

**GOVERNMENT COLLEGE OF ENGINEERING**

**SALEM – 636 011**

**(An Autonomous Institution affiliated to Anna University- Chennai)**

**Regulations 2018 - Autonomous Courses**

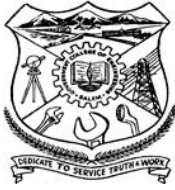
**(For Students Admitted from 2018 – 2019)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**CURRICULUM & SYLLABUS**

**(Choice Based Credit System)**

**B.E. COMPUTER SCIENCE AND ENGINEERING (F.T)**



**GOVERNMENT COLLEGE OF ENGINEERING, SALEM**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**VISION, MISSION, PEO, PO, PSO**

**Vision:**

To create proficient software professionals, academicians, researchers and entrepreneurs with moral values through quality education in the field of Computer Science and Engineering.

**Mission:**

- To impart quality education to the students.
- To establish Industry Institute Interaction to make the students ready for the industrial environment.
- To encourage entrepreneurship skills among students.
- To pursue creative research and new technologies in Computer Science and Engineering and across disciplines in order to serve the needs of industry, government, society, and the scientific community.
- Inculcating moral and ethical values to serve for the society.

**PEO (Programme Educational Objectives): B.E. – Computer Science and Engineering**

PEO1: Graduates will have the fundamental knowledge and ability to expertise in Computer Science and Engineering.

PEO2: Graduates will continue to learn and adapt latest technologies to solve real life problems.

PEO3: Graduates will have exhaustive subject knowledge and communicate the same to the peer group.

PEO4: Graduates will be ethically and socially responsible solution providers and entrepreneurs in Computer Science and other engineering disciplines.

PEO5: Graduates will pursue research and higher education.

## **PROGRAM OUTCOMES (POs): B.E. – Computer Science and Engineering**

### **Engineering Graduates will be able to**

- PO1: Apply the knowledge of Mathematics, Physical Science, Computer Science and Computer Engineering to solve engineering problems in the modeling and design of computer based systems.
- PO2: Ability to identify, formulate and analyze complex real life problems in order to provide meaningful solutions by applying knowledge acquired in Computer Science and Engineering
- PO3: Design, develop, test and debug the software with excellent programming, analytical, logical and problem solving skills.
- PO4: Ability to investigate problems in multidisciplinary fields and specialized domains.
- PO5: Create, select and apply appropriate techniques, skills, and modern computing tools to integrate IT-based solutions into the user environment effectively.
- PO6: Acquire the knowledge of sustainable development to assess society, healthcare, safety, legal and cultural issues in the professional engineering practice.
- PO7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge which is needed for sustainable development.
- PO8: Impart ethical principles and commitment to professional ethics & responsibilities in the engineering practice.
- PO9: Function effectively as an individual and as a member or leader in diverse teams in multidisciplinary settings.
- PO10: Communicate effectively on engineering activities with the engineering community and society.
- PO11: Apply the knowledge and understanding of the engineering and management principles to manage projects in interdisciplinary environments.
- PO12: Ability to excel in competitive examinations and develop confidence for lifelong learning to cope up with the rapidly evolving disciplines of Computer Science.

## **PROGRAM SPECIFIC OUTCOMES (PSOs):**

The B.E. Degree Programme in Computer Science and Engineering is offered in the department with the following programme specific objectives:

PSO1: Develop logical thinking and reasoning for designing the computerized solution to problems.

PSO2: Apply the knowledge in data handling and modeling to infer, predict or prescribe data centric business solutions.

**GOVERNMENT COLLEGE OF ENGINEERING: SALEM 636011**  
**(An Autonomous Institution Affiliated to Anna University, Chennai)**  
**(NAAC ACCREDITED)**  
**REGULATIONS 2018**

**CHOICE BASED CREDIT SYSTEM**  
**Common to all B.E. (FULL TIME) DEGREE PROGRAMME**  
**(For the students admitted to B.E Programme during the Academic year 2018-2019 and onwards)**

**1. DEFINITIONS AND NOMENCLATURE**

**In this regulation, unless the context otherwise specifies**

- (i) **“Programme”** means Degree Programme (i.e) B.E. Degree Programme.
- (ii) **“Course”** means a Theory or Practical subject that is normally studied in a semester, like Mathematics, Physics, Engineering Graphics, etc.,

**2. ELIGIBILITY FOR ADMISSION**

For admission to the Bachelor Degree Programme candidates will be required to satisfy the conditions of admission thereto prescribed by the Government of Tamilnadu and Anna University, Chennai. Provision is made for lateral entry candidates with Diploma in Engineering / Technology in the third semester of the programme of one of the branches of study and they will be required to satisfy the conditions of admissions thereto prescribed by the Government of Tamilnadu and Anna University, Chennai.

**3. BRANCHES OF STUDY**

Branches will be offered at the time of admission to the programme. The following are the branches offered in this college.

- B.E. Civil Engineering
- B.E. Computer Science and Engineering
- B.E. Electronics and Communication Engineering
- B.E. Electrical and Electronics Engineering
- B.E. Mechanical Engineering
- B.E. Metallurgical Engineering

**4. DURATION AND STRUCTURE OF THE PROGRAMME**

**4.1** The Minimum and Maximum period of the U.G. Full time programme are given below:

The total duration for completion of the programme shall not exceed the maximum duration irrespective of the period of break of study (vide clause 25) or prevention (vide clause 11.6) in order that the student may be eligible for the award of the degree (vide clause 23)

Programme	Minimum	Maximum
B.E. (Regular Stream)	4 Years (8 Semesters)	7 Years (14 Semesters)
B.E. (Lateral Entry)	3 Years (6 Semesters)	6 Years (12 Semesters)

**4.2** The duration of B.E. programme shall be 4 Years for Regular Stream and 3 Years for Lateral Entry. Each academic year will be divided into two semesters. The number of working days shall be 80 days or 540 periods (which includes the days for conducting periodical tests) each of 50 minutes duration. The number of working days shall exclude study holidays, Government holidays and end semester examination days.

#### **4.3 Categorization of Courses**

Every B.E. programme will have a curriculum with syllabi consisting of theory and practical courses that shall be categorized as follows:

- i. **Humanities and Social Sciences (HS)** courses include Technical English, Ethics and Human Values, Communication skills.
- ii. **Basic Sciences (BS)** courses include Mathematics, Physics, Chemistry, Biology, Physics laboratory, Chemistry laboratory, etc.
- iii. **Engineering Sciences (ES)** courses include Engineering practices, Computer Practice, Engineering Graphics, Engineering Mechanics, Basics of Electrical / Electronics / Mechanical / Civil/ Computer Engineering etc.
- iv. **Professional Core (PC)** courses include the core courses relevant to the chosen specialization/ branch.
- v. **Professional Elective (PE)** courses include the elective courses relevant to the chosen specialization/ branch.
- vi. **Open Elective (OE)** courses include the courses relevant to the chosen specialization / branch which a student can choose from the curriculum of other B.E. programmes and courses offered by the Departments under the Faculty of Science and Humanities.
- vii. **Project** includes Project Work, Mini Project, Seminar, Internship and Industrial/Practical Training.
- viii. **Mandatory** Course includes Environmental Science, Constitution of India, Induction Programme/**NCC / NSS / SPORTS / YRC/Yoga** activities.

**4.4** The courses of study shall be both theory and practical and shall be in accordance with the prescribed syllabi.

**4.5** Each semester curriculum shall normally have a blend of lecture and practical courses not exceeding 9 courses. However Employability and Enhancement course(s) may be included as additional course.

**4.6** A student who has passed all the courses prescribed in the curriculum for the award of the degree shall not be permitted to re-enroll to improve his/her marks in a course or the aggregate marks.

**4.7** The medium of instruction, examination and project report shall be English, except for courses on language other than English.

#### **4.8 Internship**

The Industrial / Practical Training / Internship / Summer Project shall carry 100 marks and shall be evaluated through continuous assessment only. At the end of Industrial / Practical training / Internship / Summer Project, the student shall submit a detailed report on the training undergone and a certificate from the organization concerned. The evaluation will be made based on this report and Viva-voce Examination, conducted internally by a three member Departmental Committee constituted by the HOD. Certificates (issued by the Organization) submitted by the student shall be attached to the mark list and sent to COE by the HOD with due recommendations. The training will appear in the list of Value Added Courses in the Grade Sheet with the credits (additional/extra credits) obtained.

#### **4.9 Credit Assignment**

Each course is assigned certain number of credits based on the following

Contact period per week	CREDITS
1 Lecture Period	1
1 Tutorial Periods	1
2 Practical Periods (Laboratory / Seminar / Project Work / Mini Project/ Internship etc.)	1

#### **4.10 One Credit Courses**

One credit courses shall be offered by a Department with the prior approval from the Board of Studies. The details of the syllabus must be approved by the Board of Studies. The credits earned through the one credit courses shall be over and above the total credit requirement prescribed in the curriculum for the award of the degree. They shall be allowed to take one credit courses offered in other Departments also with the permission of Head of the Department offering the course.

#### **4.11 Online Courses / Self Study Courses**

**4.11.1** Students may be permitted to enroll for one Online Course or Self Study Course with the approval of respective Board of Studies.

**4.11.2** The students can opt for Self Study Course from the list of Professional Electives provided, the students does not have any standing arrears and the CGPA should be 7.5 and above. The purpose of the course is to permit

the student to study a course of the student's choice. The students shall study on their own under the guidance of a faculty member. No formal lectures need to be delivered. One Faculty member assigned by the HOD shall be responsible for the periodic monitoring and assessment of the student in that course.

**4.11.3** The Self Study Course or online Course of 3 credits can be considered instead of one Professional Elective Course.

## **5 COURSE ENROLLMENT AND REGISTRATION**

**5.1** Each student, on admission shall be assigned to a Faculty Advisor (vide clause 6) who shall advise and counsel the student about the details of the academic programme and the choice of courses considering the student's academic background and career objectives.

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

**5.3** No course shall be offered by a Department unless a minimum of 10 students register for that course.

**5.4** 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.

**5.5** Each student on admission shall register for **all the courses prescribed in the curriculum in the student's first Semester of study.**

**5.6** The enrollment for the courses of the Semesters II 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 the student wishes, the student may drop or add courses (vide clause 5.7) within **five** working days after the commencement of the concerned semester and complete the registration process duly authorized by the Faculty Advisor.

### **5.7 Flexibility to Add or Drop courses**

5.7.1 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 the student wishes, then the student is permitted to earn more than the total number of credits prescribed in the curriculum of the student's programme.

5.7.2 From the III to VIII semesters, the student has the option of registering for additional courses or dropping existing courses. Total number of credits of such courses cannot exceed 6.

5.7.3 The student shall register for the project work in the respective semester only.

### **5.8 Fast Track System**

5.8.1 Fast Track System is for meritorious B.E Full time students.



5.8.2 With the eligibility criteria he/she will be permitted to take up and complete an eight semester professional core/professional elective in the fifth semester, a professional elective in the sixth semester and a professional elective in the seventh semester under Fast track system.

5.8.3 Eligibility Criteria for opting Fast Track System: Students should have earned minimum CGPA of 7.5 up to previous semesters. There should not be any standing arrears up to IV semester for enrollment of a Professional Core/Professional elective in the V semester of study, up to V semester for enrollment of a Professional Elective in the VI semester of study and up to VI semester for enrollment of a Professional Elective in the VII semester of study.

5.8.4 If the eligibility is not satisfied at any point of time the candidate will not be permitted to continue in FAST TRACK SYSTEM and further he/she has to complete the course as per the regular system.

5.8.5 FAST TRACK SYSTEM is optional.

## **6 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 of the students will attach a certain number of students to a teacher of the Department who shall function as Faculty Advisor for those students throughout their period of study. The Faculty Advisor shall advise the students in registering of courses, authorize the process, 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.

The responsibilities for the faculty advisor shall be:

- To inform the students about the various facilities and activities available to enhance the student's curricular and co-curricular activities.
- To guide student enrollment and registration of the courses.
- To authorize the final registration of the courses at the beginning of each semester.
- To monitor the academic and general performance of the students including attendance and to counsel them accordingly.

## **7 SYSTEM OF EXAMINATION**

Performance in each courses of study shall be evaluated based on (i) continuous internal assessment throughout the semester and (ii) an end – semester examination.

### **7.1 THEORY**

End-semester Examination will be conducted in all theory courses at the end of each semester for all the programmes. The maximum marks of each course shall be 100, out of which the continuous internal assessment will carry 40 marks, while the end semester Examination will carry 60 marks.

## **7.2 PRACTICAL / MINI PROJECT**

The practical classes for all the Practical/Laboratory component courses will be assessed continuously. The maximum marks for the Practical/Laboratory component courses shall be 100, out of which continuous internal assessment will carry 40 marks and the end semester practical examination will carry 60 marks. If any practical course contains Part A and B components, the maximum for each Part of the laboratory will be 50, out of which the continuous internal assessment will carry 20 marks, and the end semester practical examination will carry 30 marks. The end semester practical examination for award of marks shall be conducted by both Internal and External examiners.

## **7.3 PROJECT WORK AND VIVA – VOCE**

For the project work and viva – voce examination, the maximum marks shall be 200, comprising 80 marks for internal assessment and 120 marks for the end semester examination. The end semester marks of 120 shall be awarded by both the Internal and External examiners, the project report shall carry a maximum of 40 marks (same mark must be awarded to every student of the project group) The viva-voce examination shall carry 80 marks (awarded to each student of the project group based on the individual performance in the viva-voce examination conducted by External examiner, and the Internal Examiner)

## **8 CLASS COMMITTEE**

**8.1** A Class Committee consists of teachers of the class concerned, student representatives and a chairperson selected from among the faculty who do not teach that class. It is like the 'Quality Circle' (more commonly used in industries) with the overall goal of improving the teaching-learning process. The functions of the class committee include

- Solving problems experienced by the students in the class room and in the laboratories.
- Clarifying the regulations of the degree programme and the details of rules therein particularly clauses 10, 11, 12 and 13 which should be displayed in the college Web site.
- Informing the student representatives the academic schedule including the dates of assessments and the syllabus coverage for each assessment.
- Informing the student representatives the details of Regulations regarding weightage used for each assessment. In the case of practical courses (laboratory / drawing / Project work / seminar etc.) the breakup of marks for each experiment / exercise / module of work, should be clearly discussed in the class committee meeting and informed to the students.
- Analyzing the performance of the students of the class after each test and finding the ways and means of improving the slow learners.
- Identifying slow learner students, if any, and requesting the teachers concerned to provide additional help or guidance or coaching to such students.

- 8.2** The class committee for a class under a particular branch is normally constituted by the head of the department. However, if students of different branches are mixed in a class (like the first semester which is generally common to all branches), the class committee is to be constituted by the Principal.
- 8.3** The class committee shall be constituted within the first week of each semester.
- 8.4** At least 4 student representatives (usually 2 boys and 2 girls) shall be included in the class committee.
- 8.5** The chairperson of the class committee may invite the Faculty adviser(s) and the Head of the department to the meeting of the class committee.
- 8.6** The Principal may participate in any class committee of the institution.
- 8.7** The chairperson is required to prepare the minutes of every meeting, submit the same to Principal within two days of the meeting and arrange to circulate it among the students and teachers concerned. If there are some points in the minutes requiring action by the Head of the Institution the same shall be brought to the notice of Head of the institution by the head of the Department/Chief Faculty advisor.
- 8.8** The first meeting of the class committee shall be held within fifteen days from the date of commencement of the semester, in order to inform the students about the nature and weightage of assessments with the framework of the regulations. Two or three subsequent meeting may be held in a semester at suitable intervals. **The Class Committee Chairman shall put on the Notice Board the cumulative attendance particulars of each course of each student at the end of every such meeting to enable the students to know their attendance details to satisfy the clause 11 of this Regulation.** During these meetings the student members representing the entire class, shall meaningfully interact and express the opinions and suggestions of the other students of the class in order to improve the effectiveness of the teaching-learning process.

## **9 COURSE COMMITTEE FOR COMMON COURSES**

Each common theory course offered to more than one discipline or group shall have a “**Course Committee**” comprising the entire faculty teaching the common course, with one of them nominated as Course Coordinator. The nomination of the course Coordinator shall be made by the Head of the Department / Principal depending upon whether all the teachers teaching the common course belong to a single department or to several departments. The ‘Course committee’ shall meet in order to arrive at a common scheme of evaluation for the test and shall ensure a uniform evaluation of the tests.

## **10 PROCEDURE FOR AWARD OF MARKS FOR INTERNAL ASSESSMENT**

### **10.1 Theory Courses**

- 10.1.1** Unit Tests [75% weightage]: Three tests, each carrying FIFTY (50) marks, shall be conducted by the Department / Institution. The total marks of three tests

shall be reduced to 75 marks. However, a re-test, at the discretion of the Head of Department and approved by the Head of Institution, may be conducted for candidates with genuine reasons.

**10.1.2** Assignment [12.5% weightage]: The total marks of Three assignments carrying 10 Marks each shall be reduced to 12.5 marks.

**10.1.3** Tutorial / Objective Test [12.5% weightage]: The total marks of Three Tutorial / Objective Test carrying 10 Marks each shall be reduced to 12.5 marks.

The total of 100 marks shall be reduced to 40 marks (rounded off to the nearest integer).

## **10.2 Practical Courses with Laboratory Component**

Every Practical exercise / experiment shall be evaluated based on conduct of exercise / experiment and records maintained.

There shall be atleast one test. The criteria for arriving at the internal assessment marks are:

Experiment / Record / Practical classes Performance : 60% Weightage

Practical Test : 40% Weightage

The total of 100 marks shall be reduced to 40 marks (rounded off to the nearest integer).

## **10.3 Project Work**

There shall be three assessments during the semester by a review committee. The students shall make a presentation on the progress of the project before the committee. The Head of the Department shall constitute the review committee consisting of HOD, Guide and a senior member of faculty. The criteria for arriving at the internal assessment marks for the Project Work evaluated for 80 marks are:

Work assessed by the Project Guide : 50% Weightage

Work assessed by the Committee : 50% Weightage

The total of 100 marks shall be reduced to 80 marks (rounded off to the nearest integer).

## **10.4 Faculty incharge of the subject**

Every teacher is required to maintain an '**ATTENDANCE AND ASSESSMENT RECORD**' for every semester which consists of attendance marked in each theory / Laboratory / EEC class, the assessment marks and the record of class work (topics covered), for each course handled by the teacher. This should be submitted to the Head of the Department periodically (at least three times in a semester) for checking the syllabus coverage and the records of assessment marks and attendance. The Head of the Department will affix his/her signature and date after due verification. At the end of the semester, the record should be verified by the Head of the Department who shall keep this document in safe custody (for seven years). The records of attendance and assessment of both current and previous semesters should be available for inspection.

## **10.5 Assessment for Industrial / Practical Training / Internship / Summer Project**

The Industrial / Practical Training / Internship / Summer Project shall carry 100 marks and shall be evaluated through Continuous Assessment only. At the end of Assessment for Industrial / Practical Training / Internship / Summer Project, the student shall submit a

detailed report on the training undergone and a certificate from the organization concerned. The evaluation will be made based on this report and a Viva-voce Examination, conducted internally by a three member Departmental Committee constituted by the HOD. Certificates (issued by the Organization) submitted by the student shall be attached to the mark list and sent to COE by the HOD with due recommendations. The training will appear in the list of value Added Courses in the grade sheet with the credits (additional / extra credits) obtained.

#### **10.6 Assessment for Value Added one Credit Course**

The Value Added One Credit Course shall carry 100 marks and shall be evaluated through **Continuous Assessment only**. Two assessments shall be conducted during the semester by the Department concerned. The total marks obtained in the tests shall be reduced to 100 marks and rounded to the nearest integer. The HOD may identify a faculty member as Coordinator for the course. A committee consisting of the HOD, staff handling the course (if available), Programme Coordinator and a Senior Faculty nominated by the HOD shall monitor the evaluation process.

#### **10.7 Assessment for Online Course**

Students may be permitted to earn Online Courses (which are provided with certificate) with the approval of Board of Studies and HOD subject to a minimum of three credits. This Online Course of 3 credits can be considered instead of one Elective Course. Respective Boards of Studies will take a decision on the evaluation methodology for the online course. The BOS can decide whether to evaluate through End Semester Examination only and the same way be conveyed to the COE, at the beginning of the semester whenever the course is offered. The students need to obtain certification or credit to become eligible for writing the End Semester Examination to be conducted by the Institution. The HOD may identify a Faculty member Coordinator for the course, who is responsible for the evaluation of Continuous Assessment.

#### **10.8 Assessment for Self Study Course**

**The** faculty members approved by the HOD shall be responsible for periodic monitoring and evaluation of the self study course. The course shall be evaluated through continuous assessment and end semester examination. The evaluation methodology shall be the same as that of a theory course.

#### **10.9 Assessment for MOOC Courses**

Students may be permitted to earn credits through MOOC Courses with the approval of Board of Studies and HOD subject to a maximum of six credits per semester. The credits earned from the MOOC courses can be transferrable subject to the approval of the respective Performance Analysis Committee and no additional assessment is required.

## **11 REQUIREMENTS FOR COMPLETION OF A SEMESTER**

A candidate who fulfils the following conditions shall be deemed to have satisfied the requirements for completion of a semester.

**11.1** He / She secures not less than 75% of attendance for each course with the total number of working hours specified in the respective curriculum.

**11.2** Candidates representing University in State / National / International / Inter University Sports events, paper or project presentation in National / International Conference with prior permission from the Head of the Institution are given exemption upto 10% of the required attendance and such candidates shall be permitted to appear for the current semester examination on condonation (attendance 65% to 74%)

**11.3** Candidates who could not attend classes continuously due to Trauma/Infectious diseases / Surgeries requiring continuous medical attention, on submission of a valid medical certificate in time, obtained from a Government doctor not below the rank of Assistant Surgeon, are given exemption upto 10% of the required attendance and shall be permitted to appear for the current semester examination on condonation (attendance 65% to 74%)

**11.4** Permission mentioned in 11.2 and 11.3 can be allowed only twice during his/her entire course of study.

**11.4.1** Fees for 1st time condonation Rs.1000/- for one course and Rs. 300/- for every additional course

**11.4.2** Fees for 2nd time condonation Rs.5000/- for one course and Rs. 1000/- for every additional course

**11.5** His/her conduct should be certified to be satisfactory by the Head of the Department concerned and Head of the Institution.

**11.6** Candidate who does not secure 75% attendance in any one or more courses, will not be permitted to write the end semester examinations for that/those courses. However he will be permitted to move to the next semester and re-register for those courses in the next semester after earning attendance and internal marks from the course coordinator through contact hours.

**11.7** Candidates who do not complete all the courses in that semester (as per clause 11.1, 11.2 and 11.3), will not be permitted to write the end-semester examination and are not permitted to move to next semester. However, they will be permitted to write the arrear examination, if any. They are required to repeat the incomplete semester in the next academic year getting the necessary permission from the authorities.

## **12 REQUIREMENTS FOR APPEARING FOR END SEMSTER EXAMINATION**

A candidate shall normally be permitted to appear for the end semester examination of the current semester, if he/she has satisfied the semester completion requirements (subject to Clause 11.1 with 11.2 and 11.3) and has registered for examination in all courses of that semester. Registration is mandatory for arrear subjects along with current semester

examinations, failing which the candidate will not be permitted to move to the higher semester.

### 12.1 Reappearance Registration

12.1.1 If a student fail in a theory course, the reappearance registration for that course in the subsequent semester is mandatory.

12.1.2 The student may attend the classes for the reappearance registration courses, if the student wishes. However, the attendance requirement (vide clause 11) is not compulsory for such courses.

## 13 END – SEMESTER EXAMINATION

13.1 There shall be one end – semester examination of 3 hour duration in each lecture – based course.

13.2 The Project report of B.E. programme will be evaluated based on the report and a viva-voce examination by an External Examiner and an Internal Examiner.

13.3 The following will be the weightage for different courses.

13.3.1 Theory courses : Internal Assessment – 40%  
: End-Semester Examination – 60%

13.3.2 Laboratory based Courses : Internal Assessment – 40%  
: End-Semester Examination – 60%

13.3.3 Project work [Maximum Marks: 200] : Internal Assessment – 40%  
: End-Semester Examination – 60%

Internal Assessment – 80 Marks : End-Semester Examination – 120 Marks  
[Supervisor: 40 Marks, committee: 40 Marks] : [Evaluation for project report (by External Examiners) : 40 Marks and Viva-Voce: 80 Marks (Internal and External Examiners)]

## 14 PASSING REQUIREMENTS

14.1 The minimum number of total credits to be earned through successful completion of the courses of study of the respective branch by a candidate to qualify for the award of degree in the various branches of study is provided below.

Branch of study	Minimum number of credits to be earned through successful completion of the courses of study of the respective branch, for the award of degree	
	For regular entry (entry at first Semester)	For lateral entry (entry at third semester)
Civil Engineering	160	121
Computer Science and Engineering	160	121
Electronics & Communication Engineering	160	121

Electrical & Electronics Engineering	157	118
Mechanical Engineering	160	121
Metallurgical Engineering	161	122

**14.2** For each theory and laboratory courses, examination will be conducted for 100 marks. A candidate who secures 50% marks and above in the end semester examination, and 50% in continuous assessment and end semester examination both put together, shall be declared to have passed the examination in that course.

**14.3** A candidate who successfully completes the course requirements and passes all the prescribed examinations in all the eight semesters within a maximum period of 7 years (14 semesters), reckoned from the commencement of the first semester to which the candidate was admitted in regular stream and [six semesters within a maximum period of 6 years (12 semesters), reckoned from the commencement of the third semester to which the candidate was admitted for lateral entry], is eligible to get the degree.

## **15 REVALUATION**

**15.1** Copies of answer script for theory course(s) can be obtained from the Office of the Controller of Examinations on payment of a prescribed fee specified for this purpose through proper application.

**15.2** A candidate can apply for revaluation or photo copy cum revaluation of his/her semester examination answer paper in a theory course, within a week from the declaration of results, on payment of a prescribed fee through proper application to the Controller of Examinations, as per norms given by the chairman, Academic Council. Revaluation is not permitted for Practical Courses and for Project work.

## **16 CHALLENGING THE REVALUATION**

Challenging the revaluation is permitted for those students who have applied for photocopy of answer script. The copy of the answer script is to be valued by a competent authority and the valued script should be submitted to COE's office along with prescribed fee for challenging the revaluation within 2 days after declaration of the revaluation results.

## **17 MALPRACTICE**

If a student indulges in malpractice in any of the end-semester examinations, he/she shall be liable to face punitive action as prescribed by the Controller of Examination, Government College of Engineering, Salem.

## **18 PROCEDURE FOR USING SCRIBE**

If a candidate is physically challenged / meets with accident or suffers from ill health at the time of examination, then he/she may be permitted to use a scribe to write the examination on payment of a prescribed fee through proper application to the Office of the Controller of



Examinations. In such case, maximum one hour extra time will be permitted. The scribe shall be a non-engineering student/ graduate.

## **19 PROVISION FOR WITHDRAWAL FROM EXAMINATION**

- 19.1** A candidate who satisfies Clause 12, may for valid reasons and on prior application, be granted permission to withdraw from appearing for the examination of any one course or consecutive examinations of more than one course in a semester examination.
- 19.2** Such withdrawal shall be permitted only ONCE during the entire period of study of the degree programme.
- 19.3** Withdrawal application is valid only if it is made 10 days prior to the commencement of the examination in that course or courses and is recommended by the Head of the Department and approved by the Head of the Institution.
- 19.4** Notwithstanding the requirement of the mandatory TEN days notice, application of withdrawal for special case under extraordinary conditions will be considered on the merit of the case.
- 19.5** Withdrawal shall not be construed as an appearance for the eligibility of a candidate for First Class with Distinction. This provision is also applicable to those who seek withdrawal during VIII semester.
- 19.6** Withdrawal from the end semester examination is NOT applicable to arrear subjects of previous semesters.
- 19.7** The candidate shall reappear for the withdrawn courses during the examination conducted in the subsequent semester.

