2				2				2			12
2	2				2	4				6				2				2				2			20
3	2				2					6				2	4							6			22
4		2			2					6				2	4							6			22
5		2				2				6				6				2				6			24
																								Total	100

Assessment Questions

Remember

1. List the layers in OSI model.
2. Define flow control.
3. What is the use of Internetworking?
4. Define Congestion control.
5. Define RSVP.
6. What is the protocol used by MPLS?
7. What is SNMP community profile?
8. Define network management.
9. List the classification of TMN architecture.
10. Define remote monitoring.

Understand

1. Explain Transport Layer and Physical Layer.
2. Summarize about header, trailers and how do they get added and removed.
3. Explain about the responsibilities of data link layer.
4. Explain abot redundancy.
5. Explain the features of RSVP.
6. Compare VPN and MPLS.
7. Explain the network management functional model with a neat diagram.
8. Explain SNMP proxy server.
9. Exemplify TMN information architecture and its deployment.
10. Explain ATM LANE.

Apply

1. Implement three way handshaking mechanism in C-language.
2. What are header and trailers and how do they get added and removed?
3. Is IPv6 backward compatible with IPv4?
4. Find the different transition techniques for IPv6 transition.
5. Does MPLS support IPv6? How to filter MPLS labels?
6. Show the relationship between MPLS and the Interior Routing Protocol with a neat diagram?
7. Predict the applications of SNMP protocol.
8. Find the role of SNMP in ATM management.
9. Show the ATM digital exchange interface management with a neat diagram.
10. Discuss the role of ILMI in ATM management.

Analyse

1. Compare the major functions performed by the Presentation layer and Application layer of the ISO OSI model.
2. Breakdown the OSI layers by function.
3. Analyze that the Frame Relay link can be used to bridge internet traffic.
4. If MPLS get disable, will it harm my IGP or IPv4 traffic?

5. Differentiate service network from traditional network?
6. Is primitive operations are available in SNMP? Justify it.
7. Differentiate between network manager and network administrator. What are the top challenges in managing anetwork?
8. Justify the need for TMN.
9. Analyze RMON 1 groups and functions with diagram.

Evaluate

1. Data transfer is slow between the source and destination. The quality of service requested by the transport layer in the OSI reference model is not being maintained. To fix this issue, at which layer in OSI model should the troubleshooting process begin?
2. Judge which protocols are found in the network layer of the OSI reference model and are responsible for path determination and traffic switching.
3. A TCP connection has a congestion window of 4000 bytes. The maximum segment size used by the connection is 1000 bytes. What is the congestion window after it sends out 4 segments and receives acks for all of them if the connection is in congestion avoidance?
4. Check whether it possible to configure a Cisco router to act as a Frame Relay switch?
5. Consider the use of 10 K-bit size frames on a 10 Mbps satellite channel with 270 ms delay. What is the link utilization for stop-and-wait ARQ technique assuming P = 10-3?
6. Determine is the channel utilization for the go-back-N protocol with window size of 7?
7. Evaluate the important generic troubles in ATM NEs.
8. Explain how would you determine whether a device is acting as a host or a router using SNMP command
9. What are the enhancement made in SNMPV2?
10. Determine the extra capability does SDH have to help with communicating within the TMN?

Create

1. Create a neat diagram to explain the relationship of IEEE Project to the OSI model.
2. Create a model to learn different congestion avoidance techniques. Exploring the working of two TCP congestion avoidance methods.
3. Design TCP iterative Client and Server application to reverse the given input sentence.
4. Refer to the exhibit. An administrator pings the default gateway at 10.10.10.1 and sees the output as shown. At which OSI layer is the problem?
   C:\> ping 10.10.10.1
   Pinging 10.10.10.1 with 32 bytes of data:
   Request timed out.
   Request timed out.
   Request timed out.
   Request timed out.
   Ping statistics for 10.10.10.1:
   Packets: sent = 4, Received = 0, Lost =4 (100% loss).
5. Create a program for Implementing Client-Server Communication Using TCP.
6. Create a program by using JAVA for Simple Message Passing between two hosts.
7. Simulation of ARP/RARP using NS2.
8. Develop a client that contacts a given DNS server to resolve a given host name.
9. Create a C-Program to implementation Remote Procedure Call.
10. Design a RPC application to add and subtract a given pair of integers.

15CS0YG DIGITAL IMAGE PROCESSING 3 0 0 3

Course Objectives

- Understand the image fundamentals and mathematical transforms.
- Gain knowledge about the image enhancement techniques.
- Impart knowledge in image compression techniques.

Course Outcomes (COs)

1. Understand the fundamentals of image processing.
2. Specify the functions for image enhancement.
3. Identify the process of restoring images.
4. Explore the image segmentation techniques.
5. Implement the approaches to represent the image with descriptions.

UNIT I **8 Hours**

DIGITAL IMAGE FUNDAMENTALS

Introduction- origins- fundamental steps in digital image processing - components of an image processing - elements of visual perception - Image sensing and acquisition - image sampling and quantization - Relationships between pixels - mathematical tools in digital image processing

UNIT II **10 Hours**

IMAGE ENHANCEMENT

Intensity Transformation Functions - Histogram processing -- spatial filtering - Smoothing spatial filtering: linear and nonlinear filters - sharpening spatial filtering: Laplacian- Unsharp Masking

UNIT III **10 Hours**

IMAGE RESTORATION

Image Degradation/ Restoration Process - Noise Models - Mean filters - order statistic filters- adaptive filters - noise reduction by frequency domain filtering - Linear, position - Invariant degradations - Estimating degradation function - Inverse filtering - wiener filtering -Constrained least squares filtering - Geometric mean filter.

UNIT IV **8 Hours**

IMAGE SEGMENTATION

Fundamentals - Point Detection - Line Detection - Edge Detection - Thresholding - region Based segmentation: Region Growing - Region Splitting and Merging - Morphological watershed segmentation

UNIT V **9 Hours**

IMAGE REPRESENTATION AND DESCRIPTION

Boundary Following - chain codes - Polygonal Approximations using Minimum Perimeter Polygons - other Polygonal Approximation Approaches - Signatures - Boundary Segments - Skeletons - Boundary descriptors - Regional Descriptors - Principal components for Description - Relational Descriptors.

FOR FURTHER READING

Basics of Filtering in the Frequency Domain - Image Smoothing and Image Sharpening Using Frequency Domain Filters - Selective Filtering - Color Models - Color Transformations - Image Compression

Total: 45 Hours

Reference(s)

1. Rafael C Gonzalez, Richard E Woods, Digital Image Processing, 3rd Edition, Pearson Education, 2011
2. William K Pratt, Digital Image Processing, John Willey, 2007
3. Milan Sonka, Vaclav Hlavac, Roger Boyle, Image Processing Analysis and Machine Vision, Thompson Learning, 2008
4. S.Jayaraman, S.Esakkirajan and T.Veerakumar, Digital Image Processing, Tata McGraw Hill Education Private Limited, 2009
5. Bhabatosh Chanda, D. Dutta Majumder, Digital Image Processing and Analysis, Prentice Hall of India, 2011

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	6			2	6																			16
2	2				2	4				6				2				2				2			20
3	2				2					6				2			2	5				2			21
4		2			2					6				2	3			4				2			21
5		2				2				6				6				4				2			22
																								Total	100

Assessment Questions

Remember

1. Define Image.
2. List any four morphological operations.
3. List the four hardware oriented color models.
4. State the applications of color models.
5. List the elements of DIP system.
6. Define weber ratio.
7. State the types of derivative filters.
8. State one dimensional convolution theorem.
9. Define histogram.
10. Define high boost filtering.

Understand

1. Explain the categories of digital storage.
2. Identify the properties of two-dimensional Discrete Fourier Transform.
3. Explain the types of connectivity.
4. Explain separability property in two Dimensional Fourier transform.
5. Explain the categories of image enhancement.
6. Explain homogeneity property in Linear Operator.
7. Summarize the measures used in region descriptors.
8. Illustrate the Marr-Hildreth edge detector.
9. Explain region base image segmentation.
10. Explain use of edges to improve global thresholding.

Apply

1. Find the Histogram and Histogram equalization for a given image (4 x 4) – 4 bit per pixel is given by
   10 12 8 9
   10 12 12 14

12 13 10 9
14 12 10 12

2. Construct the relation for one dimensional discrete wavelet transform.
3. Construct the formula for correlation of 1D continuous function.
4. Construct the relation for one dimensional DCT.
5. Demonstrate image partitioning method of variable thresholding.
6. Demonstrate the procedure that group's pixels into a later regions based on region growing method.
7. Construct image segmentation is performed with morphological watershed.
8. Demonstrate constrained least square filtering for image restoration and derive its transfer function
9. Construct adaptive median filter for image restoration.
10. Demonstrate generalization of geometric mean filter.

Analyse

1. Differentiate photopic and scotopic vision.
2. Differentiate linear spatial filter and non-linear spatial filter.
3. Differentiate image enhancement and restoration.
4. Compare region splitting and merging.
5. Compare image degradation model and restoration process.

Evaluate

1. Determine the number of bits required to store a 256 X 256 image with 32 gray levels.
2. Determine whether the system described by the following input-output relation is linear or not. y (n1,n2)=nx(n1,n2)
3. Choose the optimum notch filtering to reduce local variance in a restored image.
4. Determine the constrained least square filtering method for image restoration and derive its transfer function.
5. Determine the image restoration by using mean filters.

Create

1. Derive an algorithm for noise reduction.
2. Derive an algorithm for line detection.

15CS0YH E-BUSINESS 3 0 0 3

Course Objectives

- Understand the concepts of E-Business.
- Impart knowledge about the approaches in internet business environment.
- Understand the role of internet marketing in an organization.

Course Outcomes (COs)

1. Understand the overall framework of E-Commerce.
2. Identify the role internet in modern business.
3. Analyze the security issues and consumer oriented e-commerce.
4. Explore the concepts of electronic payment system.
5. Distinguish the inter organizational and intra organizational e-commerce.

UNIT I **9 Hours**

INTRODUCTION TO ELECTRONIC COMMERCE

Electronic Commerce Framework - E-Commerce and Media Convergence-The Anatomy of E-Commerce Application- E-Commerce Consumer Applications- E-Commerce Organization Application- Market Forces Influencing the I-Way- Components of the I-Way-Network access equipment- The Last Mile, Global Information Distribution Networks, Public Policy Issues.