## **20 AWARD OF THE LETTER GRADES**

**20.1** The letter grade and the grade point are awarded based on percentage of marks secured by a candidate in individual course as detailed below:

Range of Total Marks	Letter Grade	Grade Points (GP)
90 to 100	S	10
80 to 89	A	9
70 to 79	B	8
60 to 69	C	7
55 to 59	D	6
50 to 54	E	5
0 to 49	RA	0
Incomplete	I	0
Withdrawal	W	0
Withheld	WH	0

“RA” denotes “reappearance” in the course.

“I” denotes “incomplete” as per clause 11.1 and hence prevention from writing End Semester Examination.

“W” denotes “withdrawal” from the course.

“WH” denotes “withheld” due to malpractice etc.

**20.2** For the Co-curricular activities such as National Cadet Corps (NCC)/ National Service Scheme (NSS) / SPORTS / YRC, a satisfactory / not satisfactory grading will appear in the mark sheet. Every student shall put in a minimum of 75% attendance in the training and attend the camp compulsorily. The training and camp shall be completed during the first year of the programme. However, for valid reasons, the Head of the Institution may permit a student to complete this requirement before the completion of final semester. **A satisfactory grade in the above co-curricular activities is compulsory for the award of degree.**

**20.3** For zero credit courses Excellent / Good / Satisfactory grading will appear in the grade sheet.

## **21 PROCEDURE FOR COMPLETING THE PROGRAMME**

**21.1** A candidate, who, for some reason has discontinued the programme can join the programme of study in any semester only at the time of its normal commencement in the Institution for regular students, upon satisfying all the following conditions:

- (a) He / she should have completed the course of study of the previous semesters.
- (b) He / she should be eligible to register for the examinations and satisfy rule 11.1
- (c) He / she should have registered for all the examinations of the previous semesters.

**21.2** A candidate will be permitted to proceed from one semester to the next higher semester only if he / she satisfies the regulation for eligibility to appear for the end-semester examination in the semester concerned, subject to the condition that the candidate should register for all the arrear courses in the lower semesters along with the current (higher) semester courses.

**21.3** A candidate should have completed the B.E Degree course within a period of SEVEN consecutive academic years (14 semesters) for regular stream [SIX consecutive academic years (12 semesters) for lateral entry] from the date of admission to the course, even if the candidate discontinues and rejoins subsequently, to be eligible for the award of the degree.

## **22 ISSUE OF GRADE SHEETS AND GPA, CGPA CALCULATION**

Individual Grade sheet for each semester will be issued through the Head of the Department concerned, after the publication of the results with following details.

- The list of courses enrolled during the semester and the grade scored.
- The Grade Point Average (GPA) for the semester and
- The Cumulative Grade Point Average (CGPA) of all courses enrolled from first semester onwards.

GPA is the ratio of the sum of the products of the number of credits of courses registered and the points corresponding to the grades scored in those courses, taken for all the courses, to the sum of the number of credits of all the courses in the semester.

$$\text{GPA} = \frac{\text{Sum of [CXGP]}}{\text{Sum of C}}$$

Where C – credit of a particular subject/Course  
GP – grade point obtained by the student in the respective subject/Course.

CGPA will be calculated in a similar manner, considering all the courses enrolled from first semester. “RA”, “I” and “W” grades will be excluded for calculating GPA and CGPA.

### **23 ELIGIBILITY FOR THE AWARD OF DEGREE**

A candidate shall be declared to be eligible for the award of the B.E. Degree provided the candidate has

- i) Successfully completed the course requirements and has passed all the prescribed examinations in all the 8 semesters within a maximum period of 7 years for regular stream (6 semesters within a maximum period of 6 years for lateral Entry) from the commencement of first semester (third semester) to which the candidate was admitted.
- ii) No disciplinary action is pending against him/her.
- iii) Successfully completed NCC/NSS/SPORTS/YRC requirements.

### **24 CLASSIFICATION OF THE DEGREE AWARDED**

#### **24.1 FIRST CLASS WITH DISTINCTION**

A candidate who qualifies for the Degree by passing the examinations in all courses of the entire programme, in first attempt, within a period of eight semesters for regular stream (six semesters for lateral entry) from the date of admission to the programme with CGPA not less than 8.50 for the entire programme shall be declared to have passed the examination for the degree in FIRST CLASS WITH DISTINCTION. For this purpose the withdrawal from examination will not be construed as an appearance. Further, the authorized break of study will not be counted for the purpose of classification.

**24.2** A candidate transferred from other Institution, who qualifies for the degree by passing the examinations in all courses of the entire programme in first attempt, within a period of eight Semesters for regular stream and six semesters for Lateral Entry stream from the date of admission to the programme with CGPA not less than 8.50 for the entire programme shall be declared to have passed the examination for the degree in FIRST CLASS WITH DISTINCTION. For this purpose the withdrawal from examination will not be construed as an appearance. Further, the authorized break of study will not be counted for the purpose of classification.

### **24.3 FIRST CLASS**

A candidate who qualifies for the award of the Degree, having passed the examinations in all the courses of the entire programme (first to eight semesters) within a maximum period of NINE consecutive semesters for regular stream (third to eight semesters) for lateral entry stream within a maximum period of SIX semesters, from the date of admission to the programme with CGPA not less than 7.00 for the entire programme, shall be declared to have passed the examination for the degree in FIRST CLASS. For this purpose, the authorized break of study will not be counted for the purpose of classification.

### **24.4 SECOND CLASS**

All other successful candidates shall be declared to have passed the examinations for the Degree in SECOND CLASS.

**24.5** A candidate who is absent for semester examination in a course / project work after having registered for the same shall be considered to have attempted that examination for the purpose of classification.

## **25 TEMPORARY BREAK OF STUDY FROM A PROGRAMME**

**25.1** Break of study shall be granted only ONCE for valid reasons for a maximum of one year during the entire period of study of the degree programme. However, in extraordinary situation the candidate may apply for additional break of study not exceeding another one year by paying prescribed fee for break of study. If candidate intends to temporarily discontinue the programme in the middle of the semester for valid reasons, and to rejoin the programme in a subsequent year, permission may be granted based on the merits of the case provided he / she applies to the Head of the Institution (through Head of the Department ) in advance, but not later than the last date for registering for the end semester examination of the semester in question, through the Principal of the Institution stating the reasons there for and the probable date of rejoining the programme.

**25.2** The candidate permitted to rejoin the programme after the break shall be governed by the Curriculum and Regulations in force at the time of rejoining. If the Regulation is changed, then, those candidates may have to do additional courses as prescribed by the head of the department and approved by the Academic Council.

**25.3** The authorized break of study (for a maximum of one year) will not be counted for the duration specified for passing all the courses for the purpose of classification. (vide clause 23). However, additional break of study granted will be counted for the purpose of classification.

**25.4** The total period for completion of the Programme reckoned from, the commencement of the first semester to which the candidate was admitted shall not exceed the maximum period specified irrespective of the period of break of study (vide clause 4.1) in order that he/she may be eligible for award of the degree.

**25.5** If any student is detained for want of requisite attendance, progress and good conduct, the period spent in that semester shall not be considered as permitted 'Break of Study' or 'Withdrawal' (clause 18 and 24) and is not applicable in this case.

## **26 DISCIPLINE**

Every student is required to observe discipline and decorous behaviour both inside and outside the college and not to indulge in any activity which will tend to bring down the prestige of the college. In the event of an act of indiscipline being reported, the Principal shall constitute a discipline committee consisting of three Heads of Department, of which one should be from the faculty of the student, to inquire into acts of indiscipline. The disciplinary action is subject to review by the University in case the student represents to the University. Any expulsion of the student from the college shall be with prior concurrence from Director of Technical Education / University.

## **27 RANK OF A STUDENT**

A candidate who qualifies for the Degree by passing the examination in all courses of the entire programme in the first attempt within a period of EIGHT Semesters from the date of admission to the course can be given his/her position in the class as rank. The rank is determined from the I Semester to VIII Semester end semester examination mark percentage. Students transferred from other Institutions to Government College of Engineering, Salem and lateral entry students are not eligible for rank.

## **28 PERSONALITY AND CHARACTER DEVELOPMENT**

All students shall enroll, on admission, in any one of the personality and character programmes (the **NCC / NSS / SPORTS / YRC**). The programme shall include classes on hygiene and health awareness and also training in first-aid.

**National Cadet Corps (NCC)** programme will have about 20 parades.

**National Service Scheme (NSS)** will have social service activities in and around college/institution.

**SPORTS** Games, Drills, Physical exercises etc.

**Youth Red Cross (YRC)** will have activities related to social services in and around college/institution.

While the training activities will normally be during weekends, the camp will normally be during vacation period.

## **29 REVISION OF REGULATIONS CURRICULUM AND SYLLABI**

The college may from time to time revise, amend or change the regulations, scheme of examinations and syllabus, if found necessary.

**GOVERNMENT COLLEGE OF ENGINEERING**  
**SALEM – 636 011**  
**(NAAC Accredited)**

**Regulations 2018 - Autonomous Courses**  
**(For Students Admitted from 2018 – 2019)**

**B.E. COMPUTER SCIENCE AND ENGINEERING– Full Time**

Course code	Name of the Course	Hours/Week							Maximum Marks		
		Category	Contact periods	Lecture	Tutorial/	Demo*	Practical	Credit	CA	FE	Total
<b>SEMESTER-I</b>											
<b>THEORY</b>											
18EN101	Professional English	HS	2	2	0	0	2	40	60	100	
18MA101	Matrices and Calculus	BS	4	3	1	0	4	40	60	100	
18CY101	Chemistry	BS	4	3	1	0	4	40	60	100	
18CS101	Fundamentals of Problem Solving and C Programming	ES	3	3	0	0	3	40	60	100	
<b>PRACTICAL</b>											
18EN102	Professional English Laboratory	HS	2	0	0	2	1	40	60	100	
18CS102	Computer Practice Laboratory	ES	4	0	0	4	2	40	60	100	
18ME102	Workshop Manufacturing Practices	ES	4	1	0	4	3	40	60	100	
18MC101	Induction Program - 21 Days	MC					0				
<b>TOTAL</b>					<b>12</b>	<b>2</b>	<b>10</b>	<b>19</b>			
<b>SEMESTER-II</b>											
<b>THEORY</b>											
18MA202	Differential Equations and Linear Algebra	BS	4	3	1	0	4	40	60	100	
18PH201	Semiconductor Physics and Optoelectronics	BS	4	3	1	0	4	40	60	100	
18EE101	Basic Electrical and Electronics Engineering	ES	4	3	1	0	4	40	60	100	
18ME101	Engineering Graphics & Design	ES	3	1	0	4	3	40	60	100	
<b>PRACTICAL</b>											
18PH103	Physics Laboratory	BS	3	0	0	3	1.5	40	60	100	
18CY102	Chemistry Laboratory	BS	3	0	0	3	1.5	40	60	100	

18EN103	Professional Communication Laboratory	HS	2	0	0	2	1	40	60	100
18EE102	Basic Electrical and Electronics Engineering Laboratory	ES	2	0	0	2	1	40	60	100
	<b>TOTAL</b>			<b>10</b>	<b>3</b>	<b>14</b>	<b>20</b>			
<b>SEMESTER-III</b>										
<b>THEORY</b>										
18MA301	Probability and Statistics	BS	4	3	1	0	4	40	60	100
18CS301	Digital Principles and System Design	ES	3	3	0	0	3	40	60	100
18CS302	Data Structures and Algorithms	PC	3	3	0	0	3	40	60	100
18CS303	Computer Organization and Architecture	PC	3	3	0	0	3	40	60	100
18CS304	Operating Systems	PC	3	3	0	0	3	40	60	100
<b>PRACTICAL</b>										
18CS305	Data Structures and Algorithms Laboratory	PC	4	0	0	4	2	40	60	100
18CS306	Operating Systems Laboratory	PC	4	0	0	4	2	40	60	100
	<b>TOTAL</b>			<b>15</b>	<b>1</b>	<b>8</b>	<b>20</b>			
<b>SEMESTER-IV</b>										
<b>THEORY</b>										
18MA401	Numerical Methods and Linear Programming Problem	BS	4	3	1	0	4	40	60	100
18CS401	Computer Networks	PC	3	3	0	0	3	40	60	100
18CS402	Design and Analysis of Algorithms	PC	3	3	0	0	3	40	60	100
18CS403	Object Oriented Programming using C++	PC	3	3	0	0	3	40	60	100
18CS404	Software Engineering	PC	3	3	0	0	3	40	60	100
18CS405	Microprocessors and Microcontrollers	ES	3	3	0	0	3	40	60	100
<b>PRACTICAL</b>										
18CS406	Object Oriented Programming using C++ Laboratory	PC	4	0	0	4	2	40	60	100
18CS407	Microprocessors and Microcontrollers Laboratory	ES	4	0	0	4	2	40	60	100

18CYMC01	Environmental Science	MC		0	0	1	0			
	<b>TOTAL</b>			<b>18</b>	<b>1</b>	<b>9</b>	<b>23</b>			
<b>SEMESTER-V</b>										
<b>THEORY</b>										
18CS501	Database Management Systems	PC	3	3	0	0	3	40	60	100
18CS502	Theory of Computation	PC	3	3	0	0	3	40	60	100
18CS503	Java Programming	PC	3	3	0	0	3	40	60	100
18MG501	Principles of Management	HS	3	3	0	0	3	40	60	100
	Open Elective I	OE	3	3	0	0	3	40	60	100
<b>PRACTICAL</b>										
18CS504	Database Management Systems Laboratory	PC	4	0	0	4	2	40	60	100
18CS505	Java Programming Laboratory	PC	4	0	0	4	2	40	60	100
18EN501	Communication Skills and Language Laboratory	BS	4	0	0	4	2	40	60	100
18MC301	Indian Constitution	MC		2	0	0	0			
	<b>TOTAL</b>			<b>17</b>	<b>0</b>	<b>12</b>	<b>21</b>			
<b>SEMESTER-VI</b>										
<b>THEORY</b>										
18CS601	Principles of Compiler Design	PC	3	3	0	0	3	40	60	100
18CS602	Web Technology	PC	3	3	0	0	3	40	60	100
	Professional Elective I	PE	3	3	0	0	3	40	60	100
	Professional Elective II	PE	3	3	0	0	3	40	60	100
	Open Elective II	OE	3	3	0	0	3	40	60	100
<b>PRACTICAL</b>										
18CS603	Compiler Design Laboratory	PC	4	0	0	4	2	40	60	100
18CS604	Web Technology Laboratory	PC	4	0	0	4	2	40	60	100
18CS605	Mini Project	EEC	6	0	0	6	3	40	60	100
	<b>TOTAL</b>			<b>15</b>	<b>0</b>	<b>14</b>	<b>22</b>			



**SEMESTER-VII****THEORY**

18CS701	Cryptography and Network Security	PC	3	3	0	0	3	40	60	100
	Professional Elective III	PE	3	3	0	0	3	40	60	100
	Professional Elective IV	PE	3	3	0	0	3	40	60	100
	Open Elective III	OE	3	3	0	0	3	40	60	100
	Open Elective IV	OE	3	3	0	0	3	40	60	100

**PRACTICAL**

18CS702	Network Security Laboratory	PC	4	0	0	4	2	40	60	100
18CS703	Project Phase I	EEC	12	0	0	12	6	40	60	100
	<b>TOTAL</b>			<b>15</b>	<b>0</b>	<b>16</b>	<b>23</b>			

**SEMESTER-VIII****THEORY**

	Professional Elective V	PE	3	3	0	0	3	40	60	100
	Professional Elective VI	PE	3	3	0	0	3	40	60	100

**PRACTICAL**

18CS801	Project Phase II	EEC	12	0	0	12	6	40	60	100
	<b>TOTAL</b>			<b>6</b>	<b>0</b>	<b>12</b>	<b>12</b>			

**Total Number of Credits = 160**

**List of Professional Electives (VI Semester)**

Course Code	Name of the Course	Category						Contact Periods		
		Category	Contact Periods	Lecture	Tutorial/Demo*	Practical	Credit	CA	FE	Total
18CSPE601	Software Project Management	PE	3	3	0	0	3	40	60	100
18CSPE602	Artificial Intelligence	PE	3	3	0	0	3	40	60	100
18CSPE603	Distributed and Parallel Computing	PE	3	3	0	0	3	40	60	100
18CSPE604	Python Programming	PE	3	3	0	0	3	40	60	100
18CSPE605	Agile Technologies	PE	3	3	0	0	3	40	60	100
18CSPE606	Object Oriented Analysis and Design	PE	3	3	0	0	3	40	60	100
18CSPE607	Data Mining and Warehousing	PE	3	3	0	0	3	40	60	100
18CSPE608	Component Based Technology	PE	3	3	0	0	3	40	60	100
18CSPE609	Computer Hardware and Trouble Shooting	PE	3	3	0	0	3	40	60	100
18CSPE610	Middleware Technologies	PE	3	3	0	0	3	40	60	100

**List of Professional Electives ( VII Semester)**

Course Code	Name of the Course	Category						Contact Periods		
		Category	Contact Periods	Lecture	Tutorial/Demo*	Practical	Credit	CA	FE	Total
18CSPE701	UNIX Architecture	PE	3	3	0	0	3	40	60	100
18CSPE702	Big Data Analytics	PE	3	3	0	0	3	40	60	100
18CSPE703	Cyber Forensic	PE	3	3	0	0	3	40	60	100
18CSPE704	User Interface Design	PE	3	3	0	0	3	40	60	100
18CSPE705	Software Quality Assurance	PE	3	3	0	0	3	40	60	100
18CSPE706	Computer Graphics and Multimedia	PE	3	3	0	0	3	40	60	100
18CSPE707	C # & .NET Frameworks	PE	3	3	0	0	3	40	60	100
18CSPE708	Advanced Databases	PE	3	3	0	0	3	40	60	100
18CSPE709	Machine Learning	PE	3	3	0	0	3	40	60	100
18CSPE710	Nano Computing	PE	3	3	0	0	3	40	60	100

**List of Professional Electives ( VIII Semester)**

Course Code	Name of the Course	Category						Contact Periods		
		Category	Contact Periods	Lecture	Tutorial/Demo*	Practical	Credit	CA	FE	Total
18CSPE801	Information Security	PE	3	3	0	0	3	40	60	100
18CSPE802	Business Intelligence and Its Application	PE	3	3	0	0	3	40	60	100
18CSPE803	E-Commerce	PE	3	3	0	0	3	40	60	100
18CSPE804	Mobile Computing	PE	3	3	0	0	3	40	60	100
18CSPE805	Deep Learning	PE	3	3	0	0	3	40	60	100
18CSPE806	Adhoc and Sensor Networks	PE	3	3	0	0	3	40	60	100
18CSPE807	Cloud Computing	PE	3	3	0	0	3	40	60	100
18CSPE808	Service Oriented Architecture	PE	3	3	0	0	3	40	60	100
18CSPE809	Free and Open Source Software	PE	3	3	0	0	3	40	60	100
18CSPE810	Natural Language Processing	PE	3	3	0	0	3	40	60	100

**List of Open Electives Offered to Other Departments**

Course Code	Name of the Course	Category						Contact Periods		
		Category	Contact Periods	Lecture	Tutorial/Demo*	Practical	Credit	CA	FE	Total
18CSOE01	Object Oriented Programming using C++	OE	3	3	0	0	3	40	60	100
18CSOE02	Operating Systems	OE	3	3	0	0	3	40	60	100
18CSOE03	Computer Networks	OE	3	3	0	0	3	40	60	100
18CSOE04	Python Programming	OE	3	3	0	0	3	40	60	100
18CSOE05	Java Programming	OE	3	3	0	0	3	40	60	100
18CSOE06	Computer Organization and Architecture	OE	3	3	0	0	3	40	60	100
18CSOE07	Data Structures using C++	OE	3	3	0	0	3	40	60	100
18CSOE08	Neural Networks	OE	3	3	0	0	3	40	60	100
18CSOE09	Soft Computing	OE	3	3	0	0	3	40	60	100
18CSOE10	Artificial Intelligence and Machine Learning	OE	3	3	0	0	3	40	60	100

## Computer Science and Engineering Scheme of Instruction

Course work	Credits recommended by AICTE	Credit % for AICTE recommendation	Credits	Credit %
Humanities and Social Sciences (HS)	12	7.54	7	4.37
Basic Sciences (BS)	24	15.09	29	18.12
Engineering Science (ES)	29	18.23	24	15
Program Core (PC)	49	30.81	55	34.37
Program Electives (PE)	18	11.32	18	11.25
Open Electives (OE)	12	7.54	12	7.5
Empl. Enhancement Courses (EEC)	15	9.43	15	9.37
Mandatory Courses(MC) (Zero Credit)	0	0	0	0
<b>Total</b>	<b>159</b>	<b>100</b>	<b>160</b>	<b>100</b>

HS	Humanities and Social Sciences
BS	Basic Sciences
ES	Engineering Sciences
PC	Program Core
PE	Program Elective
OE	Open Electives
EEC	Project Work
MC	Mandatory Courses

# **SEMESTER-I**

18EN101		PROFESSIONAL ENGLISH	L	T	P	C
			2	0	0	2
<b>Course Objectives:</b>						
1.	Master basic reading skills such as phonics, word recognition and meaningful division of sentences.					
2.	Read fast, decode accurately and remove oral reading errors that affect text meaning					
3.	Acquire and develop writing skills for academic, social and professional purposes					
4.	Gain skills in academic and functional writing tasks.					
<b>WRITING</b>						
<ol style="list-style-type: none"> <li>1. Word Formation with Prefix and Suffix, Synonyms and Antonyms, Tenses, Parts of Speech, Common Errors in English (Subject –Verb Agreement, Noun-Pronoun Agreement, Prepositions, Articles, Conditional statements, Redundancies, Clichés etc), Voices</li> <li>2. Email – Training Programme and related details, paper submission for seminars and conferences, Fixing an appointment, Arranging and Cancelling a meeting with team members, conference details, hotel accommodation, Reminder mails, Raising queries with team members, Congratulatory mails at work, arranging for a meeting with a foreign client, personal emails.</li> <li>3. Letter Writing – Business and need based communication – Formats of official, personal and business letters, official leave and request applications (Bonafide certificate, course completion, conduct certificate, permission to arrange industrial visits) complaints, replies to queries from business customers, inviting dignitaries, accepting and declining invitations, placing orders, cover letter for a job application with resume.</li> <li>4. Technical Report Writing – status reports – Work Done in the Project, Feasibility Reports on Office Accommodation, Introduction of New Products, Sales Promotion, Customers Feedback, Starting a New Company, Event Reports- Seminars, Conferences, Meeting, Recommendations and Checklists.</li> <li>5. Charts- interpreting pie charts, graphs etc.,</li> </ol>						
<b>READING</b>						
<ol style="list-style-type: none"> <li>1. Understanding notices, messages, timetables, adverts, graphs, etc.- understanding meaning and purpose of short texts.</li> <li>2. Gapped sentences – Meanings, collocations and meanings of individual words.</li> <li>3. Reading passage with multiple choice questions – reading for gist and reading for specific information – skimming for general idea of and meaning and contents of the whole text.</li> <li>4. Short reading passage; gap-filling – Grammar, especially prepositions, articles, auxiliary verbs, modal verbs, pronouns, relative pronouns and adverbs.</li> <li>5. Short reading passages; sentence matching – Scanning – ability to pick out specific information in a short text.</li> </ol>						



## METHODOLOGY

### Objective Type:

1. Vocabulary of business communication.
2. Collocations related to technical and business.
3. Coherence in paragraphs – use of sequence clues.
4. Conversations and appropriate responses.
5. Tenses with time makers.
6. Verbal phrases
7. Description of objects in a sentence or two
8. Products and likely slogans
9. Tone, vocabulary, expressions in formal and informal letters.
10. Email writing- tone, vocabulary, expressions, mail ID., creation, CC, BCC.

### Descriptive Writing:

1. Skimming and scanning to look for specific information.
2. Spotting Errors.
3. Email writing in different work place/ profession based contexts with hints.
4. Letter writing in different business based contexts with hints.
5. Report writing: feasibility report, progress in project reports, accident reports and event reports.
6. Checklists in business, office and profession based context.
7. Recommendations in business, office and profession based context.
8. Resume and Cover letter.
9. Mind mapping visuals on social and environmental issues – essay writing based on the given mind map visual.

**Total (L+T)= 30 Periods**

### Course Outcomes:

Upon completion of this course, the students will be able to:

CO1	:	Read and summarize the main ideas, key details and inferred meanings from a passage
CO2	:	Internalize the grammar items such as prepositions, articles, tenses, verbs, pronouns, and adverbs adjectives through contexts and apply them to spot errors.
CO3	:	Develop the ability to classify, check information and prepare reports.
CO4	:	Apply the academic and functional writing skills in new contexts
CO5	:	Interpret pictorial representation of data and statistic

### Text Books:

1. Norman Whitby. Business Benchmark –Pre - Intermediate to Intermediate, Students Book, Cambridge University Press, 2014

<b>Recommended Readings and Reference sources:</b>	
1.	M. Ashraf Rizvi, Effective Technical Communication, McGraw Hill
2.	Farhathullah, T.M. Communication Skills for Technical Students
3.	Meenakshi Raman and Sangeetha Sharma, Technical Communication: Principles and Practice, Oxford University Press, New Delhi, 2004
4.	David F. Beer and David McMurray, Guide to Writing as an Engineer, John Willey. New York, 2004
5.	Collins Cobuild- Student's Grammar: Self-Study Edition with Answers (Collins Cobuild Grammar) paperback- 6 May 1991
6.	Essential English Grammar paperback Raymond Murphy CUP 2007
7.	Android App for Grammar: <a href="https://play.google.com/store/apps/details?id=com.zayaninfotech.english.grammar">https://play.google.com/store/apps/details?id=com.zayaninfotech.english.grammar</a> <a href="http://www.onestopenenglish.com/grammar/">http://www.onestopenenglish.com/grammar/</a>
8.	Speak Better Write Better English paperback – Nov 2012, Norman Lewis, Goyal Publishers and Distributors
9.	Essential English Grammar Paperback Raymond Murphy CUP 2007
10	English Reading Comprehension 2014 RPH Editorial Board
11	Proficiency in Reading Comprehension Simplifying the 'Passage' for you, 2008 Ajay Singh.

18MA101		MATRICES AND CALCULUS	L	T	P	C
			3	1	0	4
<b>Course Objectives:</b>						
1.	To know the use of matrix algebra needed by engineers for practical applications.					
2.	To understand effectively the geometrical application of differential calculus and Beta, Gamma functions					
3.	To familiarize with partial differentiation concepts and its applications					
4.	To obtain the knowledge of multiple integration and their related applications					
5.	To acquire the knowledge of vector differentiation and integration and its applications					
<b>UNIT I</b>	<b>MATRICES</b>		<b>9</b>	<b>+</b>		<b>3</b>
Symmetric, Skew Symmetric and Orthogonal Matrices – Characteristic equation of a Matrix – Eigen values and Eigen vectors – Properties – Cayley-Hamilton theorem (excluding proof) – Diagonalization of Matrices - Reduction of quadratic form to canonical form by orthogonal transformation						
<b>UNIT II</b>	<b>CALCULUS</b>		<b>9</b>	<b>+</b>		<b>3</b>
Curvature , Radius of Curvature (Cartesian coordinates) – Centre and Circle of curvature - Evolutes and Involutives- Definite integrals and their properties – Beta and Gamma functions and their properties.						
<b>UNIT III</b>	<b>MULTIVARIABLE CALCULUS (DIFFERENTIATION)</b>		<b>9</b>	<b>+</b>		<b>3</b>
Partial derivatives – Euler's theorem for homogenous functions – Total Derivatives –Jacobians – Maxima, Minima and Saddle point- – Method of Lagrangian multipliers- Taylor's series.						
<b>UNIT IV</b>	<b>MULTIVARIABLE CALCULUS (INTEGRATION)</b>		<b>9</b>	<b>+</b>		<b>3</b>
Multiple integrals- Double integrals – Change of order of integration in double integrals – Change of variables (Cartesian to Polar) – Application to Areas – Evaluation of Triple integrals – Application to volumes						
<b>UNIT V</b>	<b>VECTOR CALCULUS</b>		<b>9</b>	<b>+</b>		<b>3</b>
Vector differentiation- Gradient- Directional derivative - Divergence - Curl , Vector integration- Line integration- work done – Surface and Volume integrals - Green's theorem , Gauss divergence and Stokes theorem (without proof) – Simple applications involving cubes and rectangular parallelepipeds.						
<b>Total (L+T)= 60 Periods</b>						

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Learn the fundamental knowledge of Matrix theory
CO2	: Familiar with the concept of the differentiation and integration and its applications
CO3	: Acquire skills in applications of Integral and Vector Calculus
<b>Text Books:</b>	
1.	Grewal. B.S, "Higher Engineering Mathematics", 43 <sup>rd</sup> Edition, Khanna Publications, Delhi, (2015).
2.	Veerarajan T., "Engineering mathematics for first year", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2009
<b>Reference Books:</b>	
1.	James Stewart, "Essential Calculus", Cengage Learning, New Delhi, 2 <sup>nd</sup> edition, 2013
2.	P. Kandasamy, K. Thilagavathy and K. Gunavathy," Engineering Mathematics (For I year B.E., B.Tech)", Nineth Edition, S. Chand & Co. Ltd. New Delhi, 2010
3.	Srimanta pal and Subath.C.Bhumia, "Engineering Mathematics", Oxford university publications, New Delhi, 2015
4.	Ewinkreyzig, "Advanced Engineering Mathematics", 9 <sup>th</sup> edition, John Wiley & Sons, 2006
5.	Sivaramakrishnadas.P, Ruknmangadachari.E. "Engineering Mathematics", Pearson, Chennai & Delhi, 2 <sup>nd</sup> edition, 2013

18CY101		CHEMISTRY		L	T	P	C	
				3	1	0	4	
<b>Course Objectives:</b>								
1.	Analyze microscopic chemistry in terms of atomic and molecular orbitals.							
2.	Rationalize periodic properties of elements and the knowledge of acids and bases.							
3.	Analyze the stereo chemical aspects of organic molecules and chemical reactions that are used in the synthesis of organic molecules							
4.	Rationalize bulk properties and processes in thermodynamic aspects and its extension in electrochemical processes							
5.	Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques							
<b>UNIT I</b>	<b>MOLECULAR STRUCTURE</b>					<b>9</b>	<b>+</b>	<b>3</b>
<p>Formation of molecular orbitals of diatomic molecules - energy level diagrams of – H<sub>2</sub>, He<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>, CO and NO - pi-molecular orbitals of butadiene and benzene;</p> <p>Aromaticity- Huckel rule - concept of aromaticity - aromatic, non-aromatic and anti-aromatic molecules;</p> <p>Crystal field theory - energy level diagrams for transition metal ions – octahedral and tetrahedral geometries - magnetic properties;</p> <p>Band theory - band structure of solids- Fermi level - role of doping on band structures.</p>								
<b>UNIT II</b>	<b>PERIODIC PROPERTIES AND ACID-BASE CONCEPTS</b>					<b>9</b>	<b>+</b>	<b>3</b>
<p>Effective nuclear charge – shielding effect, penetration of orbitals - variations of s, p, d and f orbital energies of atoms –Aufbau principle - electronic configuration of elements – periodic properties - atomic and ionic size, ionization energy, electron affinity and electro negativity - anomalous properties of second period elements - diagonal relationship;</p> <p>Acids and bases - Bronsted-Lowry concept - Lewis concept - pH and pKa – problems – HSAB - buffer solutions – types- mechanism of buffer action- Henderson–Hasselbalch equation- derivation and problems.</p>								
<b>UNIT III</b>	<b>STEREOCHEMISTRY AND ORGANIC REACTIONS</b>					<b>9</b>	<b>+</b>	<b>3</b>
<p>Stereoisomerism – geometrical isomerism – cis-trans and E-Z nomenclature – optical isomerism – symmetry, chirality, optical activity, enantiomer and diastereomers – absolute configuration - R-S notation - conformational analysis – Ethane, butane, cyclohexane;</p> <p>Addition reaction – hydrogenation, halogenations - Markovnikov rule – Kharasch effect - hydration,hydrohalogenation, hydroboration;</p> <p>Aliphatic nucleophilic substitution reaction –SN<sub>1</sub>, SN<sub>2</sub> and SN<sub>i</sub>mechanism – electrophilic substitution reaction in benzene– mechanism - nitration, halogenations, sulfonation, alkylation and acylation;</p> <p>Elimination reaction –E<sub>1</sub>, E<sub>2</sub> and E<sub>1</sub>CB- mechanism- Saytzeff rule – examples.</p>								

UNIT IV	USE OF FREE ENERGY IN CHEMICAL EQUILIBRIA	9	+	3
<p>Thermodynamic functions- internal energy, enthalpy, entropy and free energy- first and second law of thermodynamics - partial molar properties - Gibbs Duhem equation – variation of chemical potential with temperature and pressure – Third and Zeroth law of thermodynamics – definition only;</p> <p>Free energy and EMF relation - single electrode potential - electrochemical series and its significance.- cell potential and its measurement (Poggendorff method only) - Nernst equation-derivation and problems- Standard cell potential and equilibrium constant relation- problems.</p>				
UNIT V	SPECTROSCOPY TECHNIQUES AND APPLICATIONS	9	+	3
<p>Vibrational spectroscopy – principle - selection rule - harmonic and unharmonic oscillators -number of vibrational modes of poly-atomic molecules – overtones - Fermi resonance - instrumentation (block diagram only);</p> <p>Rotational spectroscopy- rotational spectra of rigid and non rigid diatomic rotators, simple polyatomic molecules like CO<sub>2</sub>, NH<sub>3</sub>,CH<sub>4</sub> and H<sub>2</sub>O;</p> <p>NMR - origin of NMR signal - chemical shift - factors affecting chemical shift and spin-spin coupling – application to ethanol, acetone and ethyl methyl ether.</p>				
<b>Total (L+P)= 60 Periods</b>				
<b>Course Outcomes:</b>				
Upon completion of this course, the students will be able to:				
CO1	:	Understand in-depth knowledge of atomic and molecular orbitals based chemical aspects.		
CO2	:	Realize the nature of periodic properties of elements and the knowledge of acids and bases		
CO3	:	Grasp the knowledge of 3D structural aspects of organic molecules and chemical reactions that are used in the synthesis of organic molecules.		
CO4	:	Substantiate the various processes involved in thermodynamic considerations and its involvement in electrochemical aspects		
CO5	:	Aware of spectroscopic techniques in the field of molecular identification of materials		
<b>Text Books:</b>				
1.	P.R. Puri, L.R.Sharma and Madan S. Pathania, "Principle of physical chemistry" 47 <sup>th</sup> Vishal Publishing Co, Jalandhar-8			
2.	C. N. Banwell and E. M. Mccash, "Fundamentals of Molecular Spectroscopy", Tata McGraw-Hill Publishing Company Limited, New Delhi, 2009.			
3.	Raj. K. Bansal – "A Text Book of Organic Chemistry" Revised 4th Ed.,(2005), New Age International Publishers Ltd., New Delhi.			
4.	P.S. Kalsi – "Stereochemistry conformation and Mechanism", 6th Ed., (2005), New Age International Publishers Ltd., New Delhi.			

5.	J.D. Lee – “A New Concise Inorganic Chemistry”, 5th Edn., Oxford University Press, 2011.
6.	Wahid Malik, G.D.Tuli and R.D.Madan, “Selected Topic in Inorganic Chemistry”, S.Chand & Co., Ltd (2011).
<b>Reference Books:</b>	
1.	David.W.Ball, Physical Chemistry, Cengage Learning India Pvt. Ltd., New Delhi, 2009
2.	G.Aruldhas, Molecular structure and spectroscopy, second edition, PHI learning Pvt. Ltd., New Delhi, 2008
3.	Cotton and Wilkinson – “Advanced Inorganic Chemistry”, 6th Ed., John Wiley & Sons, New York- 2004
4.	James E. Huheey, Ellen A. Keiter and Richard L. Keiter – “Inorganic Chemistry-Principles of Structure and Reactivity”, 4 thEdn., Pearson Education, 11 <sup>th</sup> Impression, 2011.
5.	F.A. Carey and R.J. Sund berg – “Advanced organic chemistry” Vol. I and II– 3rd Ed.,(1984), Plenum Publications
6.	Ernest. Eliel and Samuel H. Wilen – “Stereochemistry of Organic Compounds” – Wiley Student Ed., (2006). John Wiley and Sons Pvt. Ltd., Singapore.

18CS101		FUNDAMENTALS OF PROBLEM SOLVING AND C PROGRAMMING		L	T	P	C	
				3	0	0	3	
<b>Course Objectives:</b>								
1.	To express problem solving through programming							
2.	To practice the basic concepts of C programming language.							
3.	To provide the basics knowledge about array and strings to solve simple applications.							
4.	To use pointers and functions in the simple applications.							
5.	To review the elementary knowledge of structures and unions.							
<b>UNIT I</b>	<b>INTRODUCTION TO COMPUTER AND PROBLEM SOLVING</b>					<b>9</b>	<b>+</b>	<b>0</b>
Problem formulation, Problem Solving methods, Need for logical analysis and thinking – Algorithm – Pseudo code – Flow Chart - Need for computer languages, Generation and Classification of Computers - Basic Organization of a Computer.								
<b>UNIT II</b>	<b>C PROGRAMMING BASICS AND CONTROL STATEMENTS</b>					<b>9</b>	<b>+</b>	<b>0</b>
C Character set- Identifies and Keywords- Data Type- Declarations-Expressions-Statements and Symbolic constants- Operators – Arithmetic Operators – Unary operators – Relational and Logical Operators – Assignment operators – Conditional operators- Managing Input and Output operations- Decision Making- Branching and Looping statements.								
<b>UNIT III</b>	<b>ARRAYS AND STRINGS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Pre-processor directives-Storage classes-Arrays – Initialization – Declaration – one dimensional and two dimensional arrays. Strings - String operations – String handling functions-Simple programs-sorting-searching.								
<b>UNIT IV</b>	<b>FUNCTIONS AND POINTERS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Function – Library functions and user-defined functions – Function prototypes and function definitions – Call by value –Call by reference – Recursion – Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays.								
<b>UNIT V</b>	<b>STRUCTURES, UNIONS AND FILE</b>					<b>9</b>	<b>+</b>	<b>0</b>
Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure – Passing structures to functions – Array of structures – Pointers to structures-Union-basic file operation.								
<b>Total (L+ T)= 45 Periods</b>								



<b>Course Outcomes:</b>		
Upon completion of this course, the students will be able to:		
CO1	:	Formulate and apply logic to solve basic problems.
CO2	:	Write, compile and debug programs in C language.
CO3	:	Apply the concepts such as arrays, decision making and looping statements to solve real time applications
CO4	:	Solve simple scientific and statistical problems using functions and pointers
CO5	:	Write programs related to structures and unions for simple applications.
<b>Text Books:</b>		
1.	Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011. (Unit-I).	
2.	E.Balagurusamy, "Programming in ANSI C" fourth Edition, Tata McGraw-Hill, 2008 (Unit II-V).	
<b>Reference Books:</b>		
1.	Byron S Gottfried, "Programming with C", Schaum's Outlines, Second Edition, Tata McGraw-Hill, 2006	
2.	Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2006	
3.	Yashavant P. Kanetkar. "Let Us C", BPB Publications, 2011.	

18EN102		PROFESSIONAL ENGLISH LABORATORY	L	T	P	C
			0	0	2	1
<b>Course Objectives:</b>						
1.	To acquire and develop listening skills for academic, social and professional purposes.					
2.	To understand short conversations or monologues					
3.	To master basic reading skills such as phonics, word recognition, and fluency					
4.	Acquire and develop pre-intermediate level fluency in oral skills such as discourse management, grammar and vocabulary, pronunciation and interactive communication for academic, social and professional purposes					
5.	Address an audience and present a topic.					
6.	Express an opinion and justify it					
<b>Methodology - Listening</b> List of Audio files:						
<ol style="list-style-type: none"> <li>1. Job Responsibilities</li> <li>2. Conversation between two employees on company culture</li> <li>3. Emails</li> <li>4. Description of gadgets</li> <li>5. Interview with a leading industrialist</li> <li>6. Office procedures – applying for permission, placing an order for office equipment,</li> <li>7. Enquiries about orders and deliveries</li> <li>8. Conversation between two people on general topics</li> <li>9. Telephone Messages</li> <li>10. Fixing and Cancelling appointments</li> <li>11. Asking for directions</li> <li>12. Rescheduling a travel plan</li> <li>13. Tones : Rude and Polite</li> <li>14. Conversation : Statements, Discussions, Debating, Accepting, Negotiating</li> <li>15. Conferences ; Announcements about changes in schedules and sessions</li> <li>16. Motivational Speech</li> <li>17. TED Talk on Team Work</li> <li>18. Describing charts and data</li> <li>19. Presentation at an office</li> <li>20. Short self-descriptions</li> </ol>						
<b>METHODOLOGY: - Speaking</b>						
<ol style="list-style-type: none"> <li>1. Self-Introduction – Personal information –Name, Home background, study details, area of interest, hobbies, strengths and weaknesses, projects and paper presentations if any, likes and dislikes in food, clothes, Special features of home town, Personal role models in life, goals and dreams, favorite inspirational quote.</li> <li>2. Situational Role Play between Examiner and Candidate – Customer and Sales Manager, Hotel Manager and Organiser, Team Leader and Team member, Bank Manager and Candidate, Interviewer and Applicant, Car Driver and Client, Industrialist and Candidate, Receptionist and Appointment Seeker, New Employee and Manager, Employee and Employee, P.A. and Manager Schedule for training,</li> </ol>						

	Asking for directions, Seeking help with office equipment, Clarifying an error in the bill, Quality of Products, Buying a Product, Selling a Product, cancelling and fixing appointments, hotel accommodation, training facilities, dress code, conference facilities, faculty advisors and student, student and student, college Office personnel and student.
<b>Total (L)= 30 Periods</b>	
<b>Course Outcomes:</b>	
After the successful completion of the practical session, the students will be able to	
CO1	: Infer, interpret and correlate routine, classroom-related conversation
CO2	: Use a range of common vocabulary and context based idioms.
CO3	: Comprehend native speakers when they speak quickly to one another, although the student might still have trouble.
CO4	: Identify the most important words in a story/article.
CO5	: Summarize the main ideas, key details, and inferred meanings from listening passages of up to five minutes.
CO6	: Vocalize words without the aid of pictures
CO7	: Make effective self-introductions
CO8	: Study options, compare and contrasts the options
CO9	: Exercise a choice, justify it by giving examples and illustrations.
CO10	: Construct a situation and to participate in conversations.
<b>Text Books:</b>	
1.	Norman Whitby. Business Benchmark –Pre - Intermediate to Intermediate, Students Book, Cambridge University Press, 2014
<b>Recommended Reading and Reference Sources:</b>	
1.	Spoken English: A Self-Learning Guide. V. Sasikumar and P V Dhamija.
2.	English Conversation Practice: Grant Taylor Paperback 1976ely. Krishna Mohan, N P Singh
3.	Discussions that Work. Penny Ur. CUP, 1981
4.	<a href="http://www.onestopenGLISH.com/skills/speaking/speaking-matters/">http://www.onestopenGLISH.com/skills/speaking/speaking-matters/</a>
5.	Speak Better Write Better English Paperback - November 2012 Norman Lewis, Goyal Publishers and Distributors.

18CS102		COMPUTER PRACTICE LABORATORY		L	T	P	C
				0	0	4	2
<b>Course Objectives:</b>							
1.	To provide basic knowledge of creating Word documents and also producing mail merge						
2.	To make use of basic functions, formulas and charts in Spread sheet						
3.	To implement problem solving techniques.						
4.	To promote the programming ability to develop applications for real world problems						
<b>EXPERIMENTS</b>							
<p><b>A. Word Processing</b></p> <p>1. Document creation, Text manipulation with Scientific notations, Table creation, Table formatting and Conversion</p> <p>2. Letter preparation using Mail merge and Draw flow Charts using tools</p> <p><b>B. Spread Sheet</b></p> <p>3. Chart - Line, XY, Bar and Pie.</p> <p>4. Formula - formula editor, Sorting and Import and Export features.</p> <p>5. Spread sheet - inclusion of object, Picture and graphics, protecting the document and sheet.</p> <p><b>C. Simple C Programming</b></p> <p>6. Program using Control statements.</p> <p>7. Program using Looping.</p> <p>8. Program using Array.</p> <p>9. Program using String.</p> <p>10. Program using Function.</p> <p>11. Program using Structures.</p> <p>12. Program using Pointers.</p> <p>13. Program using Files.</p> <p style="text-align: center;"><b>* For programming exercises Flow chart and pseudo code are essential</b></p>							
<b>Total (P)= 60 Periods</b>							
<b>Course Outcomes:</b>							
After the successful completion of the practical session, the students will be able to							
CO1	:	Demonstrate the basic mechanics of Word documents and working knowledge of mail merge.					
CO2	:	Demonstrate the use of basic functions and formulas in Spread sheet.					
CO3	:	Apply good programming methods for program development.					
CO4	:	Implement C programs for simple applications.					

18ME102		WORKSHOP MANUFACTURING PRACTICES	L	T	P	C
			1	0	4	3
<b>Course Objectives:</b>						
1.	To provide an exposure of basic engineering practices to the student					
2.	To provide exposure to the students with hands on experience on various basic engineering practices in Civil and Mechanical Engineering					
<b>EXPERIMENTS</b>						
1.	Introduction to Safety measures and First aid.					
2.	Study of Lathe -Welding methods and equipment's- Casting process and tools- Sheet metal and fitting tools- Carpentry tools and joints.					
3.	Fitting: V-fitting, Square fitting, Curve fitting.					
4.	Lathe: Facing, turning, taper turning and knurling.					
5.	Welding: BUTT, LAP and T- joints.					
6.	Foundry: Green sand preparation- mould making practice.					
7.	Sheet metal: Cone, tray, cylinder.					
8.	Carpentry: CROSS, T and DOVETAIL joints.					
9.	Drilling: simple exercises.					
						<b>Total (P)= 60 Periods</b>
<b>Course Outcomes:</b>						
After the successful completion of the practical session, the students will be able to						
CO1	:	Prepare fitting of metal and wooden pieces using simple fitting and carpentry tools manually.				
CO2	:	Prepare simple lap, butt and tee joints using arc welding equipment.				
CO3	:	Prepare green sand moulding.				
CO4	:	Prepare sheet metal components.				
CO5	:	Prepare simple components using lathe and drilling machine.				
<b>Reference Books:</b>						
1.	Bawa, H.S, "Work shop Practice", Tata McGraw Hill Publishing Company Limited, 2007.					
2.	Jeyachandran, K, Natarajan, K and Balasubramanian, S, "A Primer on Engineering Practices Laboratory", Anuradha Publications, 2007.					
3.	Jeyapoovan, T, SaravanaPandian, M and Pranitha, S, "Engineering Practices Lab Manual", VikasPublishing House Pvt. Ltd, 2006.					

# **SEMESTER-II**

18MA202		DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA	L	T	P	C		
			3	1	0	4		
<b>Course Objectives:</b>								
1.	To obtain the knowledge to solve second order differential equations with constant and variable coefficients.							
2.	To familiarize with formation and solutions of first order partial differential equations.							
3.	To familiarize with the solutions of higher order partial differential equations.							
4.	To develop the use of matrix algebra needed by engineers for practical applications							
5.	To obtain the knowledge about the vector spaces, inverse of a linear transformation and composition of linear maps.							
<b>UNIT I</b>	<b>ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER</b>					<b>9</b>	<b>+</b>	<b>3</b>
Second order linear differential equations with constant and variable coefficients –Cauchy-Euler equation and Cauchy- Legendre’s linear equation - Method of variation of parameters –Simultaneous first order linear equations with constant coefficients.								
<b>UNIT II</b>	<b>PARTIAL DIFFERENTIAL EQUATIONS – FIRST ORDER</b>					<b>9</b>	<b>+</b>	<b>3</b>
Formation of partial differential equations by elimination of arbitrary constants and functions – Solutions to first order partial differential equations – Standard types of first order linear and non-linear PDE- Lagrange’s linear PDE.								
<b>UNIT III</b>	<b>PARTIAL DIFFERENTIAL EQUATIONS – HIGHER ORDER</b>					<b>9</b>	<b>+</b>	<b>3</b>
Solution to homogeneous and non-homogeneous linear partial differential equations of second and higher order by complementary function and particular integral method - Separation of variables method: simple problems in Cartesian coordinates, Laplace equation in Cartesian and polar coordinates, one dimensional diffusion equation, one dimensional wave equation.								
<b>UNIT IV</b>	<b>MATRICES</b>					<b>9</b>	<b>+</b>	<b>3</b>
Matrices - Linear system of equations – rank of a matrix- Cramer’s rule- Gauss elimination and Gauss- Jordan elimination- Inverse of a matrix by Gauss- Jordan method- Solution of Algebraic and Transcendental equations by Newton-Raphson method.								
<b>UNIT V</b>	<b>VECTOR SPACES</b>					<b>9</b>	<b>+</b>	<b>3</b>
Vector space - linear dependence of vectors, basis and dimension- Linear transformations (maps) - range and kernel of linear transformation- rank and nullity- Inverse of linear transformation- rank-nullity theorem – Composition of linear maps- Matrix associated with linear map.								
							<b>Total (L+T)= 60 Periods</b>	

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Learn the techniques of solving ordinary and partial differential equations of second and higher order that arise in engineering problems.
CO2	: Familiar with the concept of Laplace transforms method to solve second order differential equations.
CO3	: Learn the fundamental knowledge of Matrices and acquired the knowledge about the vector spaces and inverse of linear transformation and composition of linear maps.
<b>Text Books:</b>	
1.	Grewal. B.S, "Higher Engineering Mathematics", 43 <sup>rd</sup> Edition, Khanna publications, Delhi, 2015
2.	Veerarajan T., "Engineering mathematics for first year", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2009
3.	Gilbert Strang, "Linear Algebra and its applications", Cengage Learning, New Delhi, 4 <sup>th</sup> edition, 2006.
<b>Reference Books:</b>	
1.	James Stewart, "Essential Calculus", Cengage Learning, New Delhi, 2 <sup>nd</sup> edition, 2013.
2.	P. Kandasamy, K. Thilagavathy and K. Gunavathy," Engineering Mathematics (For I year B.E., B.Tech)", Nineth Edition, S. Chand & Co. Ltd. New Delhi, 2010.
3.	Srimanta pal and Subath.C.Bhumia, "Engineering Mathematics", Oxford university publications, New Delhi, 2015
4.	Ewinkreyzig, "Advanced Engineering Mathematics", 9 <sup>th</sup> edition, John Wiley & Sons, 2006.
5.	D.Poole, "Linear Algebra, A Modern introduction", 2 <sup>nd</sup> edition, Brooks, 2005.
6.	V.Krishnamurthy, V.P.Mainra and J.L.Arora, "An introduction to Linear Algebra", East-West press, Reprint 2005



18PH201		SEMICONDUCTOR PHYSICS AND OPTOELECTRONICS		L	T	P	C
				3	1	0	4
<b>Course Objectives:</b>							
1.	Classical free electron theory and band theory of solids						
2.	Basic concepts of semiconductors						
3.	Physics of p-n junction, breakdown mechanism in semiconductors						
4.	Principle and working of semiconductor laser, LED and LCD						
5.	Construction and characteristics of solar cell and photo detectors						
<b>UNIT I</b>	<b>FREE ELECTRON THEORY AND BAND THEORY OF SOLIDS</b>			<b>9</b>	<b>+</b>	<b>3</b>	
Classical free electron theory of metals - drawbacks of classical free electron theory; Quantum theory ; Fermi distribution function - effect of temperature on Fermi function ; Density of energy states - carrier concentration; Band theory of solids - E-k diagram - Brillouin zones -distinction between conductors, semiconductors and insulators.							
<b>UNIT II</b>	<b>SEMICONDUCTORS</b>			<b>9</b>	<b>+</b>	<b>3</b>	
Properties of semiconductor ; Bonds in semiconductors ; Intrinsic semiconductors ; Extrinsic semiconductors - N-type and P-type semiconductors ; Ionization energy ; Holes and electrons in semiconductors; Carrier concentration in intrinsic semiconductor (derivation) ; Electrical conductivity and band gap determination in intrinsic semiconductors ; Carrier concentration in N-type semiconductor (derivation) ; Variation of Fermi level with temperature and doping concentration ; Generation and recombination of charge carriers in semiconductors ; Direct and indirect band gap semiconductors ; Equation of continuity.							
<b>UNIT III</b>	<b>PHYSICS OF P-N JUNCTION</b>			<b>9</b>	<b>+</b>	<b>3</b>	
Formation of p-n junction-barrier potential ; Forward bias - reverse bias - current flow in a forward biased p-n junction - VI characteristics of p-n junction diode both in forward and reverse bias ; Drift current in semiconductors ; Diffusion current in semiconductors ; Types of breakdown in semiconductor devices - avalanche breakdown - Zener breakdown - thermal breakdown ; Zener diode-characteristics and applications ; Hall effect-determination of Hall co-efficient ; Applications.							
<b>UNIT IV</b>	<b>PHYSICS OF OPTOELECTRONICS</b>			<b>9</b>	<b>+</b>	<b>3</b>	
Principle of laser-absorption-spontaneous emission-stimulated emission ; Semiconductor laser – homojunction and heterojunction Semiconductor laser - construction, working and energy level diagram ; Light emitting diode (LED) - construction, working and characteristics - seven segment display ; Liquid crystal display (LCD) - principle and working ; Optical switching – self electro optic effect device (SEED).							

UNIT V	PHYSICS OF OPTOELECTRONICS	9	+	3
Photovoltaic effect - solar cell-construction, working and applications ; Photo detector -photo conductors - photo diodes - pin photo diode - avalanche photo diode - photo transistors ; Quantum well, dot, wire (qualitative) ; Modulators - Franz-Keldysh and Stark effect electro absorption modulators - quantum well electro absorption modulators - electro optic modulators.				
<b>Total (L+T)= 60 Periods</b>				
<b>Course Outcomes:</b>				
Upon completion of this course, the students will be able to:				
CO1	:	The free electron theory and difference between the electronic materials		
CO2	:	The basics of semiconductors and to apply continuity equation for various devices		
CO3	:	The concept of p-n junction and breakdown mechanism in semiconductors		
CO4	:	The principle and working of semiconductor laser, LED, LCD and switching device		
CO5	:	The Construction and characteristics of solar cell, photo conductors, photo diodes, photo transistors and modulators		
<b>Text Books:</b>				
1.	Pallab Bhattacharya, "Semiconductor optoelectronic devices", Pearson Education publications, New Delhi, 2002.			
2.	Mehta V K, Rohit Mehta, "Principles of electronics" S.Chand & co publications, New Delhi, 2007			
3.	Arumugam M, "Materials Science", Anuradha publications,kumbakonam, 2006			
4.	Rajendran V and Marikani A, "Materials Science", Tata McGraw publications, New Delhi, 2004.			
<b>Reference Books:</b>				
1.	David A.Bell, "Electronic Devices and Circuits", Oxford University press publications, New Delhi,2008			
2.	Lal Kishore K,"Electronic Devices and Circuits", BS publications, Hyderabad, 2008			
3.	Pillai S O, "Solid State Physics", New age international publishers, Chennai, 2005.			
4.	Arumugam M, "Semiconductor Physics and Optoelectronics", Anuradha publications, kumbakonam, 2006			
5.	Palanisamy P K, "Materials Science",Scitech publications(India), chennai,2007.			