UNIT II **8 Hours**

NETWORK INFRASTRUCTURE

The Internet Terminology - Chronological History of the Internet - NSFNET architecture and components - National Research and Education network - Globalization of the Academic Internet - Telco cable Online Companies - National independent ISP- Regional Level ISP- Local Level ISP.

UNIT III **11 Hours**

NETWORK SECURITY AND CONSSUMER ORIENTED E-COMMERCE

Client Server Network Security- Emerging Client - Server security threads- Firewalls and Network Security- Data and Message Security- Encrypted Documents and Email- Architectural Framework of E-commerce- Security and the Web-Consumer- oriented Applications, Mercantile Process Model - Mercantile Models from the Consumer Perspective-Mercantile Models from the Merchants Perspective.

UNIT IV **7 Hours**

ELECTRONIC PAYMENT SYSTEM

Types of E-Payment System - Digital Token Based E-Payment System- Smart Cards based Electronic payment System- Credit Card based Electronic Payment System- Risk and Electronic payment system - Designing Electronic payment system.

UNIT V **10 Hours**

INTERORGANIZATIONAL AND INTRAORGANIZATIONAL E-COMMERCE

Electronic Data interchange-EDI applications in Business- EDI legal ,security and privacy issues-EDI and electronic commerce- Standardization and EDI- EDI software Implementation-value added networks-Internal Information Systems- Macroforces and Internal Commerce-Work- flow automation and coordination-customization and internal commerce- supply chain management.

FOR FURTHER READING

The corporate digital library-The new age of information based marketing- Advertising on the Internet-charting the on-line marketing process-Market research.

Total: 45 Hours

Reference(s)

1. Ravi Kalakota and Andrew B.Whinston, Frontiers of E-Commerce, Pearson Education Asia, 2009
2. Elias M. Awad, Electronic Commerce- From the Vision to Fulfillment, Prentice Hall of India, 2009
3. Kamesh K.Bajaj and Debjani Nag, E-Commerce the Cutting Edge of Business, Tata McGraw Hill, 2005

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	4				8								6											20
2	2					6									4				4						16
3		2									12								4				6		24
4		2					6				6				6										20
5	2						4			4				6					4						20
																								Total	100

Assessment Questions

Remember

1. List the two EDI standards used in E-Commerce.
2. List the two components of I-way.
3. Define E-Business.
4. Define internet service provider.
5. State the generic business strategies required for achieving profitable business components of I-way.
6. Label the reverse auction.
7. List the role of ISP in Internet.
8. State ACID test.
9. Recall the five components of an effective business model.
10. Define application service provider.
11. Define Search Engine Optimization.
12. Identify the unique features of E-business technology.

Understand

1. Identify the unique features of E-commerce technology.
2. Identify the limitations of E-commerce.
3. Exemplify the current and potential future impacts of E-commerce technology on industry.
4. Identify the various issues of E-commerce.
5. Explain the Customer Relationship Management and E-value.
6. Elucidate the design and implementation issues that should be addressed by a firewall design.
7. Exemplify the role of World Wide Web in Ecommerce application.
8. Explain the primary revenue modes used by E-commerce firms.
9. Classify the different type of information that can be shared through peer to peer sites.
10. Summarise the potential limitations of E-payment system.

Apply

1. With a suitable example, execute the RSA algorithm.
2. Demonstrate the value chain in E- Commerce with an example.
3. Show the key steps in planning an intranet.
4. Demonstrate the systematic approach for developing E-commerce website.
5. Implement the concept of 3DES algorithm
6. Demonstrate the structure and services of ISP with a neat diagram.
7. Implement the concept of DES algorithm.
8. Demonstrate the activities of Value chain with an example.
9. Show the security assessment life cycle.
10. Execute the concept of IDEA algorithm with a suitable example.
11. Compare Smart cards and Digi-cash.
12. Compare Maintenance and Enhancement phase.
13. Differentiate browser and Web server.

Analyse

1. Differentiate between internal and external value chains.
2. Differentiate e-wallet and money.
3. Compare disintermediation and reintermediation.
4. Differentiate credit cards and Debit cards.
5. Compare interorganizational and intraorganization EDI.
6. Differentiate Server PC and Client PC.
7. Differentiate Spamming and flaming.

Evaluate

1. Determine the unique feature of the IP address 00000111.
2. Evaluate the IP address 01101101.

Create

1. Conclude special precautions should be taken by a bank to ensure that a customer does not double spend the same electronic coins?

15CS0YI KNOWLEDGE DISCOVERY IN DATABASES 3 0 0 3

Course Objectives

- Introduce the basic concepts of data warehousing.
- Familiarize in the data mining functionalities.
- Assess the strengths and weaknesses of various data mining techniques.

Course Outcomes (COs)

1. Explain the data warehouse architecture.
2. Elucidate the business analysis process and OLAP.
3. Summarize the basics of data mining.
4. Identify the association rules using frequent itemset mining algorithms.
5. Describe the classification and clustering techniques.

UNIT I **9 Hours**

DATA WAREHOUSING

Data warehousing components-Building a data warehouse-Mapping the data warehouse to a multiprocessor architechture-DBMS Schemas for decision support-Data extraction, cleanup, and transformation tools-Metadata.

UNIT II **8 Hours**

BUSINESS ANALYSIS

Reporting and query tools,applications-tool categories-the need for applications-Online analytical processing(OLAP)-need-Multidimensional data model-OLAP guidelines-Multidimesional versus multirelational OLAP-Categories of tools-OLAP tools and the internet.

UNIT III **9 Hours**

INTRODUCTION TO DATA MINING

Introduction - The evolution of database system technology - Steps in knowledge discovery from database process - Architecture of a data mining systems - Data mining on different kinds of data - Different kinds of pattern -Technologies used - Applications - Major issues in data mining - Classification of data mining

systems Data mining task primitives - Integration of a data mining system with a database or data warehouse system

UNIT IV **9 Hours**

ASSOCIATION RULE MINING

Basic concepts - Frequent itemset mining methods - Apriori algorithm, a pattern growth approach, Vertical data format, Closed and max patterns - Pattern mining in multilevel and multidimensional space - Constraint based frequent pattern mining

UNIT V **10 Hours**

CLASSIFICATION AND CLUSTERING

General approach to classification - Decision tree induction - Bayes classification methods-Rule Based Classification- Metrics for evaluating classifier performance - Prediction - Cluster Analysis - Partitioning methods - Hierarchical methods

FOR FURTHER READING

Applications of data mining-Social impacts of data mining-Tools

Total: 45 Hours

Reference(s)

1. Jiawei Han, Micheline Kamber and Jian Pai , Data Mining: Concepts and Techniques, Morgan Kauffman, 2013
2. Alex Berson and Stephen J Smith, Data Warehousing, Data Mining, and OLAP, Mcgraw-Hill, 1997
3. David Hand, Heikki Manila, Padhraic Symth, Principles of Data Mining, MIT Press, 2001
4. Margaret H.Dunham, Data Mining: Introductory and Advanced Topics, Pearson Education 2003

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1		4				4							8												16
2		4	4			6							4		4										22
3			6			4	4			4	4														22
4						4				2			4		6										16
5		4				4	8							8											24
																								Total	100

Assessment Questions

Remember

1. Define data mining.
2. Define KDD.
3. Recall data warehouse.
4. Recognise DBMS.
5. Define a report.
6. List any three OLAP tools.
7. Define rule mining.
8. Define pattern mining.
9. Recall clustering.
10. Recall classification.

Understand

1. Illustrate the architecture of data mining with neat diagram.
2. Explain the knowledge discovery in databases with neat diagram.
3. Explain the three-tier architecture of data warehouse.
4. Exemplify the DBMS schemas for decision support.
5. Illustrate the architechture of OLAP.
6. Summarise the categories of OLAP tools.
7. Eemplify the apriori algorithm.
8. Explain constraint based frequent pattern mining.
9. Explain the cluster analysis concepts.
10. Explain the K-means algorithm.

Apply

1. Suppose that the data mining task is to cluster the following eight points into three clusters : A1(2,10), A2(2,5), A3(8,4), B1(5,8), B2(7,5), B3(6,4),C1(1,2), C2(4,9). The distance function is Manhattan distance. Suppose initially A1, B1 and C1 as the center of each cluster respectively. Use the k-means algorithm to show only
   The three cluster centers after the first round execution.
2. Suppose that the data mining task is to cluster the following eight points into three clusters : A1(2,10), A2(2,5), A3(8,4), B1(5,8), B2(7,5), B3(6,4),C1(1,2), C2(4,9). The distance function is Manhattan distance. Suppose initially A1, B1 and C1 as the center of each cluster respectively. Use the k-means algorithm to show only
   The three clusters after third iteration.
3. Find the frequent item sets without candidate generation using FP-growth.
4. Find the frequent item sets with candidate generation using FP-growth.
5. Demonstrate the different classes of schemas that are used for modeling data warehouses.
6. Construct a data arehouse to store the data of an engineering college.
7. Implement OLAP for a real time data.
8. Execute the OLAP tools.
9. Show the integration of a data mining system with a database or data warehouse system.
10. Assess the steps in KDD.

Analyse

1. Compare Data warehouse and Data mart.
2. Compare and contrast datawarehouse and database.
3. Differentiate Data warehouse and operational DBMS.
4. Compare OLAP and OLTP.
5. Organise the major ideas of naïve Bayesian classification.

15CS0YJ SOCIAL NETWORK ANALYSIS CONCEPTS 3 0 0 3

Course Objectives

- Gain knowledge about the current web development and emergence of social web.
- Study about the modelling, aggregating and knowledge representation of Semantic Web.
- Understand the extraction and mining tools for social networks.

Course Outcomes (COs)

1. Explicate the fundamentals of social networks.
2. Describe the concept of modeling and visualization in social networks.
3. Explain about the mining communities in social networks analysis.
4. Elucidate the human behavior prediction and privacy issues regarding social networks.
5. Differentiate text and opinion mining concepts.

UNIT I **9 Hours**

INTRODUCTION TO SOCIAL NETWORK ANALYSIS

Introduction to Web - Limitations of current Web -Development of Semantic Web - Emergence of the Social Web -Network analysis - Development of Social Network Analysis - Key concepts and measures in network analysis - Discussion networks - Blogs and online communities - Web-based networks.

UNIT II **9 Hours**

MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION

Ontology and their role in the Semantic Web - Ontology-based Knowledge Representation - Ontology languages for the Semantic Web - RDF and OWL - Modelling and aggregating social network data - Ontological representation of social individuals, Ontological representation of social relationships.

UNIT III **9 Hours**

MINING COMMUNITIES

Extracting evolution of Web Community from a Series of Web Archive - Detecting Communities in Social Networks - Definition of Community - Evaluating Communities - Methods for Community Detection & Mining - Applications of Community Mining Algorithms - Tools for Detecting Communities Social Network Infrastructures and Communities - Decentralized Online Social Networks.

UNIT IV **9 Hours**

PREDICTING HUMAN BEHAVIOR AND PRIVACY ISSUES

Understanding and Predicting Human Behaviour for Social Communities - User Data Management, Inference and Distribution - Enabling New Human Experiences - Reality Mining - Context-Awareness- Privacy in Online Social Networks - Trust in Online Environment - Trust Network Analysis - Trust Transitivity Analysis.

UNIT V **9 Hours**

TEXT AND OPINION MINING

Text Mining in Social Networks -Opinion extraction - Sentiment classification and clustering Temporal sentiment analysis - Irony detection in opinion mining- Wish analysis - Product review mining - Review Classification - Tracking sentiments towards topics over time.

FOR FURTHER READING

Graph Theory-Clustering-Node-Edge diagrams-Hybrid representations-Applications-Covert Networks-Community Welfare-Collaboration Networks-Co-citation networks

Total: 45 Hours

Reference(s)

1. Charu C. Aggarwal, Social Network Data Analytics, Springer; 2011.
2. Peter Mika, "Social Networks and the Semantic Web", Springer, 1st edition 2007
3. BorkoFurht, "Handbook of Social Network Technologies and Applications" Springer, 1st edition, 2010
4. Giles, Mark Smith, John Yen,"Advances in Social Network Mining and Analysis", Springer, 2010.
5. GuandongXu, Yanchun Zhang and Lin Li, "Web Mining and Social Networking Techniques and applications", Springer, 1st edition, 2011.
6. Ajith Abraham, Aboul Ella Hassanien, Vaclav Snasel, "Computational Social Network Analysis: Trends, Tools and Research Advances", Springer, 2009.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1		2	2			4	4						3	2											17
2		2	3			4	3							2	6										20
3		2				6	4							2	4										18
4		2	3			6	3			6				2	4										26
5		2				2	4			6				5											19
																								Total	100

Assessment Questions

Remember

1. List the limitations of current web.
2. Mention the ways to develop the semantic web.
3. List the tools for detecting communities' social network infrastruture.
4. Define decentralized online social network.
5. State the trust in online environment.
6. Define a graph theory.
7. List the applications of visualizations.
8. Write the matrix representation.
9. Define Network analysis.
10. Define user data managenment.

Understand

1. Describe the development of semantic web.
2. Illustrate electronic sources for network analysis.
3. Exemplify ontology and their role in the semantic web.
4. Explain ontology based knowledge representation.
5. Explain aggregating and reasoning with social and network data.
6. Explain extracting evolution of web community.
7. Summarize the methods available for community detection and data mining.
8. Describe visualizing social network with Matrix-Based Representation.
9. Illustrate Social Network Infrastructures and Communities.
10. Exemplify privacy in online social networks and trust in online social environment

Apply

1. Compute hybrid representation in visualizing social networks.
2. Compute the measures in network analysis.
3. Predict the applications of Community Mining Algorithms.
4. Use matrix based representation to visualize the social networks.
5. Compute trust derivation based on trust comparisons.
6. Construct trust models based on social logic.
7. Predict the tools for detecting communities.
8. Compute ontological representation of social individuals and social relationship.
9. Write the matrix representation for social based network.
10. Predict human behavior for social communities.

Analyse

1. Compare RDF and OWL.
2. Resolve prediction of human behaviour in social communities.
3. Criticise visualization of online social networks.
4. Determine relational characterization of dynamic social network.
5. Compare trust network analysis and trust transitivity analysis.
6. Distinguish Relational and Multi-Relational Characterization of Dynamic Social Network.

15CS0YK OPERATING SYSTEM CONCEPTS 3 0 0 3

Course Objectives

- Understand the structure and the various services provided by the operating systems.
- Gain knowledge about the concepts of process management and synchronization mechanisms.
- Acquire knowledge in CPU scheduling, deadlock handling, memory management and file system implementation.

Course Outcomes (COs)

1. Explain the operating system structures.
2. Implement process management techniques.
3. Illustrate the synchronization and deadlock handling mechanisms.
4. Apply the memory management techniques.
5. Explicate the storage management techniques.

UNIT I **9 Hours**

INTRODUCTION TO OPERATING SYSTEM STRUCTURE

Introduction - operating system structure - Operating System Operations- Process Management - Memory Management - Storage Management- I/O systems-Protection and Security- Operating System Services- System Calls - Types of System Calls- System Programs

UNIT II **9 Hours**

PROCESS MANAGEMENT

Processes - Process Concept - Process Scheduling- Operations on Processes- Interprocess Communication. Threads: Overview- Multithreading Models- Threading Issues. CPU Scheduling - Basic Concepts- Scheduling Criteria- Scheduling Algorithms

UNIT III **10 Hours**

PROCESS SYNCHRONIZATION AND DEADLOCK

Introduction - The Critical-Section Problem - Synchronization Hardware - Semaphores - Deadlocks: System Model - Deadlock Characterization - Methods for Handling Deadlock - Deadlock Prevention - Deadlock Avoidance - Deadlock Detection - Recovery from Deadlock.

UNIT IV **8 Hours**

MEMORY MANAGEMENT

Main Memory: Background- Swapping- Contiguous Memory Allocation- Segmentation- Paging- Structure of the Page Table. Virtual Memory: Background- Demand Paging- Copy-on-Write- Page Replacement- Allocation of Frames- Thrashing.

UNIT V **9 Hours**

STORAGE MANAGEMENT

Overview of Mass-Storage Structure-Disk Structure- Disk Attachment-Disk Scheduling-Disk Management-Swap-Space Management. File -System Interface: File Concept-Access Methods-Directory and Disk Structure- Protection. File System Implementation: File-System Structure-File-System Implementation-Directory Implementation-Allocation Methods-Free-Space Management

FOR FURTHER READING

Case Studies: The Linux System, Windows 7, Influential Operating Systems

Total: 45 Hours

Reference(s)

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne,"Operating System Principles", John Wiley & Sons (Asia) Pvt. Ltd,9th Edition, 2013.
2. William Stallings, "Operating System", Pearson Education, 6th Edition, 2012.
3. Harvey M. Deitel, "Operating Systems", Pearson Education Pvt. Ltd, 3rd Edition, 2003.
4. Andrew S. Tanenbaum, "Modern Operating Systems", Third Edition Prentice Hall of India Pvt. Ltd, 2010

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	4	2			2	6																			14
2	3				3	6								2					6						20
3	3				2	9									12										26
4	3				3					6				2					6						20
5	4				2	6							2						6						20
																				Total					100

Assessment Questions

Remember

1. Define an operating system.
2. List the five services provided by an operating system.
3. Define process control block.
4. List the five criteria for CPU scheduling algorithms.
5. Define busy waiting.

6. State the four necessary conditions for deadlock occurrence.
7. Define thrashing.
8. List the twelve operations to be occurred during a page fault.
9. List the three types of file access methods.
10. Define seek time in disk scheduling.

Understand

1. Classify the system calls.
2. Explain the five major categories of system calls.
3. Compare program and process.
4. Explain the interprocess communication methods provided by an operating system.
5. Illustrate the solution for critical section problem using a semaphore.
6. Explain the two techniques used for dedlock recovery.
7. Illustrate the three types of memory allocation methods with an example.
8. Explain the address translation process involved in paging.
9. Summarise the five types of disk scheduling algorithms.
10. Explain the free space management techniques.

Apply

1. Show the implementation of virtual machines in Java.
2. Demonsatrate the execution of FCFS and Round Robin CPU scheduling algorithms with examples.
3. Show the execution of priority scheduling algorithm with an example.
4. Assess the performance of SRT and SJF CPU scheduling algorithms with an example.
5. Implement a solution for critical section problem using TestAndSet instruction.
6. Show the execution of five types of Disk scheduling algorithms with examples.
7. Consider a system consisting of four resources of the same type that are shared by three processes, each of which needs at most two resources. Show that the system is deadlock-free.
8. Demonstrate the Banker's algorithm for deadlock avoidance with an example.
9. Demonstrate the FIFO and LRU page replacement algorithms with examples.
10. Given five memory partitions of 100kB, 500kB, 200kB, 300kB, and 600kB (in order), how would each of the first-fit, best-fit and worst-fit algorithms place processes of 212kB, 417kB, 112kB, and 426kB (in order)? Find the algorithm which makes the most efficient use of the memory.

Analyse

1. Compare system calls and system programs.
2. Differentiate user threads and kernel threads.
3. Differentiate internal fragmentation and external fragmentation.
4. Compare preemptive and non-preemptive scheduling algorithms.
5. Just-in-time compiler is useful for executing java programs. Justify.
6. Page sizes always powers of 2.Justify.

Evaluate

1. Consider a logical address space of eight pages of 1024 words each, mapped onto a physical memory of 32 frames.
   How many bits are in the logical address and physical address?
2. Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order, is 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130 Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests, for FCFS, SSTF and SCAN disk scheduling algorithms?

15CS0YL OBJECT ORIENTED PROGRAMMING 3 0 0 3

Course Objectives

- Understand the concepts of Object Oriented Programming.
- Study the concepts of objects and classes.
- Familiarize in the types of constructors.

Course Outcomes (COs)

1. Explain the characteristics and data types of C++ language.
2. Develop a program using objects and classes.
3. Implement programs using operator overloading and inheritance.
4. Execute the concepts of polymorphism and File streams.
5. Implement the concepts of Exception handling to real world problems.

UNIT I **9 Hours**

INTRODUCTION

Need for object oriented programming - Procedural Languages vs. Object oriented approach - Characteristics Object oriented programming - C++ Programming Basics: Basic Program Construction - Output Using cout - Input with cin - Data types - Variables and Constants - Operators - Control Statements-Manipulators - Type conversion.

UNIT II **8 Hours**

OBJECTS AND CLASSES

Objects and Classes Simple Class - C++ Objects as Physical Objects - C++ Object as Data types- Constructors and Destructors- Object as Function Arguments - Returning Objects from Functions - Structures and Classes - Arrays and Strings

UNIT III **10 Hours**

OPERATOR OVERLOADING AND INHERITANCE

Operator overloading and Inheritance Need of operator overloading- Overloading Unary Operators- Overloading binary Operators - Overloading Special Operators - Data Conversion Inheritance: Derived Class and Base Class - Derived Class Constructors-Overriding Member Functions-Class Hierarchies-Public and Private Inheritance-Levels of Inheritance-Multiple Inheritance.