<b>18EE101</b>	<b>BASIC ELECTRICAL AND ELECTRONICS ENGINEERING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
(Common to Civil and Computer Science and Engineering)		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Course Objectives:</b>					
1.	To understand and analyze basic electric circuits				
2.	To study working principle of Electrical machines and transforms.				
3.	To study basics of Electronics System				
4.	To understand the concepts of Electrical Installation				
<b>UNIT I</b>	<b>DC CIRCUITS</b>	<b>9</b>	<b>+</b>	<b>3</b>	
Electrical circuit elements (R, L and C), voltage and current sources, Ohm's law, Kirchoff current and voltage laws, series and parallel circuits, analysis of simple electrical circuits with DC excitation, Simple problems. Superposition, thevenin's and Norton's theorem, Star – Delta transformation.					
<b>UNIT II</b>	<b>AC CIRCUITS</b>	<b>9</b>	<b>+</b>	<b>3</b>	
Introduction to single phase AC circuits, Representation of sinusoidal waveforms, peak and RMS values, phasor representation, real power, reactive power, apparent power, power factor. Three phase AC circuits, voltage and current relations in star and delta connections.					
<b>UNIT III</b>	<b>ELECTRICAL MACHINES AND TRANSFORMERS</b>	<b>9</b>	<b>+</b>	<b>3</b>	
Construction, operation, types, Speed control of Shunt motor and applications of DC Motor, Construction and working of a three-phase induction motors. Working of single-phase induction motor and its applications. Ideal and practical transformer, Construction and working, losses and efficiency in transformers, Introduction to Three phase transformers.					
<b>UNIT IV</b>	<b>BASICS ELECTRONICS SYSTEM</b>	<b>9</b>	<b>+</b>	<b>3</b>	
Introduction - Basic structure of semiconductors devices- PN junction diode, Zener diode and V-I characteristics- BJT – CE, CB, CC configuration and working principle. Operational Amplifier-principle of operation, Characteristics, Applications-Inverting Amplifier, Non inverting Amplifier, summing amplifier and differential amplifier.					
<b>Unit V</b>	<b>ELECTRICAL INSTALLATIONS</b>	<b>9</b>	<b>+</b>	<b>3</b>	
Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing, Basics of house wiring tools and components, types of house wiring. Batteries-Principle characteristics-Types and its applications- Introduction to UPS and SMPS.					
<b>Total (L+T)= 60 Periods</b>					

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Analyse the simple DC circuits.
CO2	: Analyse the single and three phase AC circuits.
CO3	: Understand the working principle of Electrical machines and transformers.
CO4	: Analyse the fundamentals and characteristics of Diode , BJT and OPAMP .
CO5	: Understand the concept of Electrical Installations.
<b>Text Books:</b>	
1.	R.Muthu Subramaniam, R. Salivaganan and K. A Muralidharan , “Basic Electrical and Electronics Second Edition Engineering”, Tata McGraw Hill, 2010.
2.	D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
3.	D.C.Kulshreshtha, “Basic Electrical Engineering”, Tata McGraw Hill, 2009.
<b>Reference Books:</b>	
1.	L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
2.	E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.

18ME101		ENGINEERING GRAPHICS & DESIGN	L	T	P	C
			1	0	4	3
<b>Course Objectives:</b>						
1.	To impart knowledge on concepts, ideas and design of engineering products and to provide an exposure to CAD Modelling.					
2.	Standards of Engineering Drawing: Size, layout and folding of drawing sheets, lettering - Use of drafting instruments					
<b>UNIT I PROJECTION OF POINTS, LINES AND PLANE SURFACES</b>						
			9	+	3	
General principles of orthographic projection- Projection of points, located in all quadrants – Projection of straight lines located in first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes.						
<b>UNIT II PROJECTION OF SOLIDS</b>						
			9	+	3	
Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is perpendicular to one reference plane and also inclined to one reference plane by change of position method.						
<b>UNIT III SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES</b>						
			9	+	3	
Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to other – solids inclined position with cutting planes parallel to one reference plane- Obtaining true shape of section.						
Development of lateral surfaces of simple and truncated solids – Prisms, pyramids cylinders and cones- Development of lateral surfaces of solids with square and cylindrical cutouts, perpendicular to the axis.						
<b>UNIT IV ISOMETRIC PROJECTION</b>						
			9	+	3	
Principles of isometric projection –isometric scale - isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones.						
<b>UNIT V PERSPECTIVE PROJECTION</b>						
			9	+	3	
Perspective projection of prisms, pyramids and cylinders by visual ray and vanishing point methods.						
<b>Total (L+T)= 60 Periods</b>						

**Note:** Study of drafting software – Auto CAD – Coordinate System (Absolute, relative and polar)  
 Creation of simple figures like polygon, Drawing a plan of residential building, Creation of 3-D Models of simple objects and obtaining 2-D multi view drawing from 3-D model. **(Internal Assessment only)**

**Course Outcomes:**

Upon completion of this course, the students will be able to:

CO1	:	Understand the conventions and the methods of engineering drawing.
CO2	:	Understand the fundamental concepts of theory of projection.
CO3	:	Understand the development of different surfaces.
CO4	:	Develop the relationships between 2D and 3D environments.
CO5	:	Demonstrate computer aided drafting.

**Text Books:**

1.	Bhatt N.D, "Engineering Drawing", Charotar publishing House, 2003
2.	Natarajan, K.V, "A Text book of Engineering Graphics", Dhanalakshmi Publishers, 2006.

**Reference Books:**

1.	Gopalakrishnana K.R, "Engineering Drawing", Vol. I and II, Subhas Publications, 1999.
2.	Dhananjay A. Jolhe, "Engineering Drawing with an Introduction to AutoCAD", Tata McGraw Hill Publishing Company Limited, 2008.
3.	Venugopal, K and Prabhu Raja, V., "Engineering Graphics", New Age International (P) Ltd, 2008.
4.	Gill, P.S, "Engineering Drawing-Geometrical Drawing", S.K Kataria and Sons, 2008.
5.	CAD Software Theory and User Manuals

18PH103		PHYSICS LABORATORY	L	T	P	C
(Common to All Branches of Engineering)			0	0	3	1.5
<b>Course Objectives:</b>						
1.	To handle different measuring instruments.					
2.	To understand the basic concepts of interference, diffraction, heat conduction and to measure the important parameters.					
<b>EXPERIMENTS</b>						
<b>(Any EIGHT Experiments)</b>						
1.	Newton's rings – Determination of radius of curvature of a Plano convex lens.					
2.	Carey Foster's bridge – Determination of specific resistance of the material of the wire					
3.	Poiseuille's flow – Determination of Coefficient of viscosity of a liquid					
4.	Spectrometer – Grating – Normal incidence – Determination of Wavelength of Mercury lines.					
5.	Lee's disc – Determination of thermal conductivity of a Bad conductor.					
6.	Ultrasonic interferometer – Determination of velocity of Ultrasonic Waves in Liquid					
7.	Non-uniform bending – Determination of young's modulus of the material of the Bar					
8.	Determination of Band gap of a given semi conductor					
9.	Determination of Wavelength of laser using grating and determination of particle size using Laser					
10.	Determination of Acceptance angle and Numerical Aperture of fiber					
						<b>Total (P)= 45 Periods</b>
<b>Course Outcomes:</b>						
After the successful completion of the practical session, the students will be able to						
CO1	:	Handle different measuring instruments and to measure different parameters				
CO2	:	Calculate the important parameters and to arrive at the final result based on the experimental measurements				

18CY102		CHEMISTRY LABORATORY		L	T	P	C
(Common to all branches of Engineering For student admitted from 2018-2019 and onwards)				0	0	3	1.5
<b>Course Objectives:</b>							
1.	To gain practical knowledge by applying theoretical principles and performing the following experiments						
<b>EXPERIMENTS</b>							
1.	Estimation of hardness of Water by EDTA						
2.	Estimation of Copper in brass by EDTA						
3.	Estimation of Alkalinity in water						
4.	Estimation of Chloride in water sample (Iodimetry)						
5.	Conductometric titration of Strong Acid and Strong Base						
6.	Conductometric titration of Mixture of acids and Strong base						
7.	Determination of strength of Iron by Potentiometric method						
8.	Estimation of Iron by Spectrophotometry						
9.	Determination of molecular weight and degree of Polymerisation by Viscometry.						
	<b>NOTE:</b> ➤ All the nine experiments shall be offered.						
							<b>Total (P)= 45 Periods</b>
<b>Course Outcomes:</b>							
After the successful completion of the practical session, the students will be able to							
CO1	:	To know the applicability of the practical skill gained in various fields.					
CO2	:	To know the composition of brass quantitatively and the molecular weight of polymers.					
CO3	:	To understand the principle and applications of conductometric titrations, spectrometer and potentiometric titrations.					



18EN103		PROFESSIONAL COMMUNICATION LABORATORY	L	T	P	C
(Common to All Branches)			0	0	2	1
<b>Course Objectives:</b>						
1.	Improve their reading skills.					
2.	Address an audience and present a topic.					
3.	Acquire speaking competency in English.					
4.	Strengthen their fluency in speaking					
<b>EXPERIMENTS</b>						
<b>Methodology – Reading</b>						
1) Reading a story aloud with exact pronunciation, with intonation, and with expressing sense. 2) Reading poems for improving verbal skills, memory, and critical thinking. 3) Reading newspaper articles for strengthening the vocabulary and writing skills. 4) Reading homophones with exact pronunciation for expressing different meanings						
<b>Methodology – Speaking</b>						
1) Power point presentation – on general topics - for organising and structuring presentation. 2) Oral presentation -on basic technical ideas related to engineering. 3) Speaking on a given topic – current affairs, expressing opinion on social issues. 4) Describing a process – booking Ticket online, survey for starting a new office, sending an e-mail, etc. 5) Organising official events –compering,presenting welcome address, proposing vote of thanks						
<b>Total (P)= 30 Periods</b>						
<b>Course Outcomes:</b>						
After the successful completion of the practical session, the students will be able to						
CO1	:	read short passages fluently, avoiding mispronunciation, substitution, omission and transposition of word-pairs				
CO2	:	vocalize words without the aid of pictures.				
CO3	:	develop a well-paced, expressive style of reading.				
CO4	:	make effective oral presentations on technical and general contexts				
CO5	:	describe a process with coherence and cohesion.				

**Text Books:**

- |    |   |
|----|---|
| 1. | Norman Whitby. Business Benchmark – Pre-Intermediate to Intermediate, Students book, Cambridge University Press, 2014 |
|----|---|

**Recommended Reading and Reference Sources:**

- |    |   |
|----|---|
| 1. | Spoken English: A Self-Learning Guide. V.Sasikumar and P V Dhamija  |
| 2. | English Conversation Practice: Grant Taylor Paperback 1976ly. Krishna Mohan, N P Singh  |
| 3. | Discussions that Work. Penny Ur.CUP, 1981   |
| 4. | <a href="http://www.onestopenglish.com/skills/speaking/speaking-matters/">http://www.onestopenglish.com/skills/speaking/speaking-matters/</a> |
| 5. | Speak Better Write Better English Paperback – November 2012 Norman Lewis, Goyal Publishers and Distributors                                   |

18EE102		BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY	L	T	P	C
			0	0	2	1
<b>Course Objectives:</b>						
1.	To impart hands on experience in use of measuring instruments, testing in transformers, and house wiring practices					
<b>EXPERIMENTS</b>						
1.	Verification of Kirchhoff's laws.					
2.	Verification of Superposition theorem.					
3.	Measurement of three-phase power in three-phase circuits					
4.	Determination losses in single phase Transformer					
5.	Demonstration of cut-out sections of machines: induction machine (squirrel cage rotor), and single-phase induction motor					
6.	Speed control of DC shunt motor					
7.	Study of basic safety precautions, measuring instruments – voltmeter, ammeter, multi-meter, and Electrical components.					
8.	VI Characteristics of PN Junction diode.					
9.	House wiring					
10.	Wiring for Fluorescent lamp.					
<b>Total (P)= 30 Periods</b>						
<b>Course Outcomes:</b>						
After the successful completion of the practical session, the students will be able to						
CO1	:	Get an exposure to DC and AC circuits.				
CO2	:	Understand the loading characteristics of transformers				
CO3	:	Know the parts of single-phase and three phase induction motors.				
CO4	:	Get an exposure Electron devices				
CO5	:	Make electrical connections by wires of appropriate ratings.				

## **SEMESTER-III**

18MA301		PROBABILITY AND STATISTICS	L	T	P	C
			3	1	0	4
<b>Course Objectives:</b>						
1.	To familiar with basic concepts of probability and random variables					
2.	To obtain the knowledge about discrete and continuous distributions					
3.	To acquire knowledge of bivariate distributions and the problems related to coefficient of correlation					
4.	To understand the statistical averages and fitting of curve.					
5.	To gain the knowledge of significance test for large and small samples.					
<b>UNIT I   PROBABILITY AND RANDOM VARIABLES</b>						
			9	+		3
Axioms of Probability, Conditional Probability, Total Probability, Baye's theorem- Random variables: Discrete and Continuous random variables - Moments – Moment generating functions and their properties.						
<b>UNIT II   STANDARD DISTRIBUTION</b>						
			9	+		3
Binomial, Poisson, Exponential, Gamma and Normal Distributions and their properties - Cheybyshev's inequality.						
<b>UNIT III   TWODIMENSIONAL RANDOM VARIABLES</b>						
			9	+		3
Joint distributions – Marginal and Conditional distributions – Correlation, Regression and rank correlation.						
<b>UNIT IV   BASIC STATISTICS</b>						
			9	+		3
Measures of Central tendency: Moments, Skewness and Kurtosis, Curve fitting by the method of Least Squares –Fitting of straight lines, second degree parabolas and curves reducible to linear forms						
<b>UNIT V   TEST OF HYPOTHESIS</b>						
			9	+		3
Test of significance: Large Sample tests for Single proportion, difference of proportion, single mean and difference of means- Small Sample test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.						
<b>Total (L+T)= 60 Periods</b>						

**Course Outcomes:**

Upon completion of this course, the students will be able to:

CO1	:	Acquire the concepts of probability and random variables and the knowledge of standard distributions.
CO2	:	Learn about the correlation and regression of two dimensional random variables.
CO3	:	Familiar with fitting a curve by least squares method.

**Text Books:**

1.	Veerarajan T, "Probability and Random Process (With Queuing theory)", 4 <sup>th</sup> Edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2016
2.	Jay, L. Devore, "Probability and Statistics for Engineering and Sciences", Cengage Learning, New Delhi, 8 <sup>th</sup> edition, 2012.

**Reference Books:**

1.	Fruend John, E. and Miller, Irwin, "Probability and Statistics for Engineering", 5 <sup>th</sup> Edition, Prentice Hall, 1994.
2.	Grewal, B.S., "Higher Engineering Mathematics", 43 <sup>rd</sup> Edition, Khanna Publishers, Delhi, 2014.
3.	Gupta, S.C. and Kapur, V.K. "Fundamentals of Mathematical Statistics", Sultan Chand and Sons, New Delhi, 2015

18CS301		DIGITAL PRINCIPLES AND SYSTEM DESIGN	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To comprehend digital languages, Boolean laws and Boolean functions					
2.	To understand the design of fundamental combinational and sequential circuits of a computing device					
3.	To analyse and design combinational and sequential circuits					
<b>UNIT I   BOOLEAN ALGEBRA AND LOGIC GATES</b>						
			9	+		0
Number systems – Decimal – Binary – Octal – Hexadecimal – Binary Arithmetic – Binary codes – Boolean algebra and theorems – Boolean functions – Simplifications of Boolean functions using Karnaugh map and Quine-Mccluskey method – logic gates.						
<b>UNIT II   COMBINATIONAL LOGIC</b>						
			9	+		0
Combinational circuits – Analysis and design procedures – Circuits for arithmetic operations – Half Adder – Full Adder – Half Subtractor – Full Subtractor – Adder-Subtractor – Carry Look ahead adder – Decimal Adder – Binary Multiplier – Magnitude Comparator – Code conversion circuits.						
<b>UNIT III   MSI COMBINATIONAL LOGIC &amp; SYNCHRONOUS SEQUENTIAL LOGIC</b>						
			9	+		0
Decoders – Encoders – Multiplexers – De-multiplexers – Realizing Boolean Functions with Multiplexers – Sequential circuits – Latches – SR latch – Flip flops – D Flip flop – JK Flip Flop – T Flip Flop – Analysis and Design Procedures – State reduction and state assignment – Transition table – Circuit Design						
<b>UNIT IV   MEMORY AND PROGRAMMABLE LOGICS</b>						
			9	+		0
Registers – Shift Registers – Ripple Counters – Synchronous Counters – Counters with unused states – Ring Counter – Johnson Counter – Random Access Memory – Memory Decoding – Error Detection and Correction – Read only Memory – Programmable Logic Array – Programmable Array Logic						
<b>UNIT V   ASYNCHRONOUS SEQUENTIAL LOGIC</b>						
			9	+		0
Analysis and Design procedure for asynchronous sequential circuits – Reduction of state and flow tables – Race Free State assignment – Hazards.						
<b>Total (L+T)= 45 Periods</b>						

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Apply Boolean laws to derive simplified Boolean function and implement the circuit with logic components.
CO2	: Reproduce the existing design of combinational or sequential circuits of a computing device and scale them in size
CO3	: Analyse and design simple combinational or sequential circuits
<b>Text Books:</b>	
1.	M.Morris Mano and Michael Ciletti, "Digital Design with an Introduction to the Verilog HDL", Fifth Edition, Pearson Education, 2013.
<b>Reference Books:</b>	
1.	Stephen Brown and Zvonko Vranesic, "Fundamentals with Digital Logic Design with VERILOG", Third Edition, McGraw-Hill Education 2014.
2.	Donald D.Givone, "Digital Principles and Design", McGraw Hill Higher Education,2003.
3.	Charles H.Roth, Jr and Larry L. Kinney "Fundamentals of Logic Design" Seventh Edition, Jaico Publishing House, 2014.
<b>E-References:</b>	
1.	<a href="https://nptel.ac.in/courses/117105080/">https://nptel.ac.in/courses/117105080/</a>
2.	<a href="https://nptel.ac.in/courses/117106086/">https://nptel.ac.in/courses/117106086/</a>



18CS302		DATA STRUCTURES AND ALGORITHMS	L	T	P	C		
			3	0	0	3		
<b>Course Objectives:</b>								
1.	To understand the concepts of ADTs							
2.	To Learn linear data structures – lists, stacks, and queues							
3.	To have knowledge about non-linear data structures like trees and graphs							
4.	To understand concepts about searching and sorting and hashing techniques							
<b>UNIT I</b>	<b>LINEAR DATA STRUCTURES – LIST</b>					<b>9</b>	<b>+</b>	<b>0</b>
Abstract Data Types (ADTs) – List ADT - Array based Implementation - Linked List Implementation – Singly Linked Lists - Circularly Linked Lists - Doubly-Linked Lists - Applications of Lists – Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal).								
<b>UNIT II</b>	<b>LINEAR DATA STRUCTURES –STACKS AND QUEUES</b>					<b>9</b>	<b>+</b>	<b>0</b>
Stack ADT - Operations - Applications of Stacks - Evaluating Arithmetic Expression - Conversion of infix to postfix Expression - Queue ADT - Operations - Circular Queue - DeQueue - Applications of Queue								
<b>UNIT III</b>	<b>NON LINEAR DATA STRUCTURES – TREES</b>					<b>9</b>	<b>+</b>	<b>0</b>
Tree ADT – Tree traversals – Binary Tree ADT – Expression Trees – Applications of Trees – Binary Search Tree ADT –Threaded Binary Trees- AVL Trees – B-Tree – Heaps - Operations of Heaps - Priority Queues - Binary Heap - Max Heap - Min Heap - Applications of Heap.								
<b>UNIT IV</b>	<b>NON LINEAR DATA STRUCTURES – GRAPHS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Definition – Representation of Graphs –Types of Graphs - Graph Traversals - Breadth First Search - Depth First Search - Application of Graph Structures: Shortest Path Problem: Dijkstra’s Algorithm - Minimum Spanning Trees: Prim’s Algorithm - Kruskal’s Algorithms								
<b>UNIT V</b>	<b>SEARCHING, SORTING AND HASHING TECHNIQUES</b>					<b>9</b>	<b>+</b>	<b>0</b>
Searching: Linear Search - Binary Search - Sorting Algorithms - Insertion Sort - Selection Sort - Shell Sort - Bubble Sort - Quick Sort - Merge Sort - Radix Sort - Hashing: Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.								
							<b>Total (L+T)= 45 Periods</b>	

**Course Outcomes:**

Upon completion of this course, the students will be able to:

CO1	:	Implement various abstract data types to solve real time problems by using Linear Data Structures.
CO2	:	Apply the different Non-Linear Data Structures to solve problems.
CO3	:	Analyze and implement graph data structures to solve various computing problems.
CO4	:	Critically analyze the various sorting and searching algorithms.

**Text Books:**

1. Mark Allen Weiss, " Data Structures and Algorithm Analysis in C ", 4/E Pearson Education, 2013.

**Reference Books:**

1. Seymour Lipschutz, "Data Structures With C ",( Schaum`s Outline Series ) Published by Tata McGraw-Hill Education Pvt. Ltd., 2015
2. Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, "Fundamentals of Data Structures In C", Second Edition, Silicon Press, 2008.
3. Richard F.Gilberg & Behrouz A.Forouzan, "Data Structures: A Pseudo code Approach With C", Second Edition, Cengage Learning Publishers,2005.
4. "Classic Data Structures", Second Edition by Debasis Samanta, PHI Learning, 2009.

<b>18CS303</b>	<b>COMPUTER ORGANIZATION AND ARCHITECTURE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Course Objectives:</b>					
1.	To understand the basic structure and operations of digital computer				
2.	To learn the working of different arithmetic operations				
3.	To understand the different types of control and the concept of pipelining				
4.	To study the hierarchical memory system including cache memory and virtual memory				
5.	To understand the different ways of communication with I/O devices and standard I/O interfaces				
<b>UNIT I INTRODUCTION</b>					
		<b>9</b>	<b>+</b>	<b>0</b>	
Functional units ,Basic Operational Concepts, Bus Structure ,Memory Locations and Addresses, Memory Operations, Instruction and Instruction Sequencing, Addressing modes.					
<b>UNIT II ARITHMETIC UNIT</b>					
		<b>9</b>	<b>+</b>	<b>0</b>	
Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Booth Algorithm, Fast Multiplication, Integer Division, Floating point number operations.					
<b>UNIT III PROCESSOR UNIT AND PIPELINING</b>					
		<b>9</b>	<b>+</b>	<b>0</b>	
Fundamental Concepts, Execution of Instruction, Multi Bus Organization, Hardwired control, Micro programmed control, Basic Concepts of pipelining, Data Hazards, Instruction Hazards, Data path & Control Considerations.					
<b>UNIT IV MEMORY SYSTEMS</b>					
		<b>9</b>	<b>+</b>	<b>0</b>	
Basic Concepts, Semiconductor RAM, ROM, Cache memory, Improving Cache Performance, Virtual memory, Memory Management requirements, Secondary Storage Device.					
<b>UNIT V INPUT AND OUTPUT ORGANIZATION</b>					
		<b>9</b>	<b>+</b>	<b>0</b>	
Accessing I/O devices, Programmed I/O, Interrupts, Direct Memory Access, Interface circuits, Standard I/O Interfaces (PCI, SCSI, USB).					
<b>Total (L+T)= 45 Periods</b>					

**Course Outcomes:**

Upon completion of this course, the students will be able to:

CO1	:	Explain the working principle and implementation of computer hardware components and its various functional units
CO2	:	Apply the operations of arithmetic unit to perform specific task
CO3	:	Analyze the different types of control and the concept of pipelining
CO4	:	Illustrate various memory components including Cache memory and Virtual memory
CO5	:	Explain the different ways of communication with I/O devices and standard I/O interfaces

**Text Books:**

- |    |   |
|----|---|
| 1. | Carl Hamacher V., Zvonko G. Vranesic, Safwat G. Zaky, " Computer organization ", Tata McGraw Hill, 5th Edition, 2008. |
|----|---|

**Reference Books:**

- |    |   |
|----|---|
| 1. | Patterson and Hennessey, "Computer Organization and Design ". The Hardware/Software interface, Harcourt Asia Morgan Kaufmann, 3rd Edition, 2007 |
| 2. | Hayes, "Computer Architecture and Organization ", 3 <sup>rd</sup> edition, Tata McGraw Hill, 2006   |
| 3. | Heuring V.P., Jordan H.F., " Computer System Design and Architecture ", 6 <sup>th</sup> edition ,Addison Wesley, 2008                           |

18CS304		OPERATING SYSTEMS	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To understand the structure and functions of Operating systems					
2.	To understand the process concepts and scheduling algorithms					
3.	To understand the concept of process synchronization and deadlocks					
4.	To learn various memory management schemes					
5.	To illustrate various file systems and disk management strategies					
<b>UNIT I INTRODUCTION AND OPERATING SYSTEM STRUCTURES</b>						
			9	+	0	
Main frame Systems, Desktop Systems, Multiprocessor Systems, Distributed Systems, Clustered Systems, Real Time systems, Hand held Systems; Operating Systems Structures - System Components, Operating System Services, System calls, System Programs, System Design and Implementation.						
<b>UNIT II PROCESS MANAGEMENT</b>						
			9	+	0	
Processes-Process Concepts, Process Scheduling, Operation on Processes, Co-Operating Processes, Inter Process Communication; Threads- Multithreading Models, Threading Issues; CPU Scheduling-Basic Concepts, Scheduling Criteria, Scheduling Algorithms.						
<b>UNIT III PROCESS SYNCHRONIZATION AND DEADLOCKS</b>						
			9	+	0	
Process Synchronization- The Critical Section Problem, Synchronization Hardware, Semaphores, Classical Problem of Synchronization, Monitors; Deadlocks- Deadlock Characterization, Methods for handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.						
<b>UNIT IV MEMORY MANAGEMENT AND VIRTUAL MEMORY</b>						
			9	+	0	
Memory Management- Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging; Virtual Memory - Demand paging, Page Replacement, Thrashing.						
<b>UNIT V FILE SYSTEM AND MASS-STORAGE STRUCTURE</b>						
			9	+	0	
File System Interface - File Concepts, Access methods, Directory Structure, File Sharing, File Protection; File System Implementation- File System Structure and Implementation, Directory Implementation, Allocation Methods, Free Space Management; Mass-Storage Structure - Disk Structure, Disk scheduling, Disk Management, RAID Structure; Case study: Linux system.						
<b>Total (L+T)= 45 Periods</b>						

**Course Outcomes:**

Upon completion of this course, the students will be able to:

CO1	:	Identify the components and their functionalities in the operating system
CO2	:	Apply various CPU scheduling algorithms to solve problems
CO3	:	Analyze the needs and applications of process synchronization and deadlocks
CO4	:	Apply the concepts of memory management including virtual memory and page replacement to the issues that occur in real time applications
CO5	:	Solve issues related to file system implementation and disk management

**Text Books:**

1. Abraham Silberschatz, P.B.Galvin, G.Gagne —Operating System Concepts 6<sup>th</sup> edition, John Wiley & Sons, 2003.

**Reference Books:**

1. Andrew S. Tanenbaum, —Modern Operating Systems, PHI , 2nd edition, 2001
2. D.M.Dhamdhare, "Systems Programming and Operating Systems ", 2<sup>nd</sup> edition, Tata McGraw Hill Company, 1999.
3. Maurice J. Bach, —The Design of the Unix Operating System, 1<sup>st</sup> edition, PHI, 2004.