UNIT IV **10 Hours**

POLYMORPHISM AND FILE STREAMS

Polymorphism and File Streams Virtual Function - Friend Function - Static Function-Assignment and Copy Initialization- Memory Management: new and delete Pointers to Objects, this Pointer- Streams - String I/O - Character I/O - Object I/O - I/O with Multiple Objects - File Pointers - Disk I/O with Member Functions- Error Handling in File I/O.

UNIT V **8 Hours**

TEMPLATES AND EXCEPTION HANDLING

Templates: Introduction - Function Templates - Overloading Function Templates - Class Templates - Exception Handling - Syntax, multiple exceptions, exceptions with arguments

FOR FURTHER READING

Standard Template Library (STL) - iterators, iterator adapters, containers, allocators, container adapters, function adapters

Total: 45 Hours

Reference(s)

1. Deitel & Deitel, C++ How to program, Prentice Hall,2005
2. Robert Lafore, Object Oriented Programming in-C++, Galgotia Publication.
3. D.S.Malik, C++ Programming, Thomson, 2007
4. K.R. Venugopal, Rajkumar and T.Ravishankar, Mastering C++, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2006.
5. E.Balagurusamy, Object Oriented Programming with C++, Tata McGraw Hill Publishing,New Delhi, 2011

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	4	4			4	4																			16
2	2				2	4				6				2				2				2			20
3	2				2					6				2	3							6			21
4		2			2	2				6				2	3							6			23
5		2								6				6								6			20
																								Total	100

Assessment Questions

Remember

1. Define object.
2. Define Encapsulation.
3. State the features of object-oriented programming.
4. Define Algorithm.
5. Define Recursion.
6. Identify the binary operators.
7. State class members.
8. List out the categories of static data members.
9. Write the syntax to define and declare the constructor.
10. Define abstract class.
11. Define parameterized constructors.
12. Write the syntax to delete a data object.
13. Define abstract class.
14. List the kinds of exceptions.
15. Define operator overloading.
16. Define virtual function.

Understand

1. Identify the errors while dealing with files.
2. Explain dynamic initialization of variables.
3. List 4 the objects used as functional argument.
4. Define function overloading.
5. Identify the usage of bool data type.

6. Identify the usage of this pointer.
7. Explain the functions of constructor overloading.
8. Exemplify the way how objects are initialized dynamically.
9. Differentiate the behavior of the static data members of a class template differ from the behavior of static data members of a normal class.
10. List 4 rules for Virtual Functions.
11. Identify create manipulators.

Apply

1. Analyse the message passing in C++.
2. Explain the method to represent the pointer.
3. Find the method how C++ does apply the operators in the arithmetic expression.
4. Show an example for class declaration.
5. Explain the format for calling a member function
6. Explain the concept how member functions applied.
7. Predict a method to declare a constructor.
8. Select a method to create an array using new operator.
9. Predict a class specifier that creates a class called leverage with one private data member Crowbar, of type int and one public function whose declaration is void proxy().
10. Show the parameter that is added to every non-static member function when it is called.
11. Explain a method to implement the runtime polymorphism using c++.
12. Demonstrate how a static data is accessed by a static member function.
13. Define a supplier class. Assume that the items supplied by any given supplier are different and varying in number. Use dynamic memory allocation in the constructor function to achieve the solution.
14. Implement selection sort as a generic function.
15. Justify Data items in a class must be private.
16. Define an examiner class. Provide all necessary data and function members to provide the following: The examiner must access answer sheets of at least one subject; He may examine answer sheets of multiple subjects; The examiner represents a college and also a university; Most of the examiners are local and represent local university; and have more than one constructor including one default and one with default argument. Provide a meaningful copy constructor
17. For a supermarket, define a bill class. All the bill objects will contain bill number, name of clerk preparing the bill, each item with quantity and price and total amount to be paid. Total items in the bill are varying. Define dynamic memory allocation constructor for bill class such that any number of items from 1 to 50 can be accommodated in a single bill. There is an array describing each item with a price. The price is to be picked up from that array. Now overload = operator and provide reason for the need of such operator.

Create

1. Design library management system by using the concepts of object oriented programming.
2. Create a package for Student Information System.

15CS0YM JAVA FUNDAMENTALS 3 0 0 3

Course Objectives

- Impart the fundamental concepts of core JAVA.
- Gain programming knowledge in core JAVA.
- Acquire knowledge to build GUI applications.

Course Outcomes (COs)

1. Identify the core concepts of Java.
2. Implement programs using inheritance, packages and exception handling.
3. Explore the basic Java I/O concepts.
4. Explain the string handling functions in Java.
5. Implement Java classes to build GUI's.

UNIT I **9 Hours**

BASICS OF JAVA

The Genesis of Java - Overview of Java - Data Types, Variables, and Arrays - Operators - Control Statements - Introducing Classes - Methods and Classes.

UNIT II **9 Hours**

INHERITANCE, PACKAGES AND EXCEPTIONS

Inheritance: Basics - Using Super - Creating a Multilevel Hierarchy - Method overriding - Using Abstract Classes - Packages and Interfaces: Packages - Access Protection - Importing Packages- Interfaces Definitions and Implementations - Exception Handling: Types - Try and Catch - Throw.

UNIT III **9 Hours**

EXPLORING JAVA I/O

I/O Basics - Reading Console Input -Writing Console output - Native Methods - I/ O Classes and Interfaces - File - The Byte Streams - The Character Streams - Using Stream I/ O - Serialization.

UNIT IV **9 Hours**

JAVA STRINGS

String Handling: Special String operations and Methods - String Buffer - Exploring java.lang: Simple type Wrappers - System - Math - Collections Framework: Collections Interfaces and Classes - Utility Classes: String Tokenizer - Date and Time.

UNIT V **9 Hours**

GUI WITH JAVA

Applet Basics - Applet Architecture - Applet Display Methods - Parameter Passing - Event Handling Mechanisms - Event Classes - Event Listener - Working with Windows , Graphics , Colors and Fonts - AWT Controls - Layout Managers and Menus - JDBC Concepts.

FOR FURTHER READING

Developing GUI applications using Swing controls - Container concepts - DAO and JDBC support.

Total: 45 Hours

Reference(s)

1. Herbert Schildt, Java 2-Complete Reference, Tata Mc Graw Hill, 2015.
2. Deitel & Deitel, Java How to Program, Prentice Hall of India, 2010.
3. Gary Cornell and Cay S.Horstmann, Core Java Vol.1 and Vol.2, Sun Microsystems Press, 2008.

Assessment Pattern

Unit/RBT	Remember				Understand				Apply				Analyse				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
1	2	6			2	6																			16
2	2				2	4			8					2				2				6			26
3	2					4			4					2	4							6			22
4		2			2				6					2	2										14
5		2				2			6					6								6			22
																								Total	100

Assessment Questions

Remember

1. Recall JDK.
2. Define bytecode.
3. Define JVM.
4. List any three native methods of Java.
5. Define a default constructor.
6. Define wrapper classes.
7. State class path variable.
8. List any five built-in exceptions.
9. Defin a string.
10. Define JDBC.

Understand

1. Exemplify the use of classes and methods in Java.
2. Explain the control structures in Java with an example program.
3. Illustrate the concept of packages in Java.
4. Summarize the concept of exception handling in Java.
5. Indicate how to read and write console input and output.
6. Identify the use of character streams in Java.
7. Compare = and == in java string.
8. Summarize the Collections in Java.
9. Explain the architechture of an Applet.
10. Summarise the concept of JDBC with an example program.

Apply

1. Implement a Java program with constructor and destructor.
2. Implement a Java program to read characters at the command line.
3. Implement a Java program to create a package.
4. Implement a Java program to display the acess control.
5. Implement a Java program to create an applet.
6. Execute a Java program to handle array index out of bounds exception.
7. Execute a java program to copy the contents from one file to the other.
8. Execute a java program to display date and time.
9. Execute a java program to handle mouse events.

Analyse

1. Differentiate method overloading and method overriding.
2. Compare while and do while loop.
3. Differentiate character stream and byte stream.
4. Compare string and string buffer.
5. Organize the various AWT controls.
6. Execute a Java program to check whether a number is binary or not.

Evaluate

1. Determine the volume of the cube using parameterised constructor and *this* operator.
2. Choose a package for implementing employee salary details.
3. Dtermine the I/O classes and interfaces in java.
4. Determine whether a string is a palindrome or not using string handling functions in java.
5. Determine the use of event classes.

Create

1. Generate a Java program to print the following
   0 1
   0 2 4
   0 3 6 9
   0 4 8 12 16
   0 5 10 15 20 25
   0 6 12 18 24 30 36
   0 7 14 21 28 35 42 49
   0 8 16 24 32 40 48 56 64
   0 9 18 27 36 45 54 63 72 81
2. Generate a Java program to sort objects using constructor.

ONE CREDIT COURSES

15CS0XA 3D ANIMATIONS - - - 1

Course Objectives

- Demonstrate the basic and fundamental concepts in 3D animation.
- Understand the texture operations in 3D objects.
- Learn the basics of Modeling with 3D animation.

Course Outcomes (COs)

1. Explain the basic concepts of 3D animation.
2. Explore the visual effects, lights and rendering of 3D objects.
3. Illustrate modelling with 3D.

UNIT I **15 Hours**

3D ANIMATION

3D Animation Overview - 3D Animation Preproduction - Postproduction - Understanding digital imaging - digital video - Exploring animation, story and pre -visualization - Understanding modeling and Texturing - Rigging and Animation - Understanding visual effects, lights and rendering - Modeling with 3D- Lights - camera and materials - 3D Motion Graphics - FX Rendering and V-Ray - Digital FX - 3D Animation - Architectural Visualization Portfolio - Stop Motion Pro - 3Ds Max 2010 - Adobe After Effects CS4 Professional - texture operations in 3D - Pre-production.

Total: 15 Hours

Reference(s)

1. Andy Beane, 3D Animation Essentials, John Wiley & Sons, 2012.

15CS0XB QUANTUM COMPUTING - - - 1

Course Objectives

- Understand the building blocks of a quantum computer.
- Understand the principles, quantum information and limitation of quantum operations formalizing.
- Gain knowledge about the quantum error and its correction.

Course Outcomes (COs)

1. Explain the basic concepts of quantum computing.
2. Explore the quantum computing algorithms an operations.
3. Describe the various types of quantum computers.