18CS305		DATA STRUCTURES AND ALGORITHMS LABORATORY	L	T	P	C
			0	0	4	2
<b>Course Objectives:</b>						
1.	To understand basic concepts about stacks, queues and linked list.					
2.	To have knowledge about non-linear data structures like trees and graphs.					
3.	To design and implementation of various basic and advanced data structures.					
4.	To understand about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.					
5.	To understand concepts about searching and sorting techniques.					
<b>EXPERIMENTS</b>						
1.	Implementation of List (Single, Double)					
2.	Implementation of Stack					
3.	Implementation of Queue					
4.	Implementation of Binary Search Tree					
5.	Implementation of Tree Traversal					
6.	Implementation of Heap Tree					
7.	Implementation of Breadth First Search Techniques					
8.	Implementation of Depth First Search Techniques					
9.	Implementation of Dijkstra's Algorithm					
10.	Implementation of Sorting Techniques (Internal Sort- Bubble sort, Quick Sort & External Sorting: Merge Sort)					
11.	Implementation of Searching Techniques (Linear Search & Binary Search)					
<b>Total (P) = 60 Periods</b>						
<b>Course Outcomes:</b>						
After the successful completion of the practical session, the students will be able to						
CO1	:	Understand the importance of structure and abstract data type, and their basic usability in different applications using programming languages				
CO2	:	Understand the linked implementation, and its uses both in linear and non-linear data structure				
CO3	:	Understand various data structure such as stacks, queues, trees, graphs, etc. to solve various computing problems				
CO4	:	Demonstrate understanding of various sorting techniques, including bubble sort, insertion sort, selection sort and quick sort				
CO5	:	Decide a suitable data structure and algorithm to solve a real world problem				

18CS306		OPERATING SYSTEMS LABORATORY	L	T	P	C
			0	0	4	2
<b>Course Objectives:</b>						
1.	To understand and implement basic services and functionalities of the operating system					
2.	To analyze CPU Scheduling Algorithms					
3.	To implement the concept of deadlock, memory management schemes and page replacement schemes					
4.	To analyze file allocation methods					
<b>EXPERIMENTS</b>						
(Implement the following on LINUX platform. Use C for high level language implementation)						
1.	Basics of UNIX Commands					
2.	Shell programming					
3.	Write programs using the following system calls of Ubuntu operating system: fork, exec, getpid, exit, wait, close, opendir, readdir					
4.	Write C program to simulate grep command					
5.	Implementation of CPU scheduling algorithms: FCFS & SJF					
6.	Implementation of CPU scheduling algorithms: Round Robin & Priority					
7.	Implement the Producer – Consumer problem using semaphores					
8.	Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance					
9.	Implementation of memory management schemes (First fit, Best fit & Worst fit)					
10.	Implement page replacement algorithms (FIFO & LRU)					
11.	Implementation of File allocation techniques					
<b>Total (P)= 60 Periods</b>						
<b>Course Outcomes:</b>						
After the successful completion of the practical session, the students will be able to						
CO1	:	Identify basic services and functionalities of the operating system using system calls.				
CO2	:	Apply CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority for applications				
CO3	:	Apply the concepts of deadlock in operating systems and implement them in multiprogramming system.				
CO4	:	Apply memory management schemes and page replacement schemes.				
CO5	:	Experiment with file allocation and organization techniques				



**Reference Books:**

1. Abraham Silberschatz, P.B.Galvin, G.Gagne —Operating System Concepts 6<sup>th</sup> edition, John Wiley & Sons, 2010

**E-References:**

1. <https://www.unixtutorial.org/basic-unix-commands>
2. <http://mally.stanford.edu/~sr/computing/basic-unix.html>

# **SEMESTER-IV**

18MA401		NUMERICAL METHODS AND LINEAR PROGRAMMING PROBLEM		L	T	P	C
				3	1	0	4
<b>Course Objectives:</b>							
1.	To gain the knowledge about numerical interpolation, differentiation and integration.						
2.	To acquire the knowledge about numerical solution to ODE using single step and multi step methods.						
3.	To gain the knowledge of numerical solution to partial differential equations by using explicit and implicit methods.						
4.	To acquire knowledge to find the solution of LPP using graphical and simplex methods.						
5.	To solve the transportation and assignment models of LPP						
<b>UNIT I</b>	<b>INTERPOLATION, NUMERICAL DIFFERENTIATION AND INTEGRATION</b>			<b>9</b>	<b>+</b>	<b>3</b>	
Finite differences - Relation between operators - Interpolation using Newton's Forward and Backward formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae Numerical Differentiation and Integration: Trapezoidal rule and Simpson's 1/3 rule, Simpson's 3/8 rule.							
<b>UNIT II</b>	<b>NUMERICAL SOLUTION FOR ORDINARY DIFFERENTIAL EQUATIONS</b>			<b>9</b>	<b>+</b>	<b>3</b>	
Numerical methods for initial value problems- Taylor's series method- Euler's and modified Euler's method- Runge-Kutta method of fourth order, Multi-step method: Milne's predictor - corrector method- Solution of second order boundary value problems by finite difference method.							
<b>UNIT III</b>	<b>NUMERICAL SOLUTION FOR PARTIAL DIFFERENTIAL EQUATION</b>			<b>9</b>	<b>+</b>	<b>3</b>	
Partial differential equations: Finite difference solution of two dimensional Laplace and Poisson equations- Implicit and Explicit methods for one dimensional heat equation (Bender Schmidt and Crank-Nicholson methods) - Finite difference explicit method for wave equation.							
<b>UNIT IV</b>	<b>INTRODUCTION TO LINEAR PROGRAMMING</b>			<b>9</b>	<b>+</b>	<b>3</b>	
Linear programming – formulation , solution by graphical and simplex methods (Primal- Penalty, Two Phase), Special cases- Dual Simplex method- Principles of Duality							
<b>UNIT V</b>	<b>LINEAR PROGRAMMING EXTENSIONS</b>			<b>9</b>	<b>+</b>	<b>3</b>	
Transportation models (Minimizing and Maximizing Problems) – Balanced and unbalanced problems- Initial Basic feasible solution by North-West Corner rule, Least cost and Vogel's approximation methods- Check for optimality: Solution by Modified Distribution method – Assignment models (Minimizing and Maximizing Problems)- Balanced and Unbalanced Problems- Solution by Hungarian and Branch and Bound Algorithms - Travelling salesman problem.							
<b>Total (L+T)= 60 Periods</b>							

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Obtain the knowledge about interpolation , numerical differentiation and integration.
CO2	: Solve the initial value problems by using single-step and multi-step methods.
CO3	: Find the numerical solution of partial differential equation by using Finite difference methods.
CO4	: Solve LPP by using Graphical and Simplex methods
CO5	: Obtain the solution of Transportation and Assignment models.
<b>Text Books:</b>	
1.	Veerarajan. T and Ramachandran, "Numerical methods with Programs in C and C++ ",Tata McGraw Hill, New Delhi,2006
2.	Taha, H.A., "Operations research – An Introduction", 9 <sup>th</sup> Edition, Pearson Education Edition, Asia, New Delhi (2014).
<b>Reference Books:</b>	
1.	Kandasamy.P, Thilagavathy.K, Gunavathi.K, "Numerical Methods" S.Chand & Co., New Delhi, 2005
2.	Sankara Rao. K., "Numerical methods for Scientists and Engineers", Prentice Hall of India (P) Ltd, 3 <sup>rd</sup> Edition, New Delhi, 2008.
3.	Paneer Selvam, „Operations Research", Prentice Hall of India, 2002
4.	A.M.Natarajan, P.Balasubramani, A.Tamilarasi, "Operations Research", Pearson Education, Asia, 2005.
5.	Prem Kumar Gupta, D.S. Hira, "Operations Research", S.Chand& Company Ltd, New Delhi, 3rd Edition , 2003

18CS401		COMPUTER NETWORKS	L	T	P	C		
			3	0	0	3		
<b>Course Objectives:</b>								
1.	To study the concepts of data communications and functions of different ISO/OSI reference architecture							
2.	To understand the error detection and correction methods and also the types of LAN							
3.	To study the concepts of subnetting and routing mechanisms							
4.	To understand the different types of protocols and congestion control							
5.	To study the application protocols and network security							
<b>UNIT I</b>	<b>DATA COMMUNICATIONS AND PHYSICAL LAYER</b>					<b>9</b>	<b>+</b>	<b>0</b>
Data Communication; Networks- Physical Structures (Types of Connections, Physical Topology), Categories of Networks, Interconnection of Networks: Internetwork; Protocols and Standards; Network Models-The OSI Model, Layers in the OSI Model, Addressing; Transmission media-Guided Media, Unguided Media.								
<b>UNIT II</b>	<b>DATA LINK LAYER</b>					<b>9</b>	<b>+</b>	<b>0</b>
Introduction-Types of errors, Redundancy, Detection versus Correction, Modular Arithmetic; Block Coding-Error Detection and Correction (VRC, LRC, CRC, Checksum, Hamming Code); Data link Control- Flow Control (Stop-and-Wait, Sliding Window), Error Control (Automatic Repeat Request, Stop-and-wait ARQ, Sliding Window ARQ), HDLC; Local Area Networks- Ethernet, Token Bus, Token Ring, FDDI.								
<b>UNIT III</b>	<b>NETWORK LAYER</b>					<b>9</b>	<b>+</b>	<b>0</b>
Network Layer services-Packet Switching-Network Layer Performance-IPv4 addresses-IPv6 addressing-Subnetting-Bridges-Gateways- Routers-Routing Algorithm-Distance Vector Routing, Link State Routing.								
<b>UNIT IV</b>	<b>TRANSPORT LAYER</b>					<b>9</b>	<b>+</b>	<b>0</b>
Duties of the Transport layer-User Datagram Protocol-Transmission Control Protocol- Congestion Control and Quality of Service-Congestion, Congestion Control, Quality of Service, Techniques to improve QoS, Integrated Services.								
<b>UNIT V</b>	<b>PRESENTATION LAYER AND APPLICATION LAYER</b>					<b>9</b>	<b>+</b>	<b>0</b>
Translation, Encryption/Decryption, Authentication, Data Compression; Domain Name System – FTP-SMTP-HTTP- World Wide Web.								
<b>Total (L+T)= 45 Periods</b>								

**Course Outcomes:**

Upon completion of this course, the students will be able to:

CO1	:	Classify the fundamentals of data communications and functions of layered architecture
CO2	:	Apply the error detection and correction methods and also identify the different network technologies
CO3	:	Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and routing technologies
CO4	:	Illustrate the transport layer principles and reliable data transfer using protocols
CO5	:	Analyze the application layer protocols and also the use of network security

**Text Books:**

1. Behrouz A.Ferouzan, "Data Communications and Networking", 4th Edition, Tata McGraw-Hill, 2007.

**Reference Books:**

1. Andrew S. Tanenbaum, "Computer networks "PHI, 4<sup>th</sup> edition 2008
2. William Stallings," Data and computer communications", 10<sup>th</sup> edition,PHI, 2012
3. Douglas E. comer," Internetworking with TCP/IP-Volume-I", 6<sup>th</sup> edition,PHI, 2008

18CS402		DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C		
			3	0	0	3		
<b>Course Objectives:</b>								
1.	Learn the algorithm analysis techniques.							
2.	Become familiar with the divide-and-conquer and greedy algorithm design techniques.							
3.	Become familiar with the dynamic programming design techniques.							
4.	Become familiar with the backtracking design techniques for a problem.							
5.	Understand the limitations of Algorithmic power.							
<b>UNIT I</b>	<b>INTRODUCTION</b>					<b>9</b>	<b>+</b>	<b>0</b>
The Role of Algorithms in Computing – Getting Started : Insertion Sort - Analyzing Algorithms - Designing Algorithms – Growth of Functions : Asymptotic Notations – Standard notations and common functions – Recurrences :The Substitution Method – The Recursion-tree Method – The Master Method.								
<b>UNIT II</b>	<b>DIVIDE-AND-CONQUER AND GREEDY ALGORITHMS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Divide and Conquer: General Method – Binary Search – Finding Maximum and Minimum – Merge Sort - Quick Sort – Greedy Algorithms: General Method – Container Loading – Knapsack Problem – Tree Vertex Splitting - Job Sequencing with Deadlines.								
<b>UNIT III</b>	<b>DYNAMIC PROGRAMMING</b>					<b>9</b>	<b>+</b>	<b>0</b>
Dynamic Programming: General Method – Multistage Graphs – All-Pair Shortest Paths – Single-Source Shortest Paths: General Weights - Optimal Binary Search Trees – 0/1 Knapsack – Travelling Salesperson Problem- Flow Shop Scheduling .								
<b>UNIT IV</b>	<b>BACKTRACKING</b>					<b>9</b>	<b>+</b>	<b>0</b>
Backtracking: General Method – 8 Queens problem – sum of subsets – graph coloring – Hamiltonian problem – knapsack problem.								
<b>UNIT V</b>	<b>GRAPH TRAVERSALS AND BRANCH AND BOUND</b>					<b>9</b>	<b>+</b>	<b>0</b>
Graph Traversals – Connected Components – Spanning Trees – Biconnected components – Branch and Bound: General Methods (FIFO & LC) – 0/1 Knapsack problem – Introduction to NP-Hard and NP-Complete Problems-Basic concepts, Traveling salesman problem.								
<b>Total(L+T) = 45 Periods</b>								

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Analyze the time and space complexity of different algorithms.
CO2	: Apply appropriate design technique for a problem.
CO3	: Modify existing algorithms to improve efficiency.
<b>Text Books:</b>	
1.	Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Computer Algorithms/C++, Second Edition, Universities Press, 2007. (Units II to V)
2.	T. H. Cormen, C. E. Leiserson, R.L.Rivest, and C. Stein, "Introduction to Algorithms", Second Edition, Prentice Hall of India Pvt. Ltd, 2003.( Unit I )
<b>Reference Books:</b>	
1.	Anany Levitin, "Introduction to the Design and Analysis of Algorithm", Pearson Education Asia, Third edition, 2011.
2.	Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education, 1999.
<b>E-References</b>	
1	DAA lectures by Ravindrababu-video lecture



18CS403		OBJECT ORIENTED PROGRAMMING USING C++	L	T	P	C		
			3	0	0	3		
<b>Course Objectives:</b>								
1.	To understand and develop the object oriented programming concepts.							
2.	To familiarize and design the template functions and classes							
3.	To disseminate and apply exception handling mechanisms.							
4.	To learn and exploit steam classes.							
<b>UNIT I</b>	<b>INTRODUCTION</b>					<b>9</b>	<b>+</b>	<b>0</b>
Procedure Oriented Programming paradigm - Object Oriented Programming paradigm - Basic concepts of Object Oriented Programming, benefits of OOP, application of OOP - C++ fundamentals –structure of C++ program, tokens, data types - Operators and Expressions - Control structures - Functions.								
<b>UNIT II</b>	<b>CLASSES AND OBJECTS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Classes and Objects - friend functions- constructors and destructors- Operator overloading – binary and unary operator overloading using member function and friend function - Type conversions.								
<b>UNIT III</b>	<b>INHERITANCE AND VIRTUAL FUNCTIONS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Inheritance – defining derived classes, types, virtual base classes, abstract classes, constructor in derived classes - Pointers- pointers to objects, this pointer, pointer to derived classes - Virtual functions.								
<b>UNIT IV</b>	<b>TEMPLATES AND EXCEPTION HANDLING</b>					<b>9</b>	<b>+</b>	<b>0</b>
Generic Classes – class template, class templates with multiple parameters - Generic Functions - function templates, function templates with multiple parameters, member function templates - Exception handling – basics, exception handling mechanism, rethrowing an exception – Exception handling options – understanding terminate() and unexpected() – the uncaught_exception() function – bad_exception().								
<b>UNIT V</b>	<b>CONSOLE I/O AND FILE HANDLING</b>					<b>9</b>	<b>+</b>	<b>0</b>
C++ Stream Classes – unformatted I/O operations, formatted console I/O operations, manipulators - Files- classes for file operation, opening and closing a file, detecting end of file, files modes, sequential file operations, random file operations.								
<b>Total (L+T)= 45 Periods</b>								

**Course Outcomes:**

Upon completion of this course, the students will be able to:

CO1	:	Construct the object oriented programming concepts.
CO2	:	Familiarize and build the template functions and classes
CO3	:	Disseminate and apply exception handling mechanisms.
CO4	:	Depict and exploit steam classes.

**Text Books:**

1. E. Balagurusamy "Object –Oriented Programming with C++" Sixth Edition Tata McGraw-Hill

**Reference Books:**

1. Herbert Schildt, "The Complete Reference C++", Fifth Edition, Tata McGraw Hill
2. Bjarne Stroustrup, "The C++ programming language", Fourth Edition Addison Wesley
3. K.R. Venugopal, Rajkumar Buyya "Mastering in C++" Second Edition, Tata McGraw Hill

18CS404		SOFTWARE ENGINEERING	L	T	P	C		
			3	0	0	3		
<b>Course Objectives:</b>								
1.	To understand the different life cycle models and requirements collection process							
2.	To understand design and development principles in the construction of software systems							
3.	To learn the various software testing techniques and methods used for project management							
<b>UNIT I</b>	<b>SOFTWARE PROCESS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Introduction-The software process-software Engineering Practice-A generic process model-prescriptive process models-specialized process models-unified process-Personal and Team Process Models –process technology-product and process.								
<b>UNIT II</b>	<b>UNDERSTANDING REQUIREMENTS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Requirements Engineering -Establishing the Groundwork -Eliciting Requirements -Developing Use Cases - Building the Requirements Model -Negotiating Requirements - Validating Requirements-Requirements Analysis - Scenario-Based Modeling - UML Models That Supplement the Use Case -Data Modeling Concepts - Class-Based Modeling.								
<b>UNIT III</b>	<b>DESIGN CONCEPTS AND PRINCIPLES</b>					<b>9</b>	<b>+</b>	<b>0</b>
Design within the Context of Software Engineering - The Design Process - Design -The Design Model - Software Architecture - Architectural Genres - Architectural Styles -Architectural Design -Assessing Alternative Architectural Designs -Architectural Mapping Using Data Flow.								
<b>UNIT IV</b>	<b>TESTING</b>					<b>9</b>	<b>+</b>	<b>0</b>
A Strategic Approach to Software Testing - Strategic Issues -Test Strategies for Conventional Software - Test Strategies for Object-Oriented Software - Test Strategies for WebApps - Validation Testing –System- -The Art of Debugging.								
<b>UNIT V</b>	<b>SOFTWARE PROJECT MANAGEMENT</b>					<b>9</b>	<b>+</b>	<b>0</b>
The Management Spectrum - The People - The Product - The Process -The WHH Principle - Metrics in the Process and Project Domains - Software Measurement - Metrics for Software Quality - Integrating Metrics within the Software - Metrics for Small Organizations - Establishing a Software Metrics Program - Decomposition - Empirical Estimation Models -Specialized Estimation Techniques -The Make/Buy Decision .								
<b>Total (L+T)= 45 Periods</b>								

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Familiar with the different life cycle models and requirement collection process.
CO2	: Describe design and development principles in the construction of software systems.
CO3	: Explain the various software testing techniques and methods used for project management.
<b>Text Books:</b>	
1.	Roger S.Pressman, "Software engineering- A practitioner's Approach", McGraw- Hill International Edition, 7th edition, 2010.
<b>Reference Books:</b>	
1.	PankajJalote- "An Integrated Approach to Software Engineering, Narosa Publications", Third Edition, 2008.
2.	James F Peters and WitoldPedryez, "Software Engineering – An Engineering Approach", John Wiley and Sons, New Delhi, 2000.
3.	Ian Sommerville, "Software engineering", Pearson education Asia, 6th edition, 2006.
<b>E-References:</b>	
1.	Software Engineering NPTEL video lectures by Prof.N.L. Sarda, Prof. Umesh Bellur, Prof.R.K.Joshi and Prof.Shashi Kelkar, Department of Computer Science & Engineering ,IIT Bombay.

18CS405		MICROPROCESSORS AND MICROCONTROLLERS	L	T	P	C		
			3	0	0	3		
<b>Course Objectives:</b>								
1.	To understand the Architecture of 8086 microprocessor							
2.	To learn the design aspects of I/O and Memory Interfacing circuits							
3.	To interface microprocessors with supporting chips							
4.	To study the Architecture of 8051 microcontroller and design a microcontroller based system							
<b>UNIT I</b>	<b>THE 8086 MICROPROCESSOR</b>					<b>9</b>	<b>+</b>	<b>0</b>
Introduction to 8086 – Microprocessor architecture – Addressing modes – Instruction set and assembler directives – Assembly language programming – Modular Programming – Linking and Relocation – Stacks – Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation.								
<b>UNIT II</b>	<b>8086 SYSTEM BUS STRUCTURE</b>					<b>9</b>	<b>+</b>	<b>0</b>
8086 signals – Basic configurations – System bus timing – System design using 8086 – I/O programming – Introduction to Multiprogramming – System Bus Structure – Multiprocessor configurations – Coprocessor, Closely coupled and loosely Coupled configurations – Introduction to advanced processors.								
<b>UNIT III</b>	<b>I/O INTERFACING</b>					<b>9</b>	<b>+</b>	<b>0</b>
Memory Interfacing and I/O interfacing – Parallel communication interface – Serial communication interface – D/A and A/D Interface – Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display , LCD display, Keyboard display interface and Alarm Controller.								
<b>UNIT IV</b>	<b>MICROCONTROLLER</b>					<b>9</b>	<b>+</b>	<b>0</b>
Architecture of 8051 – Special Function Registers(SFRs) – I/O Pins Ports and Circuits – Instruction set – Addressing modes – Assembly language programming.								
<b>UNIT V</b>	<b>INTERFACING MICROCONTROLLER</b>					<b>9</b>	<b>+</b>	<b>0</b>
Programming 8051 Timers – Serial Port Programming – Interrupts Programming – LCD & Keyboard Interfacing – ADC, DAC & Sensor Interfacing – External Memory Interface- Stepper Motor and Waveform generation – Comparison of Microprocessor, Microcontroller, PIC and ARM processors.								
<b>Total (L+T)= 45 Periods</b>								

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Understand and execute programs based on 8086 microprocessor.
CO2	: Design Memory Interfacing circuits.
CO3	: Design and interface I/O circuits.
CO4	: Design and implement 8051 microcontroller based systems.
<b>Text Books:</b>	
1.	Yu-Cheng Liu, Glenn A.Gibson, —Microcomputer Systems: The 8086 / 8088 Family – Architecture, Programming and Design, Second Edition, Prentice Hall of India, 2007. (UNIT I- III)
2.	Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, —The 8051 Microcontroller and Embedded Systems: Using Assembly and C, Second Edition, Pearson education, 2011. (UNIT IV-V)
<b>Reference Books:</b>	
1.	A.K.Ray,K.M.Bhurchandi,Advanced Microprocessors and Peripherals —3rd edition, Tata McGrawHill,2012
2.	Doughlas V.Hall, —Microprocessors and Interfacing, Programming and Hardware, TMH,2012
3.	Douglas V.Hall, “Microprocessors And Interfacing Programming and Hardware”, Tata McGraw Hill, 2003
4.	“Microcontrollers: Architecture, Programming, Interfacing and System Design”, Raj Kamal, Pearson Education, 2005.
<b>E-References:</b>	
1.	<a href="https://onlinecourses.nptel.ac.in/noc18_ec03/preview">https://onlinecourses.nptel.ac.in/noc18_ec03/preview</a> , (Prof. Santanu Chattopadhyay,IIT KHARAGPUR )

18CS406		OBJECT ORIENTED PROGRAMMING USING C++ LABORATORY	L	T	P	C
			0	0	4	2
<b>Course Objectives:</b>						
1.	To write programs using control structures and functions					
2.	To apply Object Oriented Programming concepts					
3.	To implement Template functions and classes					
4.	To develop program with Exceptions					
5.	To implement program using File					
<b>EXPERIMENTS</b>						
1.	Programs using control structures.					
2.	Programs Using Functions <ul style="list-style-type: none"> <li>● Implementation of Functions with default arguments</li> <li>● Implementation of Call by Value, Call by Address and Call by Reference</li> <li>● Implementation of Function Overloading</li> </ul>					
3.	Programs using Class <ul style="list-style-type: none"> <li>● Class with primitive data members</li> <li>● Class with pointers as data members</li> <li>● Class with static member functions</li> <li>● Class with friend function</li> </ul>					
4.	To implement Compile time Polymorphism <ul style="list-style-type: none"> <li>● Constructors and Destructors</li> <li>● Operator Overloading - Unary and Binary Operators.</li> <li>● Type conversions</li> </ul>					
5.	To implement Inheritances <ul style="list-style-type: none"> <li>● Single inheritance</li> <li>● Multiple inheritance</li> <li>● Hierarchical inheritance</li> <li>● Virtual Base Classes</li> </ul>					
6.	To implement Runtime Polymorphism					
7.	To implement Templates <ul style="list-style-type: none"> <li>● Function templates</li> <li>● Class templates</li> </ul>					
8.	To implement Exception Handling Mechanism <ul style="list-style-type: none"> <li>● Handling pre-defined exceptions</li> <li>● Handling user-defined exceptions</li> </ul>					
9.	File Handling <ul style="list-style-type: none"> <li>● Sequential Access</li> <li>● Random Access</li> </ul>					
<b>Total (P)= 60 Periods</b>						

**Course Outcomes:**

After the successful completion of the practical session, the students will be able to

CO1	:	Write programs using control structures and functions
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CO2	:	Construct programs using Object Oriented Programming concepts
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CO3	:	Build Template functions and classes
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CO4	:	Develop program with Exceptions
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CO5	:	Implement program using File
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**Reference Books:**

1.	E. Balagurusamy "Object –Oriented Programming with C++" Sixth Edition Tata McGraw-Hill
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2.	Herbert Schildt, "The Complete Reference C++", Fifth Edition, Tata McGraw Hill
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3.	K.R. Venugopal, Rajkumar Buyya "Mastering in C++" Second Edition, Tata McGraw Hill
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18CS407		MICROPROCESSOR AND MICROCONTROLLER LABORATORY	L	T	P	C
			0	0	4	2
<b>Course Objectives:</b>						
1.	Introduce ALP concepts and features					
2.	Write ALP for arithmetic and logical operations in 8086 and 8051					
3.	Differentiate Serial and Parallel Interface					
4.	Interface different I/Os with Microprocessors					
5.	Be familiar with MASM					
<b>EXPERIMENTS</b>						
1.	Basic arithmetic and Logical operations					
2.	Move a data block without overlap					
3.	Code conversion, decimal arithmetic and Matrix operations.					
4.	Floating point operations, string manipulations, sorting and searching					
5.	Password checking, Print RAM size and system date					
6.	Counters and Time Delay Peripherals and Interfacing Experiments					
7.	Traffic light control					
8.	Stepper motor control					
9.	Digital clock					
10.	Key board and Display					
11.	Printer status					
12.	Serial interface and Parallel interface					
13.	A/D and D/A interface and Waveform Generation 8051 Experiments using kits and MASM					
14.	Basic arithmetic and Logical operations					
15.	Square and Cube program, Find 2's complement of a number					
16.	Unpacked BCD to ASCII					
<b>Total (P)= 60 Periods</b>						

**Course Outcomes:**

After the successful completion of the practical session, the students will be able to

CO1	:	Write ALP Programmes for fixed and Floating Point and Arithmetic
CO2	:	Interface different I/Os with processor
CO3	:	Generate waveforms using Microprocessors
CO4	:	Execute Programs in 8051
CO5	:	Explain the difference between simulator and Emulator

**LAB EQUIPMENT FOR HARDWARE (A BATCH OF 30 STUDENTS):**

1.	8086 development kits – 30 nos
2.	Interfacing Units – Each 10 nos
3.	Microcontroller – 30 nos

**LAB EQUIPMENT FOR SOFTWARE (A BATCH OF 30 STUDENTS):**

1.	Intel Desktop Systems with MASM – 30 nos
2.	8086 Assembler 8051 Cross Assembler

18CYMC01 ENVIRONMENTAL SCIENCE		L	T	P	C
		0	0	1	0
<b>Course Objectives:</b>					
1.	They are part of the environment				
2.	To have an ancient wisdom drawn from Vedas				
3.	Activities based knowledge to preserve environment				
4.	Conservation of water and its optimization.				
<b>ENVIRONMENTAL AWARENESS</b>		6	+	0	
<ol style="list-style-type: none"> <li>1. Group activity on water management</li> <li>2. Group discussion on recycle of waste (4R's)</li> <li>3. Slogan making contest.</li> <li>4. Poster making event.</li> <li>5. Expert lecture on environmental awareness.</li> <li>6. Imparting knowledge on reduction of electricity usage</li> </ol>					
<b>ENVIRONMENTAL ACTIVITIES</b>		8	+	0	
<ol style="list-style-type: none"> <li>1. Identification and segregation of biodegradable and non biodegradable waste</li> <li>2. Campus cleaning activity</li> <li>3. Plantation of trees in the college campus and local waste lands.</li> <li>4. Identification of varieties of plants and their usage</li> <li>5. Shutting down the fans and ACs of the campus for an hour</li> <li>6. Field work on growing of kitchen garden for mess.</li> </ol>					
<b>Total(L+T)= 14 Hours</b>					