UNIT I **15 Hours**

QUANTUM COMPUTING

Fundamental Concepts: Global Perspectives, Quantum Bits, Quantum Computation, Quantum Algorithms, Quantum Information, Postulates of Quantum Mechanisms. Quantum Computation: Quantum Circuits - Quantum algorithms, Single Orbit operations, Control

Operations, Measurement, Universal Quantum Gates, Simulation of Quantum Systems, and Quantum Fourier transform, Phase estimation, Applications, Quantum search algorithms - Quantum counting- Speeding up the solution of NP complete problems - Quantum Search for an unstructured database. Quantum Computers: Guiding Principles, Conditions for Quantum Computation, Harmonic Oscillator Quantum Computer, Optical Photon Quantum Computer Optical cavity Quantum electrodynamics, Ion traps, Nuclear Magnetic resonance.

Total: 15 Hours

Reference(s)

1. Micheal A. Nielsen. & Issac L. Chuang - Quantum Computation and Quantum Information, Cambridge University Press,2011

15CS0XC AGILE PROGRAMMING

- - - 1

Course Objectives

- Understand the internal of the agile programming.
- Understand the implementation of agile project development.

Course Outcomes (COs)

1. Explore the basic concepts of agile programming.
2. Illustrate the methodology used in extreme programming.
3. Describe the unified process.

UNIT I **15 Hours**

ITERATIVE AND EVOLUTIONARY

Iterative and Evolutionary: Definition - comparison - major activities. Agile: Basic concepts - Major activities - available agile methods.

Motivation: Change on software projects - key motivation-requirement challenge -problems of water fall. Evidence: Research and early historical standard and though leader-business case -water fall validity.

Serum: Concepts, Method overview, Lifecycle, Work products, Roles and Practices, Values, Common mistakes and misunderstandings, Process Mixtures, Adaption Strategies, Fact versus Fantasy, Strength Versus Other, Sample Projects
Extreme Programming: Concepts, Method overview, Lifecycle, Work products, Roles and Practices, Values, Common Mistakes and Misunderstandings, Sample Projects

Unified Process: Concepts, Method overview, Lifecycle, Work products, Roles and Practices, Values, Common mistakes and misunderstandings, , Process Mixtures, Adaption Strategies, Fact versus Fantasy, Strength Versus Other, Sample Projects.

Practice Tips: Project - management - environment - requirements - tests - Frequently raised questions and answers.

Total: 15 Hours

Reference(s)

1. Craig Lannan, "Agile and Iterative Development A Manger's Guide" Pearson Education, 1st Edition, India, 2004.
2. I.Shore, "Art of Agile Development", Shroff Publishers & Distributors, 2007

15CS0XD MOBILE OPERATING SYSTEMS - - - 1

Course Objectives

- Acquire knowledge about mobile operating systems.
- Understand the architectures of emerging mobile OS.
- Develop applications using mobile OS.

Course Outcomes (COs)

1. Explore the architecture and features of Andriod OS.
2. Illustrate the features of MeeGO OS.
3. Explicate the features of Symbian OS.

UNIT I **15 Hours**

INTRODUCTION TO ANDROID:

Android - Features - Architechture - Applications - Application framework - Libraries - Application fundamentals - Application components - The Manifest file - Application resources.
MeeGo: Introduction to the MeeGo project - MeeGo architechture - MeeGo notebook UX - Benefits of the MeeGo software platform - MeeGo applications.
Symbian: Introduction to symbian OS - versions of symbian - user interfaces - Features - Architecture - Application development.

Total: 15 Hours

Reference(s)

1. http://developer.android.com/guide/topics/fundamentals.html
2. http://wiki.meego.com/images/MeeGo_Introduction.pdf
3. http://www.symbioosi.net/English/symbian_os_en.html
4. http://en.wikipedia.org/wiki/Symbian

15CS0XE GREEN COMPUTING - - - 1

Course Objectives

- Gain knowledge to minimize energy consumption.
- Impart knowledge of purchasing green energy and using green suppliers.
- Understand the concept of reducing paper and other consumables usage.

Course Outcomes (COs)

1. Summarize the reasons for going to green computing.
2. Explain the consumption issues in green computing.

UNIT I **15 Hours**

TRENDS AND REASONS TO GO GREEN

Trends and reasons to go green: Overviews and issues-Current initiatives and standards - Organization planning for green computing-Policies-metrics-The acorns diagram
Consumption Issues: Minimizing power usage-Cooling-Going paperless-recycling-Hardware

consideration
The Greening Process: Datacenter design and Redesign-Virtualization-server virtualization-server virtualization solutions - Implementation-Storage virtualization - Virtualization types-Storage virtualization solutions-server savings-storage savings.

Total: 15 Hours

Reference(s)

1. Toby J.Velte, Anthony T.Velte,Robert ElsenPeter, Green IT, McGrawHill, 2008
2. John Lamp, The Greening IT, IBM Press, 2005.
3. Lawrence Webber, Michael Wallace, GreenTech, AMACOM publication, USA, 2009.

15CS0XF INTERNET MARKETING - - - 1

Course Objectives

- Understand the E- Marketing context.
- Gain knowledge about the marketing strategies of segmenting, targeting, positioning, and differentiation.
- Evaluate several customer relationship management (CRM) strategies using internet technology.

Course Outcomes (COs)

1. Explain the theories involved in e-marketing.
2. Implement an e-commerce website for a company.

UNIT I **15 Hours**

INTERNET MARKETING

Theories of E-Marketing - Introduction to E-Marketing - E-Marketing Plan - Strategic E-Marketing and Performance Metrics - The E-Marketing Plan - Internet Marketing Overview - Website Planning & Development - Let Companies Search you on Google for Jobs - Internet Marketing Strategy and Planning - Search Engine Optimization - Social Media Marketing - Make E-Commerce website in 20 Minutes - Introduction- ATM - Selling Products Through Online Modes - Making Money via Adsense and Blogging - Explore your Talent to earn money through Internet - Affiliate Marketing- Making Tons of Money Part Time - Making Money as a FreeLancer.

Total: 15 Hours

Reference(s)

1. Mary lou Roberts, Debra Zahay Internet Marketing: Integrating Online and Offline Strategies, Tata McGraw Hill, 2012

15CS0XG GRAPHICAL PROCESSING UNIT PROGRAMMING

- - - 1

Course Objectives

- Understand the basic of GPU Programming.
- Gain knowledge about the advanced GPU programming model and techniques.

Course Outcomes (COs)

1. Elucidate the architecture of GPU programming.
2. Explore the openCL programming model.

UNIT I **15 Hours**

GPU PROGRAMMING

Architecture of a GPU - Single Instruction Multiple Data execution model - Scalar and vector instruction - Thread divergence - Nested control flow - Introduction to OpenCL - GPU computing - The OpenCL programming model - Host program and device kernel - OpenCL objects - Basic program: vector addition - Algorithms in OpenCL - Square matrix transpose and multiplication - Work-groups - OpenCL synchronization model - OpenCL memory model- Matrix multiplication with local memory- Parallel reduction algorithms - Sorting algorithms - Memory hierarchies and coherence protocols on APUs - Interconnection networks on GPUs - Rendering graphics using OpenGL - The GPU graphics pipelines - Simulation of new GPU architectures.

Total: 15 Hours

Reference(s)

1. Andrew Sheppard, Programming GPUs, O'Reilly Media, Incorporated, 2012.

15CS0XH NOSQL

- - - 1

Course Objectives

- Understand NoSQL big data management.
- Understand the basics of Hadoop.
- Install, configure, and run Hadoop and HDFS.

Course Outcomes (COs)

1. Explain the basic concepts of NoSQL.
2. Explore the working of HDFS.

UNIT I **15 Hours**

NOSQL DATA MANAGEMENT

Introduction to NoSQL - aggregate data models - aggregates - key-value and document data models - relationships - graph databases - schemaless databases - materialized views - distribution models - sharding - master-slave replication - peer-peer replication -sharding and replication --consistency - relaxing consistency - version stamps - map-reduce -partitioning and combining -composing map-reduce calculations

BASICS OF HADOOP Data format - analyzing data with Hadoop - scaling out -Hadoop streaming -

Hadoop pipes - design of Hadoop distributed file system (HDFS) - HDFS concepts -Java interface -data flow - Hadoop I/O - data integrity - compression -serialization - Avro - file-based data structures

Total: 15 Hours

Reference(s)

1. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.
2. Tom White, "Hadoop: The Definitive Guide", 3rd Edition, O'Reilley, 2012.

15CS0XI SCRIPTING LANGUAGES - - - 1

Course Objectives

- Gain knowledge about the scripting languages such as PERL, TCL/TK, Python and BASH.
- Create and run scripts using Perl / TCL / Python.
- Creation of programs in the Linux environment.

Course Outcomes (COs)

1. Illustrate the basic concepts of Linux Administration.
2. Implement programs using PERL scripts.
3. Explore the concepts of Tcl.

UNIT I **15 Hours**

SCRIPTING LANGUAGES

Introduction to Linux- File System of the Linux-General usage of Linux kernel & basic commands- Linux users and group- Permissions for file- directory and users- Searching a file & directory- zipping and unzipping concepts

Introduction to Perl Scripting, working with Simple Values- Lists and Hashes- Loops and Decisions- Regular Expressions, Files and Data in Perl Scripting- Tcl Fundamentals- String and Pattern Matching- Tcl Data Structures- Control Flow Commands- Tk Fundamentals- Tk by Examples- Introduction to Python- Using the Python Interpreter

Total: 15 Hours

Reference(s)

1. David Barron, The World of Scripting Languages, 1st Edition, Wiley publications, 2000

15CS0XJ PROJECT MANAGEMENT TOOLS AND TECHNIQUES - - - 1

Course Objectives

- Understand the methods and tools of project management.
- Understand the realistic application of project management methods.

Course Outcomes (COs)

1. Identify the tools of project management.
2. Implement the concept of PERT and CPM.

UNIT I **15 Hours**

PROJECT MANAGEMENT

INTRODUCTION OF ADVANCED METHODS AND TOOLS OF PROJECT MANAGEMENT - CPM/PERT,Design Structure Matrix,System Dynamics,Critical Chain,Discrete Event Simulation,Earned Value Management.IDENTIFICATION OF PROJECTS -Generation and screening of idea, monitoring corporate appraisal, preparing project profiles and project rating index.PROJECT APPRAISAL-Criteria, net present value, internal rate of return, payback period and accounting rate of return method .PROJECT MANAGEMENT AND IMPLEMENTATION- Project planning, project control, prerequisites of implementation. Network techniques of project Management - Project evaluation and review technique (PERT) and critical path method (CPM).ORGANIZATIONAL AND HUMAN ASPECTS IN PROJECT ORGANIZATIONS-Program Management -managing multiple projects in parallel-International Project Management (geographically dispersed teams)-Project Manager soft skills and typical profiles

Total: 15 Hours

Reference(s)

1. Project planning, analysis, selection, implementation and review by Prasanna Chandra, TMH.
2. Project management -Dr. Harold Kerzner.Total Project management-Dr. P K Macmillan.