# **SEMESTER-V**

<b>18CS501</b>		<b>DATABASE MANAGEMENT SYSTEMS</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>		
		<b>3</b>	<b>0</b>	<b>0</b>					
<b>Course Objectives:</b>									
1.	To understand the fundamentals of data models ,SQL queries and relational databases.								
2.	To make a study of database design using ER Diagram and normalize.								
3.	To impart knowledge in transaction processing.								
4.	To make the students to understand the file operations and indexing.								
5.	To familiarize the students with advanced databases								
<b>UNIT I</b>	<b>RELATIONAL DATABASES</b>						<b>9</b>	<b>+</b>	<b>0</b>
Purpose of Database System – Views of data – Data Models – Database System Architecture – Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Advanced SQL features – Embedded SQL– Dynamic SQL.									
<b>UNIT II</b>	<b>DATABASE DESIGN</b>						<b>9</b>	<b>+</b>	<b>0</b>
Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.									
<b>UNIT III</b>	<b>TRANSACTIONS</b>						<b>9</b>	<b>+</b>	<b>0</b>
Transaction Concepts – ACID Properties – Schedules – Serializability – Concurrency Control – Need for Concurrency – Locking Protocols – Two Phase Locking – Deadlock – Transaction Recovery – Save Points – Isolation Levels – SQL Facilities for Concurrency and Recovery.									
<b>UNIT IV</b>	<b>IMPLEMENTATION TECHNIQUES</b>						<b>9</b>	<b>+</b>	<b>0</b>
RAID – File Organization – Organization of Records in Files – Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Algorithms for SELECT and JOIN operations – Query optimization using Heuristics and Cost Estimation.									
<b>UNIT V</b>	<b>ADVANCED TOPICS</b>						<b>9</b>	<b>+</b>	<b>0</b>
Distributed Databases: Architecture, Data Storage, Transaction Processing – Object-based Databases: Object Database Concepts, Object-Relational features, ODMG Object Model, ODL, OQL – XML Databases: XML Hierarchical Model, DTD, XML Schema, XQuery – Data Warehousing and Data Mining - information Retrieval: IR Concepts, Retrieval Models, Queries in IR systems.									
<b>Total (L+T)= 45 Periods</b>									

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Understand the basic concepts of the database and data models.
CO2	: Design a database using ER diagrams and map ER into Relations and normalize the relations.
CO3	: Develop a simple database for applications
<b>Text Books:</b>	
1.	Abraham Silberschatz, Henry F.Korth and S.Sundarshan “Database System Concepts”, Sixth Edition, Tata McGraw Hill, 2011.
<b>Reference Books:</b>	
1.	Ramez Elamassri and Shankant B-Navathe, “Fundamentals of Database Systems”, Sixth Edition, Pearson Education, 2011.
2.	C.J. Date, “An Introduction to Database Systems”, Eighth Edition, Pearson Education Delhi, 2008.
3.	Raghu Ramakrishnan, —Database Management Systems, Fourth Edition, McGraw-Hill College Publications, 2015.
4.	G.K.Gupta, “Database Management Systems”, Tata McGraw Hill, 2011.
<b>E-References:</b>	
1.	Lecture Series on Database Management System by Dr.S.Srinath,IIIT Bangalore,nptl

18CS502		THEORY OF COMPUTATION	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To understand different computational models					
2.	To comprehend the properties of computational models					
<b>UNIT I   AUTOMATA</b>						
			9	+	0	
Introduction to Formal Proof - Additional Forms of Proof - Inductive Proof - Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions ( $\epsilon$ - NFA) – Proof of Equivalence: DFA and NFA – DFA and $\epsilon$ - NFA – NFA and $\epsilon$ - NFA						
<b>UNIT II   REGULAR EXPRESSIONS AND LANGUAGES</b>						
			9	+	0	
Regular Expression (RE) – FA and Regular Expressions – Application of RE – Algebraic Laws - Proving languages not to be regular – Closure properties of regular languages – Decision properties of regular languages – Equivalence and minimization of Automata						
<b>UNIT III   CONTEXT-FREE GRAMMAR AND LANGUAGES</b>						
			9	+	0	
Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages – Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and CFG, Deterministic Pushdown Automata – Normal Forms for Context-Free Grammars – Pumping Lemma for Context-Free Languages – Closure Properties of Context-Free Languages – Decision Properties of Context-Free Languages						
<b>UNIT IV   TURING MACHINES</b>						
			9	+	0	
Turing machines – Turing machines as acceptor – Turing machines as a Computing Device – Programming Techniques for Turing Machines – Extensions to the Basic Turing Machine – Restricted Turing Machines						
<b>UNIT V   UNDECIDABILITY AND INTRACTABLE PROBLEMS</b>						
			9	+	0	
Language That Is Not Recursively Enumerable–Undecidable Problem That Is Recursively Enumerable – Undecidable Problems About Turing Machines – The Classes P and NP – An NP-Complete Problem – A Restricted Satisfiability Problem						
<b>Total (L+T)= 45 Periods</b>						

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Develop a computational model to recognize regular language or context free language
CO2	: Establish equivalence among computational models of equivalent capacities.
CO3	: Recall the procedures involved in the construction of computational models.
<b>Text Books:</b>	
1.	J.E.Hopcroft, R.Motwani, J.D.Ullman, "Introduction to Automata Theory, Languages and Computations", 3rd Edition, Pearson Education,2008.
<b>Reference Books:</b>	
1.	Dexter C. Kozen, "Automata and Computability", Springer Publishers, 2007.
2.	John. C. Martin, "Introduction to languages and the theory of computation", Tata McGrawHill, 2003.
3.	Peter Linz, "An introduction to formal language and automata", Narosa publishers, 2002.
4.	Kamala Kritivasan and R.Rama,"Introduction to Formal Languages, Automata Theory and Computation", Pearson Publishers, 2009.
<b>E-References:</b>	
1.	<a href="https://nptel.ac.in/courses/106104028/">https://nptel.ac.in/courses/106104028/</a>
2.	<a href="http://www.nptelvideos.in/2012/11/theory-of-computation.html">http://www.nptelvideos.in/2012/11/theory-of-computation.html</a>
3.	<a href="http://infolab.stanford.edu/~ullman/ialc.html">http://infolab.stanford.edu/~ullman/ialc.html</a>



18CS503		JAVA PROGRAMMING	L	T	P	C		
			3	0	0	3		
<b>Course Objectives:</b>								
1.	To familiarize and apply the Object Oriented concepts and java features							
2.	To write the standalone applications and applet applications							
3.	To build simple chart application and Database Connectivity							
<b>UNIT I</b>	<b>INTRODUCTION TO JAVA</b>					<b>9</b>	<b>+</b>	<b>0</b>
Fundamentals of object oriented programming- Java features, comparing Java with C and C++,Java environment; Overview of java language - Java program structure, Java tokens, Java statements, implementing Java program, Java Virtual Machine, command line arguments; constants, variables and data types - Operators and expressions - Decision making – branching and looping - Arrays and Strings.								
<b>UNIT II</b>	<b>JAVA FEATURES</b>					<b>9</b>	<b>+</b>	<b>0</b>
Classes, Objects, methods – Inheritances – Interface – Packages - Exception handling - Multithreaded programming - Exploring java.lang– primitive types, wrapper classes ; Exploring java.io - java I/O classes and interfaces, files, stream classes, byte streams, character stream.								
<b>UNIT III</b>	<b>APPLET AND EVENT HANDLING</b>					<b>9</b>	<b>+</b>	<b>0</b>
Applet class- two types of applets, Applet basics, Applet architecture, Applet skeleton, simple Applet display method – Passing parameters to Applet; Event handling – two event handling Mechanisms, delegation event model, event classes, sources of events, event listener interfaces; Introduction to AWT - AWT classes, windows fundamentals, working with frame Windows, creating a frame window in an Applet, creating a windowed program, working with graphics, working with color, working with fonts.								
<b>UNIT IV</b>	<b>AWT AND SWING CONTROLS</b>					<b>9</b>	<b>+</b>	<b>0</b>
AWT - AWT controls, Layout Managers, Menu Bars and Menus, Dialog Boxes, FileDialogs; Swings-JApplet, JLabel and ImageIcon, JTextField, Swing Buttons, JTabbedPane, JScrollPane, JList, JComboBox, Trees, JTables.								
<b>UNIT V</b>	<b>NETWORKING AND JDBC</b>					<b>9</b>	<b>+</b>	<b>0</b>
Networking - Networking Basics, InetAddress, TCP/IP Client Sockets, URL, URL Connection, TCP/IP ServerSockets, Datagrams; Design of JDBC - JDBC drivers; JDBC programming concepts - Database concepts, making connection, executing SQL commands, managing connections, statements, and result sets; Query execution - Prepared Statements.								
<b>Total (L+T)= 45 Periods</b>								

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Familiarize and apply the Object Oriented concepts and java features
CO2	: Build the standalone applications and applet applications
CO3	: Develop simple chart application and Database Connectivity
<b>Text Books:</b>	
1.	PatricNaughton , Herbert Schildt, "The Complete Reference Java 2" , Eighth edition Tata McGraw Hills. (Unit II - V)
2.	E. Balaguruswamy, "Programming with Java", Fifth Edition, TMH.(Unit- I)
<b>Reference Books:</b>	
1.	Cay S. Horstmann, Gary Cornell " Core Java 2" Eighth Edition, Pearson Education
2.	Graham Hamilton , Rick Cattell, Maydene Fisher , "JDBC Database access with java".
3.	PaulDeitel and Harvey Deitel, "Java How to Program", Tenth Edition, Pearson Prentice Hall.

18MG501		PRINCIPLES OF MANAGEMENT	L	T	P	C		
			3	0	0	3		
<b>Course Objectives:</b>								
1	To familiarize the students about the overall management functions like planning, organizing, staffing, leading, and controlling and also the systems model integrates these functions into a system and links the organization with its environment.							
<b>UNIT I</b>	<b>INTRODUCTION</b>					<b>9</b>	<b>+</b>	<b>0</b>
Definitions of management – features of management – Management thoughts – different schools of management – Scientific management – Arts or Science, Management Vs administration – Principles of Management								
<b>UNIT II</b>	<b>FUNCTIONS OF MANAGEMENT</b>					<b>9</b>	<b>+</b>	<b>0</b>
Role of managers. Functions approach to management, Management functions Vs Management levels – management skills Vs Management levels – the role approach to management, reconciling functions and role, responsibility of managers – towards subordinates, peers, supervisors, customers, government, company, creditors, shareholders, competitors								
<b>UNIT III</b>	<b>MANAGERIAL PLANNING AND DECISION MAKING</b>					<b>9</b>	<b>+</b>	<b>0</b>
Planning fundamentals, objectives. Management by objectives – Changes in objectives – goal distortions – major types of plans, policies and objectives, procedures – methods, rules, programmes and schedule, projects, budgets – importance of decision making, types of decisions, decision making process – decision theory – quantitative techniques – decision making conditions – Operation Research (OR), Definition, successful areas of operation research - Decision tree								
<b>UNIT IV</b>	<b>ORGANIZATION</b>					<b>9</b>	<b>+</b>	<b>0</b>
Organization: Basic concepts – organization as a structure – as a process – as a group properties of modern organization – typology, importance of organization – business /industrial organization – sole trading, partnership company, co – operative , public enterprise line (military), line and staff, functional , matrix committee based organization - departmentation – need, bases of departmentation – by function product, territory, customer, process, marketing channels								
<b>UNIT V</b>	<b>STAFFING, CONTROLLING AND COMMUNICATION</b>					<b>9</b>	<b>+</b>	<b>0</b>
Nature and purpose of staffing – man power planning, aims and objectives of HRP recruitment, selection and training sources of recruitment, process of recruitment training methods – performance appraisal methods – communication – importance – methods process – barriers to communications. Hoe to remove obstacles of effective communication – controlling – definition – Characteristics of control – types of control – requirements of effective control – control techniques – Break even analysis, budgeting, PERT/ CPM, MIS, ZBB, ratio analysis.								
<b>Total (L+T)= 45 Periods</b>								

<b>Course Outcomes:</b>		
Upon completion of this course, the students will be able to:		
CO1	:	Identify the concepts of management, administration and the evolution of management thoughts
CO2	:	Apply the planning concepts in different applications
CO3	:	Analyze the different organizational structures
CO4	:	Analyze the various staffing, controlling and communication processes
<b>Text Books:</b>		
1.	Herald knootz and Heinz wehrich, —Essentials of Managementl, McGraw-Hill Publishing Company, Singapore International Edition, 2007	
2.	Joseph L, Massie, —Essentials of Managementl, Prentice Hall of India Pvt., Ltd (Pearson) Fourth Edition, 2003.	
<b>Reference Books:</b>		
1.	Stephen A. Robbins & David A. Decenzo& Mary Coulter, “Fundamentals of Management” 7th Edition, Pearson Education, 2011	
2.	Robert Kreitner&MamataMohapatra, “Management”, Biztantra, 2008.	
3.	Tripathy PC & Reddy PN, “Principles of Management”, Tata McGraw Hill, 1999.	

18CS504		DATABASE MANAGEMENT SYSTEMS LABORATORY		L	T	P	C
				0	0	4	2
<b>Course Objectives:</b>							
1.	Learn to create and use a database.						
2.	Be familiar with a query language.						
3.	Have hands-on experience on DDL, DML and DCL commands.						
4.	Familiarize advanced SQL queries.						
5.	Be Exposed to different applications.						
<b>EXPERIMENTS</b>							
1.	Create a relational database system using DDL commands with constraints.						
2.	Update the database system using DML commands.						
3.	Query the database using simple and complex queries.						
4.	Create and update views.						
5.	High level programming language extensions (Control structures, Procedures and Functions).						
6.	Create triggers.						
7.	Create assertions and indexes.						
8.	Use of front end tools to manipulate the database.						
9.	Generate reports using a reporting tool.						
10.	Database Design and implementation of an application system. (Suggested Mini Project)						
<b>Total (P)= 60 Periods</b>							
<b>Course Outcomes:</b>							
After the successful completion of the practical session, the students will be able to							
CO1	:	Build tables, construct relationships among them and retrieve data with simple and complex queries.					
CO2	:	Build various constraints, triggers and indexes on the tables.					
CO3	:	Design and implement a database and to integrate into a simple application.					

18CS505		JAVA PROGRAMMING LABORATORY	L	T	P	C
			0	0	4	2
<b>Course Objectives:</b>						
1.	To implement object oriented programming concepts and java features					
2.	To build Java standalone applications and applet applications					
3.	To develop simple chat applications and database connectivity applications					
<b>EXPERIMENTS</b>						
1.	Program using Control structures					
2.	Program using arrays and strings					
3.	Program using Java Classes and Objects					
4.	Program to implement inheritance					
5.	Program to implement interface					
6.	Program to create packages and import the package					
7.	Program to create own Exceptions and catch the exceptions					
8.	Program to implement the Multiple threads					
9.	Program to implement File operations					
10.	Program to create a simple applet application					
11.	Program to create application the AWT controls with events					
12.	Program to create application with Layouts					
13.	Program to create application the Swings controls with events					
14.	Program to implement a simple chat using Sockets programming					
15.	Program to implement a simple chat using Datagrams.					
16.	Program to implement JDBC connectivity					
<b>Total (P)= 60 Periods</b>						
<b>Course Outcomes:</b>						
After the successful completion of the practical session, the students will be able to						
CO1	:	Implement object oriented programming concepts and java features				
CO2	:	Develop Java standalone applications and applet applications				
CO3	:	Build simple chat applications and database connectivity applications				

**Reference Books:**

1.	PatricNaughton , Herbert Schildt, "The Complete Reference Java 2" , Eighth edition Tata McGraw Hills , 2011.
2.	E. Balaguruswamy, "Programming with java", Second Edition, TMH, 1999.
3.	Cay S. Horstmann, Gary Cornell " Core Java 2" Eighth Edition, Pearson Education

18EN501		COMMUNICATION SKILLS AND LANGUAGE LABORATORY	L	T	P	C
			0	0	4	2
<b>Course Objectives:</b>						
1.	Communicate effectively with interviewers					
2.	Express opinions, illustrate with examples, elucidate and conclude in group discussions					
3.	Write error free letters and prepare reports					
4.	Speak fluently and avoid pitfalls in pronunciation and grammatical errors					
<b>EXPERIMENTS</b>						
<p><b>WRITING SKILLS (15 hours)</b></p> <ul style="list-style-type: none"> <li>• Letter seeking permission to go on industrial visit</li> <li>• Letter of invitation</li> <li>• Resume and Cover Letter</li> <li>• Report Writing – Progress in project work</li> </ul> <p><b>SPEAKING SKILLS (15 hours)</b></p> <ul style="list-style-type: none"> <li>• Welcome Address and Vote of Thanks</li> <li>• Analysing and presenting business articles</li> <li>• Power Point Presentation</li> <li>• Group Discussion</li> </ul> <p><b>SOFT SKILLS (15 hours)</b></p> <ul style="list-style-type: none"> <li>• Psychometric profile</li> <li>• Self-Introduction</li> <li>• Interview skills</li> <li>• Conducting a board meeting</li> </ul> <p><b>VERBAL ABILITIES (15 hours)</b></p> <ul style="list-style-type: none"> <li>• Error Spotting</li> <li>• Listening Comprehension</li> <li>• Rearranging Jumbled sentences</li> <li>• Vocabulary</li> </ul> <p><b>Lab Record</b></p> <ol style="list-style-type: none"> <li>1. Group Discussion - Literature survey</li> <li>2. Group Discussion - Transcripts</li> <li>3. Group Discussion - Assessment forms</li> <li>4. Interview Skills – Psychometric profile</li> <li>5. Interview Skills - Self-introduction</li> <li>6. Interview Skills – Resume and Cover Letter</li> <li>7. Interview Skills - Transcription of interview</li> <li>8. Interview Skills - Assessment sheet signed by interview panel</li> <li>9. Power Point Presentation</li> <li>10. Error spotting worksheet</li> </ol>						



	11. Jumbled sentences worksheet 12. Welcome Address 13. Vote of Thanks 14. Letter seeking permission to go on industrial visit 15. Report Writing – Progress in project work 16. Presentation of business articles - Transcription
<b>Total (P)= 60 Periods</b>	
<b>Course Outcomes:</b>	
After the successful completion of the practical session, the students will be able to	
CO1	: Write error free letters and prepare reports
CO2	: Deliver welcome address and vote of thanks
CO3	: Speak coherently with proper pronunciation and accent
CO4	: Avoid common Indianisms and grammatical errors
CO5	: Improve repertoire of passive vocabulary
CO6	: Answer questions posed by interviewers confidently
CO7	: Participate in group discussion effectively
CO8	: Undertake online psychometric and IQ test to understand their strengths and weaknesses
<b>Suggested References:</b>	
1.	Anderson, P.V, Technical Communication, Thomason Wadsworth, Sixth Edition, New Delhi, 2007
2.	Prakash, P, Verbal and Non-Verbal Reasoning, Macmillan India Ltd., Second Edition, New Delhi, 2004
3.	John Seely, The Oxford Guide to Writing and Speaking, Oxford University Press, New Delhi, 2004
4.	Evans, D, Decision maker, Cambridge University Press, 1997
5.	Thorpe, E, and Thorpe, S, Objective English, Pearson Education, Second Edition, New Delhi, 2007
6.	Turton, N.D and Heaton, J.B, Dictionary of Common Errors, Addison Wesley Longman Ltd., Indian reprint 1998
7.	Ready, Steady, Go. Deepak Mehra, Jaico Publishing House, Delhi, 2015
8.	Business English Certificate Materials, Cambridge University Press
9.	<a href="http://www.seemypersonality.com">http://www.seemypersonality.com</a> (Personality Test and IQ Test).
10.	<a href="http://www.humanmetrics.com/cgi-win/jtypes2.asp">http://www.humanmetrics.com/cgi-win/jtypes2.asp</a>

18MC301		INDIAN CONSTITUTION		L	T	P	C
(Common to all branches)				2	0	0	0
<b>Course Objectives:</b>							
1.	learn the salient features of the Indian Constitution						
2.	list the Fundamental Rights and Fundamental Duties						
3.	present a systematic analysis of all dimensions of Indian Political System						
4.	understand the power and functions of the Parliament, the Legislature and the Judiciary						
<b>UNIT I</b>				6	+	0	
Union and its Territory – Citizenship–Fundamental Rights–Directive Principles of State Policy–Fundamental Duties							
<b>UNIT II</b>				6	+	0	
The Union–The States–The Union Territories–The Panchayats–The Municipalities							
<b>UNIT III</b>				6	+	0	
The Co-operative Societies–The scheduled and Tribal Areas–Relations between the Union and the States–Finance, Property, Contracts and Suits–Trade and Commerce within the territory of India							
<b>UNIT IV</b>				6	+	0	
Services under the Union, the States – Tribunals – Elections– Special Provisions –Relating to certain Classes							
<b>UNIT V</b>				6	+	0	
Languages–Emergency Provisions – Miscellaneous–Amendment of the Constitution							
<b>Total (L+T)= 30 Periods</b>							
<b>Course Outcomes:</b>							
On completion of the course, students will:							
CO1	:	understand the emergence and evolution of the Indian Constitution					
CO2	:	explain the key concepts of Indian Political System					
CO3	:	describe the role of constitution in a democratic society.					
CO4	:	present the structure and functions of the Central and State Governments, the Legislature and the Judiciary					
<b>Text Books:</b>							
1.	SubhashC.Kashyap, Our Constitution, National Book Trust, 2017						
2.	Durga Das Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.						
3.	M.V.Pylee, Constitutional History of India, S.Chand publishing, 2010						
4.	Granville Austin, The Indian Constitution: Cornerstone of a Nation, Oxford University Press, 1999						

# **SEMESTER-VI**

18CS601		PRINCIPLES OF COMPILER DESIGN		L	T	P	C
				3	0	0	3
<b>Course Objectives:</b>							
1.	To explore the principles involved in the design and construction of compilers.						
2.	To understand the algorithms used in the development of compilers.						
<b>UNIT I   INTRODUCTION TO COMPILER &amp; LEXICAL ANALYSIS</b>							
				9	+	0	
Compilers – Phases of a compiler – Grouping of Phases – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens – Recognition of tokens – Finite Automata (FA) – Regular Expression (RE) – RE to Non deterministic Finite Automata (NFA) – NFA to Deterministic Finite Automata (DFA) – Minimizing states of FA – RE to DFA							
<b>UNIT II   SYNTAX ANALYSIS</b>							
				9	+	0	
Role of the parser – Context-Free Grammars – Top Down parsing – Recursive Descent Parsing – Predictive Parsing – Bottom-up parsing – Operator Precedence Parsing – LR Parsers – SLR Parser – Canonical LR Parser – LALR Parser.							
<b>UNIT III   SYNTAX DIRECTED TRANSLATION &amp; INTERMEDIATE CODE GENERATION</b>							
				9	+	0	
Syntax Directed definitions – Construction of Syntax Trees – Bottom up evaluation of S-attributed definitions – L-attributed definitions – Top-down translation – Bottom up evaluation of inherited attributes – Intermediate languages – Declarations – Assignment Statements – Boolean Expressions – Case Statements – Back patching – Procedure calls.							
<b>UNIT IV   CODE GENERATION</b>							
				9	+	0	
Issues in the design of a code generator – The target machine – Run-time storage management – Basic Blocks and Flow Graphs – Transformations on Basic Blocks – Next-use Information – A simple Code generator – Register allocation and assignment – DAG representation of Basic Blocks – Peephole Optimization.							
<b>UNIT V   CODE OPTIMIZATION AND RUN TIME ENVIRONMENTS</b>							
				9	+	0	
Introduction – Principal Sources of Optimization – Optimization of basic Blocks – Loops in Flow graphs – Reducible Flow graphs – Introduction to Global Data Flow Analysis – Reaching Definitions – Data flow analysis of structured programs							
<b>Total (L+T)= 45 Periods</b>							

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Illustrate the operation of any phase of a compiler.
CO2	: Compute the information to perform the task of a compiler phase.
CO3	: Recall the principles and algorithms involved in compiler construction.
<b>Text Books:</b>	
1.	Alfred Aho, Monica S Lam, Ravi Sethi and Jeffrey D Ullman, "Compilers Principles, Techniques and Tools", Pearson Education Asia, Second Edition, 2014.
<b>Reference Books:</b>	
1.	Keith D Cooper and Linda Torczon, "Engineering a Compiler", Elsevier Publication, 2012.
2.	J.P. Bennet, "Introduction to Compiler Techniques", Second Edition, Tata McGraw-Hill, 2003.
<b>E-References:</b>	
1.	<a href="https://nptel.ac.in/courses/106108113/">https://nptel.ac.in/courses/106108113/</a>
2.	<a href="https://doc.lagout.org/programmation/C/Modern%20Compiler%20Implementation%20in%20C%20%5BAp%20pel%201997-12-13%5D.pdf">https://doc.lagout.org/programmation/C/Modern%20Compiler%20Implementation%20in%20C%20%5BAp%20pel%201997-12-13%5D.pdf</a>
3.	<a href="https://nptel.ac.in/courses/106104072/">https://nptel.ac.in/courses/106104072/</a>

18CS602		WEB TECHNOLOGY		L	T	P	C	
				3	0	0	3	
<b>Course Objectives:</b>								
1.	To express the fundamental concepts of Clients, Servers and communication between them							
2.	To create Web pages with static and dynamic information and Client side program (Java scripts)							
3.	To learn the features of Document Object Model (DOM)							
4.	To practice the Servlet and Server side programs(JSP)							
5.	To defined the web data representations							
6.	To demonstrates how the various web service technologies interact							
<b>UNIT I</b>				<b>WEB ESSENTIALS AND MARKUP LANGUAGES</b>				<b>9 + 0</b>
Web Essentials: Clients, Servers, and Communication. The Internet-Basic Internet Protocols -The World Wide Web-HTTP request message-response message-Web Clients Web Servers-Case Study. Markup Languages: XHTML. An Introduction to HTML History-Versions-Basic XHTML Syntax and Semantics-Some Fundamental HTML Elements-Relative URLs-Lists-tables-Frames-Forms-XML Creating HTML Documents-Case Study.								
<b>UNIT II</b>				<b>STYLE SHEETS AND CLIENT SIDE PROGRAMMING</b>				<b>9 + 0</b>
Style Sheets: CSS-Introduction to Cascading Style Sheets-Features-Core Syntax-Style Sheets and HTML Style Rule Cascading and Inheritance-Text Properties-Box Model-Normal Flow Box Layout- Beyond the Normal Flow-Other Properties-Case Study. Client-Side Programming: The JavaScript Language-History and Versions Introduction to JavaScript in Perspective-Syntax-Variables and Data Types-Statements-Operators-Literals-Functions-Objects-Arrays-Built-in Objects - JavaScript Debuggers.								
<b>UNIT III</b>				<b>HOST OBJECTS AND SERVER SIDE PROGRAMMING</b>				<b>9 + 0</b>
Host Objects: Browsers and the DOM-Introduction to the Document Object Model DOM History and Levels-Intrinsic Event Handling-Modifying Element Style-The Document Tree-DOM Event Handling-Accommodating Noncompliant Browsers Properties of window-Case Study. Server-Side Programming: Java Servlets-Architecture -Overview-A Servlet-Generating Dynamic Content-Life Cycle- Parameter Data-Sessions-Cookies- URL Rewriting-Other Capabilities-Data Storage Servlets and Concurrency-Case Study- Related Technologies.								
<b>UNIT IV</b>				<b>DATA REPRESENTATION AND PRESENTATION</b>				<b>9 + 0</b>
Representing Web Data: XML-Documents and Vocabularies-Versions and Declaration- Namespaces JavaScript and XML: Ajax-DOM based XML processing Event-oriented Parsing: SAX-Transforming XML Documents-Selecting XML Data: XPATH-Template based Transformations: XSLT-Displaying XML Documents in Browsers-Case Study-Related Technologies. Separating Programming and Presentation: JSP								