15CS0XK SMART CODING - - - 1

Course Objectives

- Gain knowledge about the fundamentals of smart coding.
- Understand the smart coding techniques.

Course Outcomes (COs)

1. Explore the testing strategies.
2. Illustrate the steps in smart coding.

UNIT I **15 Hours**

SMART CODING

Professionalism - Taking Responsibility - Work Ethic - Team Player - A Language of Commitment - Coding - The Flow Zone - Writer- Block - Debugging - Test Driven Development - Practicing - Acceptance Testing - Communicating Requirements - Testing Strategies - Test Automation Pyramid - Time Management - Estimating Tasks -Pressure - Avoiding Pressure - Handling Pressure -Collaboration - Programmers versus People- Teams and Projects - Mentoring, Apprenticeship, and Craftsmanship - Tooling - Source Code Control - IDE / Editor - Issue Tracking - Continuous Build - Unit Testing Tools - Component Testing Tools - Integration Testing Tools - UML/MDA.

Total: 15 Hours

Reference(s)

1. Robert C.Martin, The clean coder, Pearson education, 2011.

15CS0XL PYTHON PROGRAMMING --- 1

Course Objectives

- Demonstrate the basic and fundamental concepts in Python programming.
- Gain knowledge about functions, error handling techniques and modules in Python.
- Understand the implementation of python project development.

Course Outcomes (COs)

1. Explain the basic concepts of Python programming.
2. Explore the python programming model.
3. Describe the Modules in python.

UNIT I **15 Hours**

PYTHON PROGRAMMING

Open source software with examples - Introduction about Python - Syntax and Styles - Numbers - Lists - Tuples - Dictionaries - Python Objects - Sequences - Conditionals and Loops in Python- Python Files I/O - Exceptions in Python - Functions - Modules -Classes and oops in Python.

Total: 15 Hours

Reference(s)

1. Vernon L. Ceder ," The Quick Python Book, 2nd Edition, Manning Publications, Jan 2013.
2. Alex Martelli, "Python in a Nutshell", O'reilly Publications, 3rd edition, July 2014.

15CS0XM RASPBERRY PI --- 1

Course Objectives

- Demonstrate the basic and fundamental concepts in Raspberry PI tool.
- Gain knowledge about Linux system administration commands.
- Understand the implementation of understanding game programming.

Course Outcomes (COs)

1. Explain the basic concepts of Raspberry PI tool.
2. Explore the Linux Shell Programming model.
3. Describe the Game Programming.

UNIT I **15 Hours**

INTRODUCTION TO RASPBERRY PI

Introduction to Raspberry Pi - Hardware aspects - Board details - Overview of available hardware resources - Operating systems available - Pre-requisites of using raspberry pi - Installation of OS on Raspberry Pi - Download Image and Prepare SD Card - Install Raspberry Pi operating system- Linux

Commands - Basic Operations of Linux and commands understanding - Raspberry Pi Configuration - Installing and uninstalling software - Boot and Display Options. Programming the Pi - Introduction to Compilers - GCC, and C programming - Python Programming for Pi - Shell Programming - Accessing resources of Raspberry pi using shell - GPIO programming over shell. Hardware Interfacing - GPIO interfacing through Python - LED, Buzzer, Switch interfacing - Sensors Interfacing. Understanding Game Programming - Learning About Game Frameworks and Libraries - Setting Up the PyGame Library - Using PyGame - Learning More About PyGame - Dealing with PyGame Action.

Total: 15 Hours

Reference(s)

1. Matt Richardson and Shawn Wallace, "Getting started with Raspberry pi", O'Reilly, 2013.
2. Simon Monk, "Programming the raspberry pi", Second Edition: Getting Started with Python, Tata McGraw Hill Publishing Co. Ltd., 2015.
3. Simon Monk, "Raspberry pi Cookbook", O'Reilly, 2014.

15CS0XN PROBLEM SOLVING USING PYTHON --- 1

Course Objectives

- Demonstrate the basic and fundamental concepts in Python programming.
- Gain knowledge about functions, error handling techniques and modules in Python.
- Understand the implementation of python project development.

Course Outcomes (COs)

1. Explain the basic concepts of Python programming.
2. Explore the python operational model.
3. Describe the GUI in python.

UNIT I **15 Hours**

PROBLEM SOLVING USING PYTHON

Programming and Problem Solving using Python - Emphasizes Principles of Software Development - Style and Testing - Procedures and Functions - Iteration - Recursion - Arrays and Vectors - Strings - Operational Model of Procedure and Function Calls - Algorithms - Exceptions - Object-Oriented Programming - Graphical User Interfaces.

Total: 15 Hours

Reference(s)

1. Vernon L. Ceder ," The Quick Python Book", 2nd Edition, Manning Publications, Jan 2013.
2. Alex Martelli, "Python in a Nutshell", o'reilly Publications, 3rd edition, July 2014.

ADDITIONAL ONE CREDIT COURSES (I to III Semesters)

15GE0XA HEALTH AND FITNESS - - - 1

Course Objectives

- To understand the fundamental concepts about physical fitness & its types, training and assessment of physical fitness.

Course Outcomes (COs)

1. Acquire the knowledge and training of the individual physical, mental and social concepts.
2. Understand the fundamental concepts of yogic practice and physical fitness.
3. To acquire the knowledge about nutrition and health consciousness.

Fitness: Meaning & Definition – Need & importance of Physical fitness – Types Physical fitness - Exercise, Training and Conditioning and it is important.

Yoga: Meaning and definition – Principles of practicing – Basic Asana and it important – Pranayama and Meditation - Relaxation Techniques.

Nutrition and Balance Diet: Needs and Important – Significant of Nutritional Food - Tips for balance diet. **Common Diseases for IT professionals:** Common diseases - cause – prevention – First aid for common sports injuries.

Total: 15 Hours

Reference(s)

1. Anderson, Bob., Pearl, Bill.,&Burke, Edmund R., (2001). Getting in Shape Workout Programs for Men&Women. Mumbai: Jaico Publishing House.
2. Baechle, Thomas. R, & Earle, Roger. W., (2000). Essentials of Strength Training and Conditioning. Champaign: Human Kinetics.
3. Iyengar, BKS., (2003). The Art of Yoga. New Delhi: Harper Collins Publishers.
4. Singh, Hardayal, (1995). Science of Sports training. New Delhi: D.V.S. Publications.
5. Begum, Raheena. M., (2002). A Textbook of Foods, Nutrition and Dietetics. New Delhi: Sterling Publishers Private Limited.

15GE0XB FOUNDATION COURSE IN COMMUNITY RADIO TECHNOLOGY - - - 1

Course Objective

The course focuses on community radio technology and various program productions techniques for radio broadcasting.

Course Outcomes (COs)

1. Understand the hardware required for field recording and setting up a studio and carry out studio and field recording
2. Examine the available options for telephony interfaces for radio
3. Demonstrate proper techniques of wiring, fixing of connectors, soldering and use of tools and equipment for studio work.

INTRODUCTION TO COMMUNITY RADIO

Evolution of Community Radio (CR) in India- principles behind setting up of CR- policy guidelines and their impact on technology and content of a CR station- fundamental principles behind deciding the technology for a CR station.

STUDIO TECHNOLOGY

Properties and components of sound-difference between analogue and digital audio-hardware required for field recording and setting up a studio-fundamental principles for setting up an audio studio

AUDIO PRODUCTION

Concept of recording and storing audio-hardware related to audio recording-open source software solutions for audio production- telephony interfaces for radio- audio Post Production

STUDIO OPERATIONS

Wiring, fixing of connectors, soldering and use of tools and equipment- preventive and corrective maintenance of studio and equipment.

RADIO TRANSMISSION TECHNOLOGY

Components of the FM transmission chain- FM transmitter-different types of FM antenna - coaxial cable-propagation and coverage of RF signals-FM transmitter setup

Total: 15 Hours

Reference(s)

1. UNESCO (2001). Community Radio Handbook.
2. Vinod Pavarala, Kanchan K Malik, "Other Voices: The Struggle for Community Radio in India", SAGE Publications India,2007.
3. Steve Buckley, Mark Raboy, Toby Mendel, Kreszentia Duer, Monroe E. Price, Seán Ó Siochrú, "Broadcasting, Voice, and Accountability: A Public Interest Approach to Policy, Law, and Regulation", University of Michigan Press, 2008.
4. www.floridasound.com
5. www.mediacollege.com
6. www.procosound.com

15GE0XC VEDIC MATHEMATICS - - - 1

Course Objectives

- To improve their calculation speed, analytical thinking and numerical skills.

Course outcome (COs)

1. Solve problems creatively in mathematics and its applications.

Vedic Mathematics

Addition- Subtraction- System of Multiplication- Squaring numbers- Cube roots- Square roots- Solution of simultaneous equations- Solutions of Quadratic equations

Total: 15 Hours

Reference(s)

1. Dhaval Bathia, Vedic Mathematics, JAICO Publishing House, 29th Edition, Mumbai, 2014.
2. Jagadguru Swami Sri Bharathi Krsna Tirthaji Maharaja, Vedic Mathematics, Motilal Banarsidass Publishers Private Limited, New Delhi, 1997.

15GE0XD INTRODUCTION TO ALGORITHM - - - 1

Course Objectives

- Analyze the asymptotic performance of algorithms, Divide and conquer and Dynamic Problems.
- Use Sorting and Searching algorithms for arranging the data.
- Apply important algorithmic techniques to solve the real world Problems.

Course Outcomes (COs)

1. Apply Divide and conquer and Dynamic Programming Algorithm techniques to Provide the solutions for simple Problems.
2. Design algorithms for Performing Sorting and Searching of data.
3. Construct the Graph, Heap and BST for the given Data information.

Algorithm Design Techniques: Divide and Conquer, Dynamic Programming, Sorting and Searching, Basic graph algorithms –Simple Data Structures: Heaps, Balanced Search Trees.