Technology-Introduction-JSP and Servlets-Running JSP Applications Basic JSP-JavaBeans Classes and JSP-Tag Libraries and Files-Support for the Model-View-Controller Paradigm-Case Study-Related Technologies			
<b>UNIT V</b>	<b>WEB SERVICES</b>	<b>9</b>	<b>+ 0</b>
Web Services: JAX-RPC-Concepts-Writing a Java Web Service-Writing a Java Web Service Client-Describing Web Services: WSDL- Representing Data Types: XML Schema-communicating Object Data: SOAP Related Technologies-Software Installation-Storing Java Objects as Files-Databases and Java Servlets.			
<b>Total (L+T)= 45 Periods</b>			
<b>Course Outcomes:</b>			
Upon completion of this course, the students will be able to:			
CO1	:	Express the fundamental concepts of Clients, Servers and communication between them	
CO2	:	Design of Web pages with static and dynamic information and Client side program(Java scripts)	
CO3	:	Articulate the features of Document Object Model (DOM)	
CO4	:	Implement the Servlet and Server side programs(JSP)	
CO5	:	Persuasive the web data representations	
CO6	:	Illustrates how the various web service technologies interact	
<b>Text Books:</b>			
1.	Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.		
<b>Reference Books:</b>			
1.	Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education, 2007.		
2.	Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2006.		
3.	Marty Hall and Larry Brown,"Core Web Programming" Second Edition, Volume I and II, Pearson Education, 2001		

18CS603		COMPILER DESIGN LABORATORY	L	T	P	C
			0	0	4	2
<b>Course Objectives:</b>						
1.	To develop Finite state machines					
2.	To implement Parsers					
<b>EXPERIMENTS</b>						
1.	Regular Expression (RE) to Non deterministic Finite Automata with Epsilon ( $\epsilon$ - NFA).					
2.	$\epsilon$ - NFA to Deterministic Finite Automata (DFA).					
3.	Recognizing token using DFA.					
4.	Top down Parsing of strings.					
5.	Operator precedence parsing of strings.					
6.	Bottom up parsing of strings.					
7.	Generating intermediate code for arithmetic expressions.					
						<b>Total (P)= 60 Periods</b>
<b>Course Outcomes:</b>						
After the successful completion of the practical session, the students will be able to						
CO1	:	Implement the representation for RE, $\epsilon$ - NFA and DFA and perform conversions among them.				
CO2	:	Implement Top-down and Bottom-up parsing.				
<b>Reference Books:</b>						
1.	Allen I. Holub "Compiler Design in C", Prentice Hall of India, 2003.					
<b>E-References:</b>						
1.	<a href="https://nptel.ac.in/courses/106108113/">https://nptel.ac.in/courses/106108113/</a>					
2.	<a href="https://doc.lagout.org/programmation/C/Modern%20Compiler%20Implementation%20in%20C%20%5BApapel%201997-12-13%5D.pdf">https://doc.lagout.org/programmation/C/Modern%20Compiler%20Implementation%20in%20C%20%5BApapel%201997-12-13%5D.pdf</a>					
3.	<a href="https://nptel.ac.in/courses/106104072/">https://nptel.ac.in/courses/106104072/</a>					



18CS604		WEB TECHNOLOGY LABORATORY		L	T	P	C
				0	0	4	2
<b>Course Objectives:</b>							
1.	To expressive and build Web applications using various technologies HTML, DHTML, XML, Java scripts, Servlets and JSP						
<b>LIST OF EXPERIMENTS</b>							
<ol style="list-style-type: none"> <li>1. Creation of HTML pages with frames, links, tables and other tags.</li> <li>2. Create a web page with the following using HTML <ol style="list-style-type: none"> <li>i. To embed an image map in a web page</li> <li>ii. To fix the hot spots</li> <li>iii. Show all the related information when the hot spots are clicked.</li> </ol> </li> <li>3. Usage of internal and external CSS along with HTML pages.</li> <li>4. Client Side Programming.( Form validation including textfield, radio buttons, checkboxes, listbox and other controls )</li> <li>5. Usage of JSP objects Request, Response, Application, Session, Server, ADO etc. (Writing online applications such as Shopping, railway/air/bus ticket reservation system)</li> <li>6. Writing Servlet Program using HTTP Servlet.</li> <li>7. Any online application with database access. (Write a JSP application for Telephone Directory using MS-ACCESS)</li> <li>8. Creation of XML document for a specific domain.</li> <li>9. Writing DTD or XML schema for the domain specific XML document.</li> <li>10. Parsing an XML document using DOM and SAX Parsers.</li> </ol>							
<b>Software Required:</b>							
1.	JDK						
<b>Course Outcomes:</b>							
Upon completion of this course, the students will be able to:							
CO1	:	Articulate and build Web applications using various technologies HTML, DHTML, XML, Java scripts, Servlets and JSP					

18CS605	MINI PROJECT	L	T	P	C
		0	0	6	3
<p>The objective of project work is to enable the students to work in convenient groups of not more than four members in a group on a project involving some design and fabrication work or theoretical and experimental studies related to the respective engineering discipline.</p> <p>Every project work shall have a Guide who is a member of the faculty of the University. Six periods per weeks shall be allotted in the Time Table for this important activity and this time shall be utilized by the student to receive directions from the Guide, on library reading, laboratory work, computer analysis, or field work as assigned by the Guide and also to present periodical seminars of viva to review the progress made in the project.</p> <p>Each student shall finally produce a comprehensive report covering background information, literature-survey, problem statement, project work details, estimation of cost and conclusions. This final report shall be in typewritten form as specified in the guidelines.</p> <p>The continuous assessment and semester evaluation may be carried out as specified in the guidelines to be issued time to time.</p>					

# **SEMESTER-VII**

18CS701		CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To know about various encryption techniques and number theory					
2.	To understand the concepts of block cipher and public key encryption					
3.	To study about authentication and Hash functions and digital signatures					
4.	To learn about the network security tools and system level security					
5.	To understand the IP security and Web security.					
<b>UNIT I   INTRODUCTION AND NUMBER THEORY</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Security Attacks - Services and Mechanisms - OSI Security Architecture - Classical Encryption techniques (Symmetric Cipher Model, Substitution Techniques - Transposition Techniques and Steganography). Finite Fields and Number Theory: Groups - Rings and Fields - Modular Arithmetic - Euclidean Algorithm - Finite fields - Polynomial Arithmetic - Prime Number - Fermat's and Euler's theorem - Testing of Primality - The Chinese remainder Theorem and Discrete logarithms.						
<b>UNIT II   BLOCK CIPHERS AND PUBLIC KEY CRYPTOGRAPHY</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Data Encryption Standard - Block Cipher Design Principles and Modes of Operation - Advanced Encryption Standard. Principles of Public Key Cryptosystems - The RSA Algorithm - Key Management - Diffie-Hellman key Exchange- Elliptic Curve Arithmetic and Cryptography.						
<b>UNIT III   AUTHENTICATION, HASH FUNCTION AND DIGITAL SIGNATURES</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Authentication requirements - Authentication functions - Message Authentication Codes - Hash Functions - Security of Hash Functions and MACs – HMAC - MD5 message Digest algorithm - Secure Hash Algorithm - Digital Signatures - Authentication Protocols - Digital Signature Standard.						
<b>UNIT IV   NETWORK SECURITY AND SYSTEM SECURITY</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Authentication Applications: Kerberos - X.509 Authentication Service - Firewall Design Principles - Trusted Systems – Intruders - Intrusion Detection - Password management - Viruses and related Threats, virus Countermeasures.						

<b>UNIT V</b>	<b>EMAIL, IP AND WEB SECURITY</b>	<b>9</b>	<b>+</b>	<b>0</b>
Pretty Good Privacy - S/MIME - IP Security Overview - IP Security Architecture - Authentication Header - Encapsulating Security Payload - Web Security Considerations - Secure Socket Layer and Transport Layer Security - Secure Electronic Transaction(SET).				
<b>Total (L+T)= 45 Periods</b>				
<b>Course Outcomes:</b>				
Upon completion of this course, the students will be able to:				
CO1	:	Gain knowledge of various encryption techniques and number theory		
CO2	:	Understand the concepts of block cipher and public key encryption		
CO3	:	Learn basics of authentication and Hash functions and digital signatures		
CO4	:	Understand the concept of network security tools and system level security		
CO5	:	Gain knowledge of the IP security and Web security.		
<b>Text Books:</b>				
1.	William Stallings, "Cryptography and Network Security – Principles and Practices", Fourth Edition, 2006.			
<b>Reference Books:</b>				
1.	AtulKahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003.			
2.	Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.			
3.	Charles P. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Third Edition, Prentice Hall of India, 2006.			

18CS702		NETWORK SECURITY LABORATORY		L	T	P	C
				0	0	4	2
<b>Course Objectives:</b>							
1.	To understand how AES algorithm is implemented						
2.	To implement DES algorithm						
3.	To be familiar with how RSA and Secure hash algorithm are implemented						
4.	To understand how Diffie-Hellman Algorithm is implemented and stimulated						
5.	To be familiar with simulation of firewall concepts and virus attacks						
<b>EXPERIMENTS</b>							
1.	Implementation of Caesar Cipher Algorithm.						
2.	Implementation of Playfair Cipher Algorithm.						
3.	Implementation of Hill Cipher Algorithm.						
4.	Implementation of DES Algorithm.						
5.	Implementation of AES Algorithm.						
6.	Implementation of RSA Algorithm.						
7.	Implement and simulate Diffie –Hellman Algorithm.						
8.	Implementation of Secure Hash Algorithm.						
9.	Create a model to simulate Digital Signature concept.						
10.	Create a model to simulate firewall concept.						
11.	Create a model to simulate the concept of virus attack.						
<b>Software Required:</b> Borland C++ / Java							
<b>Total (P)= 60 Periods</b>							
<b>Course Outcomes:</b>							
After the successful completion of the practical session, the students will be able to							
CO1	:	Understand how AES algorithm is implemented.					
CO2	:	Implement DES algorithm.					
CO3	:	Familiar with how RSA and Secure hash algorithm are implemented.					
CO4	:	Understand how Diffie-Hellman Algorithm is implemented and stimulated.					
CO5	:	Familiar with simulation of firewall concepts and virus attacks.					

**Reference Books:**

- |    |   |
|----|---|
| 1. | William Stallings, "Cryptography and Network Security – Principles and Practices", Fourth Edition, 2006.    |
| 2. | PatricNaughton , Herbert Schildt, "The Complete Reference Java 2" , Eighth edition Tata McGraw Hills, 2011. |
| 3. | Herbert Schildt, "The Complete Reference C++", Fourth edition, TMH, 2003                                    |

18CS703	PROJECT PHASE I	L	T	P	C
		0	0	12	6
<p>The objective of project work is to enable the students, to work in convenient groups of not more than four members in a group, on a project involving some design and fabrication work or theoretical and experimental studies related to the respective engineering discipline.</p> <p>Every project work shall have a Guide who is a member of the faculty of the University. Twelve periods per weeks shall be allotted in the Time Table for this important activity and this time shall be utilized by the student to receive directions from the Guide, on library reading, laboratory work, computer analysis, or field work as assigned by the Guide and also to present periodical seminars of viva to review the progress made in the project.</p> <p>Each student shall finally produce a comprehensive report covering background information, literature-survey, problem statement, project work details, estimation of cost and conclusions. This final report shall be in typewritten form as specified in the guidelines.</p> <p>The continuous assessment and semester evaluation may be carried out as specified in the guidelines to be issued time to time.</p>					



# **SEMESTER-VIII**

18CS801	PROJECT PHASE II	L	T	P	C
		0	0	12	6
<p>The objective of project work is to enable the students, to work in convenient groups of not more than four members in a group, on a project involving some design and fabrication work or theoretical and experimental studies related to the respective engineering discipline.</p> <p>Every project work shall have a Guide who is a member of the faculty of the University. Twelve periods per weeks shall be allotted in the Time Table for this important activity and this time shall be utilized by the student to receive directions from the Guide, on library reading, laboratory work, computer analysis, or field work as assigned by the Guide and also to present periodical seminars of viva to review the progress made in the project.</p> <p>Each student shall finally produce a comprehensive report covering background information, literature-survey, problem statement, project work details, estimation of cost and conclusions. This final report shall be in typewritten form as specified in the guidelines.</p> <p>The continuous assessment and semester evaluation may be carried out as specified in the guidelines to be issued time to time.</p>					

**LIST OF PROFESSIONAL ELECTIVES  
(VI SEMESTER)**

18CSPE601		SOFTWARE PROJECT MANAGEMENT	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To explain the main tasks undertaken by project managers					
2.	To introduce software project management and to describe its distinctive characteristics					
3.	To discuss project planning and the planning process					
4.	To show how graphical schedule representations are used by project management					
5.	To discuss the notion of risks and the risk management process					
<b>UNIT I INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Project Definition – Contract Management – Activities Covered By Software Project Management – Overview of Project Planning – Stepwise Project Planning.						
<b>UNIT II PROJECT EVALUATION</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Strategic Assessment – Technical Assessment – Cost Benefit Analysis –Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation.						
<b>UNIT III ACTIVITY PLANNING</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Objectives – Project Schedule – Sequencing and Scheduling Activities –Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature of Risk – Types of Risk – Managing Risk – Hazard Identification – Hazard analysis – Risk Planning and Control.						
<b>UNIT IV MONITORING AND CONTROL</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance.						
<b>UNIT V MANAGING PEOPLE AND ORGANIZING TEAMS</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Introduction – Understanding Behavior – Organizational Behaviors A Background – Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation – The Oldham – Hackman Job Characteristics Model – Working In Groups – Becoming A Team –Decision Making – Leadership – Organizational Structures – Stress –Health And Safety – Case Studies.						
<b>Total (L+T)= 45 Periods</b>						

**Course Outcomes:**

Upon completion of this course, the students will be able to:

CO1	:	Apply project management practices and techniques and gain hands-on experience in planning, organizing, and managing software projects
CO2	:	Apply time, risk, and cost management techniques in real time software projects.
CO3	:	Apply quality management concepts and models.
CO4	:	Appreciate the importance of software project management processes and understand the software project lifecycle

**Text Book:**

1. Bob Hughes, Mikecoterrell, "Software Project Management", Third Edition, Tata McGraw Hill, 2004.

**Reference Books:**

1. Ramesh, Gopaldaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.

18CSPE602		ARTIFICIAL INTELLIGENCE	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To learn the various characteristics of Intelligent agents, different search strategies and represent knowledge in solving AI problems					
2.	To understand the different ways of designing software agents					
3.	To know about the various applications of AI					
<b>UNIT I   INTRODUCTION</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Introduction–Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents–Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.						
<b>UNIT II   PROBLEM SOLVING METHODS</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Problem solving Methods – Search Strategies- Uninformed – Informed – Heuristics – Local Search Algorithms and Optimization Problems – Searching with Partial Observations – Constraint Satisfaction Problems – Constraint Propagation – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning.						
<b>UNIT III   KNOWLEDGE REPRESENTATION</b>			<b>9</b>	<b>+</b>	<b>0</b>	
First Order Predicate Logic – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation – Ontological Engineering-Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories – Reasoning with Default Information.						
<b>UNIT IV   SOFTWARE AGENTS</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems.						
<b>UNIT V   APPLICATIONS</b>			<b>9</b>	<b>+</b>	<b>0</b>	
AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving.						
<b>Total (L+T)= 45 Periods</b>						

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Use appropriate search algorithms for any AI problem
CO2	: Represent a problem using first order and predicate logic
CO3	: Provide the apt agent strategy to solve a given problem
CO4	: Design software agents to solve a problem and Design applications for NLP that use Artificial Intelligence
<b>Text Books:</b>	
1.	S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, Third Edition, 2009
2.	I. Bratko, —Prolog: Programming for Artificial Intelligence, Fourth edition, Addison-Wesley Educational Publishers Inc., 2011
<b>Reference Books:</b>	
1.	M. Tim Jones, —Artificial Intelligence: A Systems Approach(Computer Science), Jones and Bartlett Publishers, Inc.; First Edition, 2008
2.	Nils J. Nilsson, —The Quest for Artificial Intelligence, Cambridge University Press, 2009
3.	William F. Clocksin and Christopher S. Mellish,  Programming in Prolog: Using the ISO Standard, Fifth Edition, Springer, 2003
4.	Gerhard Weiss, —Multi Agent Systems, Second Edition, MIT Press, 2013
5.	David L. Poole and Alan K. Mackworth, —Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010
<b>E-References:</b>	
1.	<a href="https://builtin.com/artificial-intelligence">https://builtin.com/artificial-intelligence</a>
2.	<a href="https://science.howstuffworks.com/robot6.htm">https://science.howstuffworks.com/robot6.htm</a>
3.	<a href="https://www.thestreet.com/technology">https://www.thestreet.com/technology</a>

18CSPE603		DISTRIBUTED AND PARALLEL COMPUTING	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To Familiarize with the system models and the basic client server communication.					
2.	To learn the architecture of Remote Procedure Call.					
3.	To Illustrate the Design principles of Parallel Processing.					
4.	To explain the concept of Interconnection Networks and parallel programming models.					
<b>UNIT I   CHARACTERIZATION OF DISTRIBUTED SYSTEMS</b>						
			9	+	0	
Resource sharing and the Web-System models:-Architectural models-Fundamental Models, Interposes Communication:-The API for the Internet protocols, External data representation and marshalling, Client Server communication, Group communication						
<b>UNIT II   DISTRIBUTED OBJECTS AND REMOTE INVOCATION</b>						
			9	+	0	
Communication between distributed objects, Remote Procedure call, Events and notifications. Operating System Support. The operating system layer- Protection-Processes and threads-Communication and invocation-Operating system architecture.						
<b>UNIT III   SCALABILITY AND CLUSTERING</b>						
			9	+	0	
Evolution of Computer Architecture – Dimensions of Scalability – Parallel Computer Models – Basic Concepts Of Clustering – Scalable Design Principles – Parallel Programming Overview – Processes, Tasks and Threads – Parallelism Issues – Interaction / Communication Issues – Semantic Issues In Parallel Programs						
<b>UNIT IV   SYSTEM INTERCONNECTS</b>						
			9	+	0	
Basics of Interconnection Networks – Network Topologies and Properties – Buses, Crossbar and Multistage Switches, Software Multithreading – Synchronization Mechanisms.						
<b>UNIT V   PARALLEL PROGRAMMING</b>						
			9	+	0	
Paradigms And Programmability – Parallel Programming Models – Shared Memory Programming						
<b>Total (L+T)= 45 Periods</b>						



**Course Outcomes:**

Upon completion of this course, the students will be able to:

CO1	:	Familiarize with the system models and the basic client server communication.
CO2	:	Explain the architecture of Remote Procedure Call.
CO3	:	Illustrate the Design principles of Parallel Processing
CO4	:	Explain the components of Interconnection Networks and parallel programming models

**Text Book:**

1.	George Coulouris, Jean Dollimore, Tim Kindberg- Distributed Systems Concepts and Design- AWL, Fifth Edition- 2012.(Unit I,II)
2.	Kai Hwang and Zhi.Wei Xu, "Scalable Parallel Computing", Tata McGraw-Hill, New Delhi, 2003. (Unit III - V).

**Reference Books:**

1.	Maarten Van Steen,Andrew & Tanenbaum-Distributed Systems: Principles and Paradigms-PrenticeHall-second edition -2007.
2.	Ross J.Anderson-Security Engineering: A Guide to building dependable distributed systems-John Wiley & Sons- second edition -2008.

18CSPE604		PYTHON PROGRAMMING	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To learn Python data structures, conditional and control structures and files.					
2.	To study Python Modules, packages, Functions and Exceptions.					
3.	To describe Object oriented programming features and Regular Expressions.					
4.	To learn about Web programming, GUI Programming and Database programming					
<b>UNIT I   INTRODUCTION</b>						
			9	+	0	
Python: Features - The Basics-Python Objects-Numbers-Sequences-Mapping and set types- Conditionals and loops-if statement-else statement-elif-Conditional Expressions-while statement-for statement-break-continue.						
<b>UNIT II   FUNCTIONS, MODULES AND PACKAGES</b>						
			9	+	0	
Functions-Calling functions-Creating functions-Passing Functions-Formal Arguments-Variable length arguments-variable scope-Recursion, Modules-Packages.						
<b>UNIT III   FILES AND EXCEPTIONS</b>						
			9	+	0	
Files and Input/ Output –Errors and Exceptions-Introduction-Detecting and handling Exceptions-Context Management-Raising Exceptions-Assertions-Standard Exceptions.						
<b>UNIT IV   OBJECT ORIENTED PROGRAMMING AND REGULAR EXPRESSIONS</b>						
			9	+	0	
Object Oriented Programming Introduction-Classes-class Attributes-Instances-Instances attributes-Building and Method Invocation-Static methods and class Methods-Inheritance-Operator overloading - - Regular Expressions-Network Programming –Multithreaded Programming						
<b>UNIT V   ADVANCED TOPICS</b>						
			9	+	0	
GUI Programming- Web Programming-Database Programming						
						<b>Total (L+T)= 45 Periods</b>
<b>Course Outcomes:</b>						
Upon completion of this course, the students will be able to:						
CO1	:	Develop programs using control structures and files.				
CO2	:	Create own Python Modules, packages, functions and Exceptions.				
CO3	:	Illustrate Object oriented Programming features and Regular Expressions.				
CO4	:	Create own Web programs, GUI and database programs.				

**Text Books:**

1. Wesley J.Chun-"Core Python Programming" –Prentice Hall, Second Edition, 2006.

**Reference Books:**

1. Swaroop C N, " A Byte of Python ", ebsshelf Inc., 1st Edition, 2013
2. "A Practical Introduction to python programming", Brian Heinold,Mount St.Mary's University,2012
3. Learning to Program with Python," Richard L. Halterman"., Southern Adventist University

**E-References:**

1. Introduction to Python Programming NPTEL video lectures by Dr. Sudip Misra, IIT Kharagpur 2017.

18CSPE605		AGILE TECHNOLOGIES	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To understand the internals of the Agile Project Development					
2.	To know how Agile Project Development is actually implemented					
3.	To understand the concepts of Scrum and Extreme Programming					
4.	To understand the concepts of Unified Process and EVE					
<b>UNIT I   INTRODUCTION</b>						
			9	+	0	
<b>Iterative and Evolutionary:</b> Definition – Comparison - Major activities. <b>Agile:</b> Basic concepts - Major activities - Available agile methods. <b>Story:</b> Overview-Estimated hours remaining.						
<b>UNIT II   MOTIVATION AND EVIDENCE</b>						
			9	+	0	
<b>Motivation:</b> Change on software projects – Key motivation-Requirement challenge –Problems of water fall. <b>Evidence:</b> Research and early historical – Standard and though leader-Business case -Water fall validity.						
<b>UNIT III   SCRUM AND EXTREME PROGRAMMING</b>						
			9	+	0	
<b>Scrum:</b> 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 <b>Extreme Programming:</b> Concepts, Method overview, Lifecycle, Work products, Roles and Practices, Values, Common Mistakes and Misunderstandings, Sample Projects.						
<b>UNIT IV   UNIFIED PROCESS AND EVE</b>						
			9	+	0	
<b>Unified Process:</b> Concepts, Method overview, Lifecycle, Work products, Roles and Practices, Values, Common mistakes and misunderstandings, Process Mixtures, Adaption Strategies, Fact versus Fantasy, Strength Versus Other, and Sample Projects. <b>EVE:</b> Concepts, Method overview, Lifecycle, Work products, Roles and Practices, Values, Common mistakes and misunderstandings ,Process Mixtures, Adaption Strategies, Fact versus Fantasy, Strength Versus Other.						
<b>UNIT V   PROJECT MANAGEMENT</b>						
			9	+	0	
<b>Practice Tips:</b> Project – Management – Environment – Requirements – Tests - Frequently raised questions and answers.						
<b>Total (L+T)= 45 Periods</b>						

**Course Outcomes:**

Upon completion of this course, the students will be able to:

CO1	:	Understand the internals of the Agile Project Development
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CO2	:	Understand how Agile Project Development is actually implemented
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CO3	:	Understand the concepts of Scrum and Extreme Programming
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CO4	:	Understand the concepts of Unified Process and EVE
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**Text Books:**

1.	Craig Larman, "Agile and Iterative Development A Manger's Guide" Pearson Education, First Edition, India, 2004.
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**Reference Books:**

1.	Shore, "Art of Agile Development", Shroff Publishers & Distributors, 2007
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18CSPE606		OBJECT ORIENTED ANALYSIS AND DESIGN	L	T	P	C		
			3	0	0	3		
<b>Course Objectives:</b>								
1.	To understand the fundamentals of object modelling.							
2.	To understand and differentiate Unified Process from other approaches.							
3.	To design with static UML diagrams.							
4.	To design with the UML dynamic and implementation diagrams.							
5.	To map the design properly to code							
<b>UNIT I</b>	<b>INTRODUCTION</b>					<b>9</b>	<b>+</b>	<b>0</b>
The system life cycle - Traditional life cycle models - The object-oriented approach - The Rational Unified Process (RUP) - The Unified Modeling Language (UML) - UML models - Introduction to the case study - Requirements for the Wheels case study system - Requirements engineering - Requirements elicitation - List of requirements for the Wheels system - Use cases - Use case diagram - Use case descriptions- Actors and actor descriptions - Use case relationships: communication association, include and extend - Boundary - Using the use case model in system development.								
<b>UNIT II</b>	<b>OBJECTS AND CLASSES</b>					<b>9</b>	<b>+</b>	<b>0</b>
Basics – Object – classes - Relationships between classes - The class diagram - Stages in building a class diagram - Packages - Using the class diagram in system development.								
<b>UNIT III</b>	<b>IDENTIFYING FUNCTIONALITIES</b>					<b>9</b>	<b>+</b>	<b>0</b>
Introduction - CRC cards and interaction diagrams - Identifying operations using the CRC card technique - Interaction diagrams - Specifying operations - Using the CRC cards and interaction diagrams in system development - State Diagrams - States and events - Constructing a state diagram - Using state diagrams in system development.								
<b>UNIT IV</b>	<b>ACTIVITY DIAGRAMS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Introduction - Modeling a sequence of activities - Modeling alternative courses of action - Modeling iteration of activities - Modeling activities that are carried out in parallel – Swimlanes - Design - Architecture - Implementation diagrams The user interface Dealing with persistent data.								
<b>UNIT V</b>	<b>DESIGNING OBJECTS AND CLASSES</b>					<b>9</b>	<b>+</b>	<b>0</b>
Introduction - class diagram - Interaction diagrams. Implementation of class diagram - The code - Sequence diagram.								
<b>Total (L+T)= 45 Periods</b>								

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Identify various scenarios based on software requirements
CO2	: Express software design with UML diagrams
CO3	: Understand the various testing methodologies for OO software
<b>Text Books:</b>	
1.	Carol Britton and Jill Doake, "A Student Guide to Object - Oriented Development", Elsevier, Butterworth – Heinemann, Eighth edition, 2007.
<b>Reference Books:</b>	
1.	Brett McLaughlin, Gary Pollice and David West, "Head First Object-Oriented Analysis and Design: A Brain Friendly Guide to OOA&D", O'Reilly, Shroff Publishers & Distributors Pvt. Ltd., 2008.
2.	Mahesh P. Matha, "Object Oriented Analysis and Design using UML", Prentice-Hall of India, 2008.