Total: 15 Hours

Reference(s)

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, Second Edition, Pearson Education, 2015.
2. Thomas H. Cormen. Charles E. Leiserson. Ronald L. Rivest. Clifford Stein, Introduction to Algorithms, Second Edition, MIT Press, 2014.
3. J.P.Tremblay and P.G.Sorenson, An Introduction to Data Structures with Application II Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2008.

15GE0XE ETYMOLOGY - - - 1

Course Objectives

- To increase vocabulary and enhance use, knowledge, and understanding of the English language;
- To stimulate an appreciation for the English language, including how it developed, how new wordsenter the language, and how it continues to be dynamic;
- To demonstrate the importance of a broad-based vocabulary for effective oral and writtencommunication;

Course Outcomes (COs)

1. Examine prefixes, roots, and suffixes of Latin, Greek, Germanic, and Anglo-Saxon origin.
2. Explore the historical aspects of language, including the infusion of Indo-European languages, semantic changes, and the influence of world events.

CONVENTIONS &VOCABULARY

Acronyms – Abbreviations – Initialisms – Jargon – Neologisms - Idiomatic Expressions – Euphemisms – Spoonerisms – Malapropisms – Mondegreens - Words Derived from Latin - Words Derived from Greek - Words Derived from - Germanic/Anglo-Saxon - Abstract word Acronym - Affix Analogy - Antonym – Apheresis - Blend word Assimilation - Colloquial language Clipped word

WORD ANALYSIS

Concrete word Derivative - Dialect Diminutive suffix - Dissimilation Doublet - Etymology Euphemism - Figurative word Homonym - Hybrid word Inflection - Informal language Infusion - Jargon Linguistics -

Loan words Metathesis – Modify - Philology Onomatopoeia - Romance language Prefix - Semantics - Root-base word - Suffix Slang - Word component Synonym

Total: 15 Hours

Reference(s)

1. Norman, Lewis. Word Power Made Easy,Goyal Publisher. Edition 2.2014.
2. C T Onions. The Oxford Dictionary of English Etymology.Volume 11, Issue 1.70, Wynford Drive, Don Mills, Ont.Oxford University Press.1965.
3. Nurnberg W, Maxwell and Rosenblum, Morris, How to build a better Vocabulary, Completely Revised and Updated, Popular Library.1961

15GE0XF HINDUSTANI MUSIC - - - 1

Course Objectives

- To have an awareness on aesthetic and therapeutic aspects of Hindustani music.
- To identify and differentiate the various styles and nuances of Hindustani music.
- To apply the knowledge accumulated throughout the duration of the course by way of improvisation, composition and presentation.

Course Outcomes (COs)

1. Have Basic knowledge of aesthetic and therapeutic value of Hindustani Music.

Aesthetics

Introduction to music - Aesthetics of Hindustani Music - Classification (Raga, instruments, style as per the presentation and the gharaanaas) - Folk music, Dhamaar, Dhrupad

Composition and Therapeutic Value

Taal and Raga - Bandeesh, Taraanaa – Madhya and drut laya, Vilambit khyaal as demonstration - Therapeutic benefits of Hindustani music - Stage performance

Total: 20 Hours

Reference(s)

1. Devdhar B.R., Raga bodh (Part 1 & 2), Devdhar School of Indian Music, Mumbai, 2012.
2. Vasant, Sangeet Vishaarad , Hathras, Uttar Pradesh, 2015.

Websites

1. raag-hindustani.com/
2. play.raaga.com/Hindustani
3. raag-hindustani.com/Scales3.html
4. www.poshmaal.com/ragas.html
5. www.soundofindia.com/raagas.asp
6. https://www.quora.com/Which-is-the-toughest-raga-in-Indian-classical-music
7. www.likhati.com/2010/10/20/popular-ragas-for-the-beginner-ear-durga

15GE0XG CONCEPT, METHODOLOGY AND APPLICATIONS OF VERMICOMPOSTING

- - - 1

Course Objectives

- To understand the importance of safe methods of treating solid wastes generated through various human activities.
- To appreciate the skills / devices / practices associated with the compact proceedures of biodegradation of unwanted solid residues.

Course Outcomes (COs)

1. Understand the role of recycling of garbage leading to the sustenance of our health and environment.
2. Recognize the organic farming practices and production of healthy food products.
3. Prepare and maintain tips for small scale compost units and thereby becoming more environmentally conscious.

15 Hours

Vermicomposting Technology

Ecological roles and economic importance of earthworms - need for earthworm culture – scope and importance of vermiculture – limiting factors - types of worm culturing and the relative benefits – Small scale and commercial methods: process & advantages – Vermicomposting equipments, devices – Design and maintenance of vermi bed - Products from vermiculture (matter & humus cycle) – vermicastings in organic farming/horticulture - Marketing the products of vermiculture – quality control, market research, marketing techniques – Applied vermiculture: use of urban solids & farm/ industrial residues for

vermicomposting - Constraints of vermiculture and its future perspectives – Artificial Earthworm as a standalone biodegradation assembly.

Total: 15 Hours

Reference(s)

1. Sultan Ahmed Ismail, 2005. The Earthworm Book, Second Revised Edition. Other India Press, Goa, India.4
2. Vermiculture Technology; Earthworms, Organic Wastes and Environmental Management, 2011, Edited by Clive A Edwards, Norman Q Arancon & Rhonda Sherman, CRC Press
3. www.organicgrowingwithworms.com.au
4. New York Times – Scientists Hope to Cultivate and Immune System for Crops

15GE0XH AGRICULTURE FOR ENGINEERS - - - 1

Course Objectives

1. To impart the basic knowledge of agricultural and horticultural crops, cropping systems.
2. To study the weed and nutrient management, irrigation water requirement and its quality.

Course Outcomes (COs)

1. Understand the science of Agriculture.
2. Summarize and apply the methodologies needed in agriculture based on the field conditions.
3. Develop enough confidence to identify the crop patterns in real world and offer appropriate solutions.

Agronomical practices and Crops **5 Hours**

Definition and scope of agronomy , Classification of Crops, agricultural and horticultural crops Effect of Different Weather Parameters on Crop Growth and Development , Principal of Tillage, Tilth and Its Characteristics, Role of Water in Plant and Its Absorption, Conduction and Transpiration of Water and Plant Processes, Soil Water Extraction Pattern and Plant Response. Introduction to weeds, Weeds Control.

Crop rotation, cropping systems, relay and mixed cropping **5 Hours**

Crop Rotation, Different Cropping Systems – I, Different Cropping Systems – II, Scope of Horticultural Crops, Soil Requirement for Fruits, Vegetables and Flowers Crops, Climatic Requirement for Fruits, Vegetables and Flowers Crops.

Plant nutrients **5 Hours**

Essential Plant Nutrients, Nutrient Deficiency, Toxicity and Control Measures. Chemical fertilizers, fertilizer Reaction in Soil and Use Efficiency

Quality of irrigation water and irrigation methods **5 Hours**

Quality of Irrigation Water, Poor Quality of Irrigation Water and Management Practices. Surface Irrigation methods, and micro irrigation methods

Total: 20 hours

Reference(s)

1. SP. Palaniappan, and S. Sivaraman, Cropping systems in the tropics- Principles and Management, New Age international publishers, New Delhi, (2nd edition), 1998.
2. S.Sankaran and V.T Subbaiah Mudaliar, Principles of Agronomy, the Bangalore Printing and Pubg Co, Bangalore, 1993.
3. P.Balasubramain and SP. Palniappan, Principles and Practices of Agronomy, Agrobios publishers, Ludhiana, 2001.
4. T.Yellamanda Reddy and G.H. Sankara Reddi, Principles of Agronomy, Kalyani publishers, Ludhiana, 2005
5. B.Chandrasekaran, B. , K. Annadurai and E. Somasundaram, A Text book of Agronomy, Scientific publishers, Jodhpur, 2007
6. George Acquaah, Horticulture-principles and practices, Prentice-Half of India Pvt. Ltd., New Delhi, 2002.

15GE0XI INTRODUCTION TO DATA ANALYSIS USING SOFTWARE - - - 1

Course Objectives

- To familiarize students on the features of MS Excel.
- To enable the students to use Excel in the area of critical evaluation.
- Facilitate the student to construct graphs.

Course Outcomes (COs)

1. Create versatile Excel document.
2. Apply built in functions for data analysis.
3. Prepare dynamic Charts.

Excel Fundamentals and Editing **4 Hours**

Starting and Navigating a Worksheet– Entering Information – Hyperlinks – Saving – Editing Techniques – Entering a Series of Labels, Numbers and Dates – Checking Errors.

Formatting **4 Hours**

Formatting Cells – Changing Column Widths and Row Heights – Creating Conditional Formatting – Using Styles – Creating and Modifying Templates – Changing Page Breaks.

Power Organizing and Customizing Excel **4 Hours**

Managing Worksheets – Referencing Cells in Other Worksheets – Using More than One Work Book – Managing Shared Work Books – Protecting Worksheets and Workbooks.

Adjusting Views – Setting Printing Options – Using Multiple Panes – Customizing Excel Using the Options Dialog Box.

Crunching Numbers **5 Hours**

Building a Formula – Using Basic Built-in Functions – Using Functions to Analyze Data – Using Names in Functions – Array Functions

Work Sheet Charts **3 Hours**

Planning a Chart – Creating Chart – Formatting a Chart – Adding Labels and Arrows.

Total: 20 Hours

Reference(s)

1. Michael J. Young, Michael Halvorson, “Office System 2007 Edition”, Prentice-Hall of India (P) Ltd., New Delhi, 2007
2. John Walkenbach, “Microsoft Office Excel 2007”, Wiley Publishing, Inc. 2007
3. Curtis D. Frye, Microsoft Office Excel 2007 Step by Step, Microsoft Press, 2007
4. Mark Dodgeand Craig Stinson, “Microsoft Office Excel 2007 Inside Out”, Microsoft Press, 2007

15GE0XJ ANALYSIS USING PIVOT TABLE - - - 1

Course Objectives

- To familiarize students on the features of Pivot Table.
- To enable the students to use Pivot Table in the area of data analysis.
- Facilitate the student to construct the charts for visualization of data.

Course Outcomes (COs)

1. Able to construct the Pivot Table and Group, Sort, Filter the Data to do the analysis.
2. Able to do the Calculation with in Pivot Table for advance analysis.
3. Capable of Constructing Pivot Charts to make visual presentation.

Pivot Table Fundamentals **4 Hours**

Introduction about Pivot Table, Why and When to use the Pivot Table, Anatomy of the Pivot Table, Limitations, Preparing the Source Data, Creating the Pivot Table.

Grouping Pivot Table Data **4 Hours**

Grouping the Items in a Report Filter, Grouping Text Items, Grouping Dates by Month, Grouping Dates Using the Starting Date, Grouping Dates by Fiscal Quarter, Grouping Dates by Week, Grouping Dates by Months and Weeks, Grouping Dates in One Pivot Table Affects Another Pivot Table, Grouping Dates Outside the Range.

Sorting and Filtering Pivot Table Data **4 Hours**

Sorting a Pivot Field: Sorting Value Items, Sorting Text Items, Sorting Items in a Custom Order. *Filtering a Pivot Field:* Manual Filter, Label Filter, Value Filter, Multiple Filters.

Calculations within the Pivot Tables

5 Hours

Using Formulae: Creating a Calculated Field with and without "IF Condition, Calculated Item, Using Custom Calculations: % of Column, % of Row, % of Total, % Of, Running Total, Difference From, % Difference From, Index.

Pivot Charts **3 Hours**

Creating a Normal Chart from Pivot Table Data, Filtering the Pivot Chart, Changing the Series Order, Changing Pivot Chart Layout Affects Pivot Table, Changing Number Format in Pivot Table Affects Pivot Chart, Converting a Pivot Chart to a Static Chart, Refreshing the Pivot Chart, Creating Multiple Series for Years

Total: 20 Hours

Reference(s)

1. Debra Dalgleish, "Excel 2007 - PivotTables Recipes A Problem-Solution Approach", Apress, 2007, (ISBN-13 (pbk): 978-1-59059-920-4)
2. Bill Felen and Michael Alexander, "Pivot Table Data Crunching for Microsoft Office 2007", Pearson Education, Inc., QUE Series.
3. Wayne L. Winston, "Microsoft Office Excel 2007: Data Analysis and Business Modeling", Microsoft Press, 2007
4. John Walkenbach, "Microsoft Office Excel 2007", Wiley Publishing, Inc. 2007
5. Mark Dodgeand Craig Stinson, "Microsoft Office Excel 2007 Inside Out", Microsoft Press, 2007
6. Curtis D. Frye, Microsoft Office Excel 2007 Step by Step, Microsoft Press, 2007

BRIDGE COURSES

15CSB01 COMPUTER PROGRAMMING

Introduction to C programming – Data types, variables, constants and keywords-Operators and expressions-Decision making statements-Looping statements-Arrays-Functions- Strings-Structures-Pointers-File handling.
Introducton to OOPS concepts – Classes and objects-Constructors and destructors-Inheritance-Types of Inheritance—Virtual base class- Arrays, strings and operator overloading-Functions-Virtual functions-Pointers-File handling-Exception handling

Total: 30 Hours

15CSB02 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Basics of electric circuits-magnetic circuits-Principles of electrical machines-Introduction to diodes-rectifiers-transistors-amplifiers-oscillators-logic gates-basic computer organization-Introduction to communication systems.

Total: 30 Hours

VALUE ADDED COURSES

15CSV01 ADOBE AEM DEVELOPMENT

Objectives:

- To impart knowledge on Content Management System.
- To design a professionally groomed CMS Site with Adobe CQ.

Course Outcomes:

At the end the Training tenure the students will be able

- To create their own CMS site with Adobe CQ.

Software's Used

- JDK .
- Adobe CQ jar.

Introduction to Adobe CQ - Adobe CQ Introduction - Advantages over other Content - Management - Adobe CQ Presentation.Adobe CQ Frameworks- WCM and its Purpose- Adobe CQ and its Purpose - Adobe CQ Frameworks (JCR, OSGI, Apache Sling) - Adobe CQ Welcome Page - Site Admin and its Concepts – CRXDE – Components- Template - Adobe CQ Design - Page Creation - Template and Components in Page - Content Concept

Page Design In CQ - Sidekick and its purpose - Parsys and its purpose - Mode (Edit, Design and Disabled) - Dynamic Updation In CQ - Dialog Creation - Design Dialog Creation - Dialog working with Page - CQ Welcome Properties - Package Creation – Translator – Dispatcher. AUTHOR And Publish Environment In CQ – Replication - Reverse Replication - Author and Publish Mode. Digital Asset Management - Upload Images, Documents - Using Images and Document in Page - CUG Properties - Project Creation - Page Creation with Dialog - Page Creation without Dialog - Page Creation with parsys, sidekick - Mini Project.

References:

1. Shane Closer , "Adobe Experience Manager Quick-Reference Guide: Web Content Management ", Peachpit- a division of Pearson Education,Nov 2013.
2. Ryan D. Lunka, "Adobe Experience Manager A Guide to CQ5 for Marketing Professionals",Adobe Systems, Aug 2013.

15CSV02 ANDROID APPLICATION DEVELOPMENT

Objectives:

- To impart knowledge on Mobile Development Skill.
- To create awareness of Mobile UI and Mobile Programming.
- To become a Professional Mobile Developer.

Course Outcomes:

At the end the Training tenure the students will be able

- To create their own mobile App.
- To create Mobile Application Projects.

Software's Used

- SDK,ADT, ECLIPSE, JDK.

Introduction to Android - Android operation system - Advantages over other operating systems - Android Architecture and Working Process. Android Development Tools - Android SDK - Android Development Tools - Dalvik Virtual Machine. Android Virtual Device –Emulator - Android Virtual Device - Creating own Android Virtual Device - edit an Emulator. Installation - Pre-requisites - Eclipse - Install ADT Plug-ins and Android SDK - Manual installation of the Android SDK. Android Project Architecture - Source files - Generated files - Drawable files – Resources – Activity. UI design - Widgets - Time and Date - Images and media - Layout.

Creating Android Applications - Creating an Android Applications using Buttons. Intents-External and Pending Intents - Moving Pages.Creating Quiz Application - Creating quiz application using Radio Buttons and Intent.Spinners and Toast -Working with List - Array Adapter - Displaying Toast. Content Providers - SQLite Database.Working with SQLite Database - Insertion of values to the database - Deleting values from the database - Updating values in the database - Retrieving values from the database -Cursor. Introduction to DDMS - Fetching Database from the Emulator -Creating Login Form with Database Connectivity - Deployment in Mobile.

References:

1. Bill Philips & Brian Hardy , "Android Programming: The Big Nerd Ranch Guide (Big Nerd Ranch Guides)", The Big Nerd Ranch, 2013.
2. ZigurdMednieks, Laird Dornin, G. Blake Meike& Masumi Nakamura , "Programming Android", Second Edition ,O'Reilly , 2012.
3. Dawn and David, "Head First Android Development" ,O'Reilly, 2015.

4. Dave Smith & Jeff Friesen, “Android Recipes: A Problem-Solution Approach” ,second Edition, APress , 2012.

15CSV03 MULTIMEDIA AND WEB DEVELOPMENT

Objectives:

- To enhance the skills in Graphic and web designing.
- To create Brouchure, Visiting cards, Poster, Banner, Flyers, Websites, etc.

Course Outcomes:

At the end the Training tenure the students will be able

- To edit and repair photos properties.
- To create and design Graphical Designs.
- To create good looking websites.

Software Used:

Photoshop and Dreamweaver.

Photoshop - Introduction & Layer Creation - Selection & Cropping Tools - Editing & Painting Operations - Drawing & Path Operations - Adobe Image Ready(gif Images) - Styles & Properties - Designing Posters, Banners.

Dreamweaver - Introduction and basics of DW - Implementation and execution of HTML , CSS, java script in DW - Concepts of fireworks - HTML syntax, tags and basic attributes - Formatting text with HTML - Styles in HTML - Adding Tables and Images and Marquee tags - Creation of Class and Layouts - Creating lists in HTML - HTML FORM - HTML Form Creation - Form Elements, types and Attributes – Introduction to CSS - Types of style sheets - Formatting Text and Fonts - Converting Table layout to CSS - Formatting Colors and Backgrounds - Exploring CSS Class and ID Attributes - Margin and padding properties - Background properties - Div and Span and Z-index.

References:

1. Ranjan Parekh, “Principles of Multimedia” ,Second Edition,Tata McGraw Hill Publishing Co. Ltd., NewDelhi, 2012.
2. Andrew Faulkner and Conrad Chavez , “Adobe Photoshop CC Classroom in a Book (2015 release)” , Adobe , 2015.
3. Jon Duckett, “Web Design with HTML, CSS, JavaScript and jQuery Set”,Wiley,2014 .
4. Adobe Dreamweaver CC Classroom in a Book, Adobe, 2013.

15CSV04 EMERGING TOOLS IN IINTERNET OF THINGS

Objectives:

- To enhance the skills in Internet Of Things.
- To create IOT related Real Time Projects.

Course Outcomes:

At the end the Training tenure the students will be able

- To create IOT related application Projects.

Software Used:

- Arduino IDE
- Dreamweaver
- MySQL
- WampServer

Installation of Arduino IDE – Configuration Setting – Testing Arduino Board – Working With Arduino IDE - Explanation of Structure, Functions, Variables, Data Types – Sample Program. Blinking LED – Looping Program – Explanation - Upload Program to Arduino Board – Testing Output. Button Program – Explanation – Upload to Arduino Board – Testing Output. Array Program – Explanation – Upload to Arduino Board – Testing Output. Analog Input Program – Explanation – Upload to Arduino Board – Testing Output.Physical Pixel Program – Explanation – Upload to Arduino Board – Testing Output.

Buzzer Program – Explanation – Upload to Arduino Board – Testing Output – RGB LED Program– Explanation – Upload to Arduino Board – Testing Output. Fading and Temperature sensor Program – Explanation - Upload to Arduino Board – Testing Output.

List of experiments in IoT:

1. Practical works of Online Data Storage - SQL Syntax (Create, insert, update, deleting table), Basic syntax of PHP, Database Connection in PHP with MySQL.
2. IOT Based Liquid Level Monitoring System.
3. IOT Based Garbage Monitoring System.
4. IOT Based Home Electronicdevices Monitoring.
5. IOT Based Room Temperature Monitor.
6. IOT Based Heart Beat Rate Monitor.
7. IOT Based Body Temperature Monitor.

References:

1. Peter Waher, “Learning Internet of Things” ,Packt Publishing , 2015.
2. Adrian McEwen, “ Designing the Internet of Things”, Wiley, 2013 .
3. CunoPfister , “Getting Started with the Internet of Things: Connecting Sensors and Microcontrollers to the Cloud”, first Edition, O’Reilly, 2011.