18CSPE607		DATA MINING AND WAREHOUSING	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To know the fundamentals of data mining					
2.	Be familiar with the concepts of data warehouse					
3.	To understand the importance of association rule mining					
4.	To understand the techniques of classification and clustering .					
5.	Be aware about the recent trends of data mining					
<b>UNIT I</b>	<b>DATA MINING</b>		9	+		0
Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing.						
<b>UNIT II</b>	<b>DATA WAREHOUSING</b>		9	+		0
Basic concepts – Data Cube – Multidimensional Data Model – Data Warehouse Architecture – Data warehouse implementation – From Data Warehousing to Data Mining.						
<b>UNIT III</b>	<b>ASSOCIATION RULE MINING AND CLASSIFICATION</b>		9	+		0
Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining. Classification and Prediction, Issues, Decision Tree Induction, Bayesian Classification, Rule Based Classification, Classification by Backpropagation – Support Vector Machines - Other Classification Methods.						
<b>UNIT IV</b>	<b>CLUSTERING AND OUTLIER ANALYSIS</b>		9	+		0
Cluster Analysis - Types of Data – Categorization of Major Clustering Methods – K-means– Partitioning Methods – Hierarchical Methods - Density-Based Methods – Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.						
<b>UNIT V</b>	<b>DATA MINING TRENDS</b>		9	+		0
Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, World Wide Web, Applications and Trends in Data Mining. Case studies involving classification and clustering.						
<b>Total (L+T)= 45 Periods</b>						



<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Discuss the fundamentals of data mining and preprocessing.
CO2	: Explain the basic concept of data warehousing and multidimensional model.
CO3	: Develop association rule mining and classification algorithms.
CO4	: Apply different clustering and outlier detection techniques.
CO5	: Have an overview about the applications and recent trends in Data Mining.
<b>Text Books:</b>	
1.	Jiawei Han, Micheline Kamber, "Data Mining: Concepts and Techniques", Morgan Kaufmann, Third Edition, 2011.
<b>Reference Books:</b>	
1.	G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, Third Edition, 2014.
2	David Hand, Heikki Manila, Padhraic Symth, "Principles of Data Mining", PHI 2012.
3.	W.H.Inmon, "Building the Data Warehouse", Third Edition, Wiley, 2011.

18CSPE608		COMPONENT BASED TECHNOLOGY	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To be familiar with component based technology.					
2.	To understand the support to component based technology in different languages					
<b>UNIT I INTRODUCTION</b>						
			9	+	0	
Software Components – objects – fundamental properties of Component technology – modules – interfaces – callbacks – directory services – component architecture – components and middleware						
<b>UNIT II JAVA BASED COMPONENT TECHNOLOGIES</b>						
			9	+	0	
Threads – Java Beans – Events and connections – JAR files – reflection – object serialization – Enterprise Java Beans – Distributed Object models – RMI and RMI-IIOP						
<b>UNIT III CORBA COMPONENT TECHNOLOGIES</b>						
			9	+	0	
CORBA – Interface Definition language – Object Request Broker – system object model – portable object adapter – CORBA services – CORBA component model – containers – application server – model driven architecture						
<b>UNIT IV .NET BASED COMPONENT TECHNOLOGIES</b>						
			9	+	0	
COM – Distributed COM – object reuse – interfaces and versioning – dispatch interfaces – connectable objects – OLE containers and servers – Active X controls – .NET components - assemblies – appdomains – contexts – reflection – remoting						
<b>UNIT V COMPONENT FRAMEWORKS AND DEVELOPMENT</b>						
			9	+	0	
Connectors – contexts – EJB containers – CLR contexts and channels – Black Box component framework – directory objects – cross-development environment – component-oriented programming – Component design and implementation tools – testing tools - assembly tools						
<b>Total (L+T)= 45 Periods</b>						

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Recall the fundamentals of component based technology.
CO2	: Describe the support to component based technology in different languages.
CO3	: Design simple applications based on component based technology
<b>Text Books:</b>	
1.	Clemens Szyperski, "Component Software: Beyond Object-Oriented Programming", Second Edition, Pearson Education publishers, 2003.
<b>Reference Books:</b>	
1.	Thomas J. Mowbray and William A. Ruh, "Inside CORBA: Distributed Object Standards And Applications", Pearson Education, 2016.
2.	Wayne S Freeze, "Visual Basic Development Guide for COM & COM+", BPB Publication, 2000.
3.	Cay S Hortsman and Gray Cornell, "CORE JAVA Vol-II Advanced Features" Eleventh Edition, Prentice Hall, 2018
<b>E-References:</b>	
1.	<a href="http://rmi.yaht.net/bookz/core.java/9780134177908-Vol-2.pdf">http://rmi.yaht.net/bookz/core.java/9780134177908-Vol-2.pdf</a>

18CSPE609		COMPUTER HARDWARE AND TROUBLESHOOTING	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To understand the fundamentals of computer					
2.	To learn the different types of memory					
3.	Be familiar with Nomenclature, technology, standards of computer					
4.	Be expose to the issues in troubleshooting					
5.	To learn the printers and its types					
<b>UNIT I FUNDAMENTALS OF COMPUTER</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Block diagram and brief introduction of each block, Types of computers, PC, Main Parts: CPU Box, Monitor, & Peripherals [Keyboard, Mouse, Speaker]. Inside CPU Box: Motherboard, I/O Cards, Cables, Floppy Drive, HDD, CD-Drive						
<b>UNIT II MOTHER BOARD IN DETAIL</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Nomenclature, technology, standards AMD CPUs, Cyrix CPUs. CPUs: CPU over clocking, troubleshooting, CPU problems. Chip Sets: AMD chip sets, Intel chip sets, VIA chip sets SIS. chip sets, OPTI chipsets, Legacy and support ICS						
<b>UNIT III BASIC CONCEPTS OF MEMORY AND ITS TYPES</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Memory Chips: RAM and ROM, EPROM. Memory Modules and packaging, Logical and Physical organization of memory in computer. Cache Memory - LX and LZ, EDO. Various terms used in computer memory						
<b>UNIT IV PC- ASSEMBLY AND CMOS SETUP AND TROUBLESHOOTING</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Observation of all parts of Floppy drives, HDD, CD, and SMPS. Identification of cables and computers. Mounting Motherboard in cabinet Installation of cards, devices and then connecting cables. Fitting of cabinet. CMOS – Setup Troubleshooting						
<b>UNIT V BASICS OF PRINTERS</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Types of printers and printing mechanism, How printer works. Inject printer, working of laser printer, Fonts/Type faces, Trouble shooting printers.						
<b>Total (L+T)= 45 Periods</b>						

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Explain the concepts and block diagram of a computer
CO2	: Familiar with the technology and standards used in computer
CO3	: Identify and understand security issues related to troubleshooting
CO4	: Familiar with the different memories used in computer
CO5	: Explain the working mechanism of printers and its types
<b>Text Books:</b>	
1.	Hardware bible By : Winn L Rosch, 2nd Edition, B.P.B, Publication Ltd.,1996
2.	Trouble shooting, maintaining and repairing PCs, Stephon J Bigelow Tata McGraw Hill Publication
3.	Modern All about printers, Manohar Lotia, Pradeep Nair, Bijal Lotia BPB publications
<b>Reference Books:</b>	
1.	Mueller.S, Upgrading and repairing PCS, 4th Edition, Prentice Hall, 1995
2.	Govindarajulu.B, IBM PC and Clones Hardware trouble shooting and maintenance McGraw Hill, 1993
3.	D.V.Hall, Microprocessors and Interfacing Programming and Hardware, Mc Graw Hill,1986

18CSPE610		MIDDLEWARE TECHNOLOGIES	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To gain knowledge in various middleware technologies for distributed applications					
2.	To create distributed application using EJB,CORBA and COM					
3.	To familiarize and create the web services					
4.	To disseminate web server architecture and standards					
<b>UNIT I INTRODUCTION</b>			<b>9</b>	<b>+</b>	<b>0</b>	
General Middleware, Service Specific Middleware, Client/Server Building blocks – Peer-to– Peer Communications – RPC Middleware – Messaging - Java RMI - Computing Standards – OMG – Overview of CORBA - Overview of COM/DCOM - Overview of EJB - Middleware types - Middleware in Distributed Applications.						
<b>UNIT II EJB AND CORBA</b>			<b>9</b>	<b>+</b>	<b>0</b>	
EJB Architecture - Overview of EJB Software Architecture, EJB Conversation, Building and Deploying EJBs, Roles, EJB Applications – Types of Enterprise Beans - Lifecycle of Beans - EJB clients - Developing an Application - Deployment. CORBA – Components - Architectural Features – Method Invocations - Static and Dynamic CORBA – Structure of CORBA IDL - Self-Describing Data Type- Interface Repository - Building an Application Using CORBA - CORBA Services - Object Location Services, Messaging Services- CORBA Component Model.						
<b>UNIT III COM AND .NET FRAMEWORK</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Evolution of DCOM - Introduction to COM - COM Clients and Servers - COM IDL – COM Interfaces- COM Threading Models – Marshalling - Custom and Standard Marshalling -Comparison of RMI, COM and CORBA - Introduction to .NET - .NET Framework Architecture –Remoting						
<b>UNIT IV SOA AND WEB SERVICES</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Defining SOA - Business value of SOA - SOA characteristics - Concept of a Service - SOA Infrastructure-Enterprise Application Integration (EAI) - Enterprise Service Bus (ESB) - SOA – Conceptual Model – SOA Architecture – SOA Analysis & Design - WSDL – SOAP – UDDI - WS Standards -Web Services and Service Oriented Enterprise (SOE) – WSCoordination and Transaction - Business Process Execution Language for Web Services.						

<b>UNIT V</b>	<b>OTHER TYPES OF MIDDLEWARE</b>	<b>9</b>	<b>+</b>	<b>0</b>
Other Types of Middleware, Real-Time Middleware, Embedded Systems Middleware, Mobile Middleware, Oracle Fusion Middleware.				
<b>Total (L+T)= 45 Periods</b>				
<b>Course Outcomes:</b>				
Upon completion of this course, the students will be able to:				
CO1	:	Gain knowledge of various middleware technologies for distributed applications		
CO2	:	Build distributed application using EJB,CORBA and COM		
CO3	:	Familiarize and create the web services		
CO4	:	Express web server architecture and standards		
<b>Text Books:</b>				
1.		G. SudhaSadasivam, RadhaShankarmani, —Middleware and Enterprise Integration Technologies, Wiley.		
<b>Reference Books:</b>				
1.		SasuTarkoma, —Mobile Middleware: Supporting Applications and Servicesl, First Edition, Wiley.		
2.		Wei Zhao, —Challenges in Design and Implementation of Middleware for Real-Time Systems, First Edition, Springer.		
3.		Reza Shafii, Reza Shafii, Stephen Lee, and GangadharKonduri, —Oracle Fusion Middleware 11g Architecture and Managementl, First Edition,McGraw-Hill Osborne Media.		
4.		Tammy Noergaard, —Demystifying Embedded Systems Middleware: Understanding File Systems, Databases, Virtual Machines, Networking and More, Elsevier.		
5.		Gustavo Alonso, Fabio Casati, Harumi Kuno, Vijay Machiraju, —Web Services: Concepts, Architectures and Applications, Springer.		

**LIST OF PROFESSIONAL ELECTIVES  
(VII SEMESTER)**



18CSPE701		UNIX ARCHITECTURE	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To provide knowledge about Unix operating system working principles, its file system and programming for interprocess communication.					
2.	To be familiar with process control and process scheduling concepts.					
3.	To understand the various system calls.					
4.	To understand memory management policies concepts.					
5.	To be familiar with internal representation of files and structure of process.					
<b>UNIT I OVERVIEW</b>			<b>9</b>	<b>+</b>	<b>0</b>	
General Overview of the system: History, system structure - User perspective - Operating system services and assumptions about hardware. Introduction to the kernel: Architecture of the UNIX operating system - Introduction to system concepts kernel data structures - System administration. The buffer cache: Buffer headers - Structure of the buffer pool - Scenarios for retrieval of a buffer -Reading and writing disk blocks - Advantages and disadvantages of the buffer cache.						
<b>UNIT II FILE SUBSYSTEM</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Internal representation of files: Inodes - Structure of a regular file - Directories - Conversion of a path name to an Inode - Super block - Inode assignment to a new file						
<b>UNIT III SYSTEM CALLS FOR THE FILE SYSTEM</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Open - Read - Write - File and record locking - Adjusting the position of file I/O - Lseek - Close - File creation - Changing directory, root, owner, mode - stat and fstat - Pipes - Dup - Mounting and unmounting file systems - link - unlink						
<b>UNIT IV PROCESSES</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Process states and transitions - Layout of system memory - The context of a process. ProcessControl: Process creation - Signals - Process termination - user id of a process -The Shell - System boot and the INIT process - Process Scheduling-algorithm - scheduling parameters						
<b>UNIT V MEMORY MANAGEMENT AND I/O</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Memory Management Policies: Swapping-allocation swap space - swapping processes out - fork swap-expansion swap-swapping processes in. The I/O Subsystem: Driver Interface - Inter process communication-process tracing.						
<b>Total (L+T) = 45 Periods</b>						

**Course Outcomes:**

Upon completion of this course, the students will be able to:

CO1	:	Provide knowledge about Unix operating system working principles, its file system and programming for interprocess communication.
CO2	:	Be familiar with process control and process scheduling concepts.
CO3	:	Understand the various system calls.
CO4	:	Understand memory management policies concepts.
CO5	:	Familiar with internal representation of files and structure of process.

**Text Books:**

1. Maurice J. Bach, "The Design of the Unix Operating System", Prentice Hall of India, 2004.

**Reference Books:**

1. Vahalia, "Unix Internals: The New Frontiers", Pearson Education Inc, 2003.
2. S. J. Leffler, M. K. McKusick, M. J. Karels and J. S. Quarterman. The Design and Implementation of the 4.4 BSD Operating System, Addison Wesley, 1996

18CSPE702		BIG DATA ANALYTICS		L	T	P	C
				3	0	0	3
<b>Course Objectives:</b>							
1.	To introduce basic concepts and challenges of big data (3 V's: volume, velocity, and variety) and methodologies for analyzing structured and unstructured data.						
2.	To impart basic concepts about Big Data Environment and Big Data Technology Landscape.						
3.	To understand the importance of Hadoop Ecosystem.						
4.	To know about Pig, Hive, MongoDB, NoSQL and Cassandra.						
5.	To know about Jasper Report using Jasper Soft Studio.						
<b>UNIT I</b>	<b>DIGITAL DATA AND BIG DATA</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Types of Digital Data- Structured, Semi-structured, Unstructured, Characteristics of data Definition of big Data-Challenges of big data-Why big data-Traditional BI vs. Big data-A typical BI environment- A Big data environment-What is changing in the realms of big data?							
<b>UNIT II</b>	<b>BIG DATA ANALYTICS AND TECHNOLOGY LANDSCAPE</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Big Data Analytics - Classification of Analytics- Top challenges facing Big Data- Importance of Big Data Analytics- Greatest challenges that prevent businesses from capitalizing on Big Data - kind of technologies to help meet the challenges posed by Big Data- Data Science- Terminologies used in Big Data Environment- Big Data Technology Landscape- NoSQL- Types of NoSQL Databases- Why NoSQL- Advantages of NoSQL - SQL Vs. NoSQL - NewSQL - Comparison of SQL, NoSQL and NewSQL.							
<b>UNIT III</b>	<b>HADOOP</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Hadoop Overview - Hadoop Components - High Level Architecture of Hadoop - Features of Hadoop- Key advantages of Hadoop- Versions of Hadoop- Hadoop 1.0, Hadoop 2.0- Overview of Hadoop Ecosystems- Interacting with Hadoop EcoSystem- Hive, Pig, HBASE, Sqoop - Hadoop Vs. SQL- High Level Architecture of Hadoop - Hadoop Distributed File System- HDFS Daemons- Special Features of Hadoop- Processing Data With Hadoop- MapReduce Daemons-How Map Reduce Works- Map Reduce Example- Limitation of Hadoop 1.0 - Hadoop 2: HDFS - Hadoop 2: YARN							
<b>UNIT IV</b>	<b>NoSQL – MongoDB, CASSANDRA, HIVE , PIG</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Introduction to MongoDB- Why MongoDB? –Terms used in RDBMS and MongoDB-Data Types in MongoDB – MongoDB Query Language. Apache Cassandra- An Introduction- Features of Cassandra-CAL Data Types- CQLSH- Keyspaces- CRUD- Collections- Using a Counter- Time to Live(TTL)alter commands- Import and Export-Querying System Tables-Introduction to Hive- Hive Architecture- Hive Data Types- Hive File Format- Hive Query Language (HQL)Introduction to Pig- Key Features of Pig- Anatomy of Pig- Pig on Hadoop – Pig Philosophy-Use Case for Pig- ETL Processing – Pig Latin Overview – Data Types in Pig - Running Pig - Execution Modes of Pig – HDFS Commands- Relational Operators- Eval Functiuon- Complex Data Types - Pig Versus Hive.							

<b>UNIT V</b>	<b>JASPER REPORT USING JASPER SOFT STUDIO</b>			<b>9</b>	<b>+</b>	<b>0</b>
Introduction to Jasper Report using Jasper Soft Studio - Reporting using MongoDB - Reporting using Cassandra. Introduction to MAPREDUCE Programming- Mapper - Reducer - Combiner - Partitioner - Searching – Sorting - Compression. Introduction to Machine Learning- Machine Learning Algorithms.						
<b>Total (L+T)= 45 Periods</b>						
<b>Course Outcomes:</b>						
Upon completion of this course, the students will be able to:						
CO1	:	Understand the types of digital data and challenges with big data.				
CO2	:	Know about the Big data Landscape Technology.				
CO3	:	Understand the common Hadoop ecosystem components, Hadoop Architecture, HDFS, Hadoop MapReduce framework and the working of MapReduce on data stored in HDFS.				
CO4	:	Learn the concepts of Pig, Hive, MongoDB, NoSQL and Cassandra				
CO5	:	Produce Report using Jasper Soft studio.				
<b>Text Books:</b>						
1.	Seema Acharya, Subhashini Chellappan, “Big Data And Analytics”, Willey ,2015.					
<b>Reference Books:</b>						
1.	David Loshin,” Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools,Techniques, NoSQL, and Graph”, Morgan Kaufmann Publishers,2013.					
2.	Wen-Chen Hu and Naima Kaabouch (eds) ,” Big Data Management, Technologies, and Applications “, IGI Global,2013.					
3.	Tom White, “Hadoop: The Definitive Guide”, O`Reilly Publishers, USA, 2012.					
4.	Michael Berthold, David J. Hand, “Intelligent Data Analysis”, Springer, 2007					

18CSPE703		CYBER FORENSICS		L	T	P	C
				3	0	0	3
<b>Course Objectives:</b>							
1.	To acquire the knowledge computer forensics						
2.	To familiarize the forensics tools						
3.	To analyze and validate forensics data						
4.	To gain the knowledge of ethical hacking techniques						
<b>UNIT I   INTRODUCTION TO COMPUTER FORENSICS</b>				9	+	0	
Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.							
<b>UNIT II   EVIDENCE COLLECTION AND FORENSICS TOOLS</b>				9	+	0	
Processing Crime and Incident Scenes – Working with Windows and DOS Systems, Current Computer Forensics Tools - Software/ Hardware Tools.							
<b>UNIT III   ANALYSIS AND VALIDATION</b>				9	+	0	
Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics.							
<b>UNIT IV   ETHICAL HACKING</b>				9	+	0	
Introduction to Ethical Hacking - Foot-printing and Reconnaissance - Scanning Networks - Enumeration - System Hacking - Malware Threats – Sniffing.							
<b>UNIT V   ETHICAL HACKING IN WEB</b>				9	+	0	
Social Engineering - Denial of Service - Session Hijacking - Hacking Web servers - Hacking Web Applications – SQL Injection - Hacking Wireless Networks - Hacking Mobile Platforms.							
<b>Total (L)= 45 Periods</b>							
<b>Course Outcomes:</b>							
At the end of the course students will be able to							
CO1	:	Acquire the basics of computer forensics					
CO2	:	Apply different computer forensic tools to a given scenario					
CO3	:	Analyze and validate forensics data					
CO4	:	Implement real-world hacking techniques to test system security					
<b>Text Books:</b>							
1.	Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart, “Computer Forensics and Investigations”, Cengage Learning, India Edition, 2016.						
2.	CEH official Certified Ethical Hacking Review Guide, Wiley India Edition, 2015.						

**Reference Books:**

1.	John R.Vacca,"Computer Forensics", Cengage Learning, 2005
2.	Marjie T.Britz, "Computer Forensics and Cyber Crime": An Introduction", 3 <sup>rd</sup> Edition, Prentice Hall, 2013.
3.	AnkitFadia "Ethical Hacking" Second Edition, Macmillan India Ltd, 2006.
4.	Kenneth C.Brancik "Insider Computer Fraud "Auerbach Publications Taylor & Francis Group-2008.

18CSPE704		USER INTERFACE DESIGN	L	T	P	C		
			3	0	0	3		
<b>Course Objectives:</b>								
1.	Learn the characteristics of User Interface and design issues.							
2.	Study the design principles, techniques and technologies to the development of User interface.							
3.	Gain knowledge of various testing tools of interface designs.							
<b>UNIT I</b>	<b>INTRODUCTION</b>					9	+	0
UID Importance-Human-Computer interface-characteristics of graphics interface-Direct manipulation graphical system - web user interface-popularity-characteristic & principles.								
<b>UNIT II</b>	<b>DESIGN ISSUES</b>					9	+	0
User interface design process- obstacles-usability-human characteristics in design - Human interaction speed-business functions-requirement analysis-Direct-Indirect methods-basic business functions-Design standards-system timings - Human consideration in screen design - structures of menus - functions of menus-contents of menu-formatting -phrasing the menu - selecting menu choice-navigating menus-graphical menus.								
<b>UNIT III</b>	<b>WINDOWS CONTROLS(GUI)</b>					9	+	0
Windows: Characteristics-components-presentation styles-types-managements-organizations-operations-web systems-device-based controls: characteristics-Screen -based controls: operate control - text boxes-selection control-combination control-custom control-presentation control.								
<b>UNIT IV</b>	<b>MULTIMEDIA</b>					9	+	0
Text for web pages - effective feedback-guidance & assistance-Internationalization-accessibility-Icons-Image-multimedia -coloring.								
<b>UNIT V</b>	<b>LAYOUT AND TOOLS</b>					9	+	0
Windows layout-test: prototypes - kinds of tests - retest - Information search - visualization - Hypermedia - www - Software tools.								
<b>Total (L+T)= 45 Periods</b>								
<b>Course Outcomes:</b>								
Upon completion of this course, the students will be able to:								
CO1	:	Outline the characteristics of User Interface and design issues						
CO2	:	Be familiarizing with the design principles, techniques and technologies to the development of User interface.						
CO3	:	Explain various testing tools of interface designs.						
<b>Text Books:</b>								
1.	Wilbent. O. Galitz, "The Essential Guide to User Interface Design: An Introduction to GUI Design Principles", John Wiley & Sons, 2007.							
<b>Reference Books:</b>								
1.	Ben Sheiderman, "Design the User Interface", Pearson Education, 2 <sup>nd</sup> Edition, 2008.							
2.	Alan Cooper, "The Essential of User Interface Design", Wiley – Dream Tech Ltd., 2008.							

18CSPE705		SOFTWARE QUALITY ASSURANCE	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	Understand the basic tenets of software quality and quality factors.					
2.	Be exposed to the Software Quality Assurance (SQA) architecture and the details of SQA components.					
3.	Understand of how the SQA components can be integrated into the project life cycle.					
4.	Be familiar with the software quality infrastructure					
5.	Be exposed to the management components of software quality.					
<b>UNIT I INTRODUCTION TO SOFTWARE QUALITY &amp; ARCHITECTURE</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Need for Software quality – Quality challenges – Software quality assurance (SQA) – Definition and objectives – Software quality factors- McCall's quality model – SQA system and architecture – Software Project life cycle Components – Pre project quality components – Development and quality plans.						
<b>UNIT II SQA COMPONENTS AND PROJECT LIFE CYCLE</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Software Development methodologies – Quality assurance activities in the development process- Verification & Validation – Reviews – Software Testing – Software Testing implementations – Quality of software maintenance – Pre-Maintenance of software quality components – Quality assurance tools – CASE tools for software quality – Software maintenance quality – Project Management.						
<b>UNIT III SOFTWARE QUALITY INFRASTRUCTURE</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Procedures and work instructions – Templates – Checklists – 3S developmenting – Staff training and certification Corrective and preventive actions – Configuration management – Software change control – Configuration management audit -Documentation control – Storage and retrieval.						
<b>UNIT IV SOFTWARE QUALITY MANAGEMENT &amp; METRICS</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Project process control – Computerized tools – Software quality metrics – Objectives of quality measurement – Process metrics – Product metrics – Implementation – Limitations of software metrics – Cost of software quality – Classical quality cost model – Extended model – Application of Cost model.						
<b>UNIT V STANDARDS, CERTIFICATIONS &amp; ASSESSMENTS</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Quality management standards – ISO 9001 and ISO 9000-3 – capability Maturity Models – CMM and CMMI assessment methodologies – Bootstrap methodology – SPICE Project – SQA project process standards – IEEE standards 1012 & 1028 – Organization of Quality Assurance – Department management responsibilities – Project management responsibilities.						
<b>Total (L+T)= 45 Periods</b>						



**Course Outcomes:**

Upon completion of this course, the students will be able to:

CO1	:	Utilize the concepts in software development life cycle.
CO2	:	Demonstrate their capability to adopt quality standards.
CO3	:	Assess the quality of software product.
CO4	:	Apply the concepts in preparing the quality plan & documents.

**Text Books:**

1. Daniel Galin, "Software Quality Assurance", Pearson Publication, 2009.

**Reference Book:**

1. Alan C. Gillies, "Software Quality: Theory and Management", International Thomson Computer Press, 1997.
2. Mordechai Ben-Menachem "Software Quality: Producing Practical Consistent Software", International Thompson Computer Press, 1997.

18CSPE706		COMPUTER GRAPHICS AND MULTIMEDIA		L	T	P	C
				3	0	0	3
<b>Course Objectives:</b>							
1.	To understand and design two-dimensional graphics.						
2.	To understand and apply two dimensional transformations.						
3.	To design three dimensional graphics and apply three dimensional transformations.						
4.	To be familiar with various software programs used in the creation and implementation of multi-media (interactive, motion/animation, presentation, etc.).						
5.	To be familiar with hypermedia messaging and distributed multimedia systems.						
<b>UNIT I</b>	<b>INTRODUCTION</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Survey of computer graphics - Video display devices, Raster scan systems - Random scan systems, Graphics monitors and Workstations - Graphics Software. Output Primitives: Points and Lines - Line Drawing Algorithms (DDA Algorithm, Bresenham's Line Algorithm), Circle generating algorithms.							
<b>UNIT II</b>	<b>TWO DIMENSIONAL GRAPHICS</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Basic Transformations - Matrix representations and homogeneous coordinates - Composite Transformations- Other Transformations- The viewing pipeline - Viewing coordinate reference frame - Window-to-viewport coordinate transformation. Clipping: Clipping operations - Point clipping - Line clipping (Cohen Sutherland algorithm, Liang Barsky algorithm) - Polygon Clipping (Sutherland-Hodgeman Algorithm) - Curve Clipping - Text Clipping.							
<b>UNIT III</b>	<b>THREE DIMENSIONAL GRAPHICS</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Three Dimensional Object Representations: Polygon surfaces - Quadric surface - Spline representation - Bezier Curves and surfaces - B-spline curve and surfaces. Three dimensional Geometric and Modeling Transformations: Translation – Rotation – Scaling - Composite Transformation. Three Dimensional viewing: Viewing Pipeline - Viewing Coordinates -Projections (Parallel and Perspective).							
<b>UNIT IV</b>	<b>MULTIMEDIA SYSTEM DESIGN AND MULTIMEDIA FILE HANDLING</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Multimedia basics – Multimedia applications – Multimedia system architecture – Evolving technologies for multimedia – Defining objects for multimedia systems – Multimedia data interface standards – Multimedia databases. Compression and decompression – Data and file format standards – Multimedia I/O technologies – Digital voice and audio – Video image and animation – Full motion video – Storage and retrieval technologies.							
<b>UNIT V</b>	<b>HYPERMEDIA</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Multimedia authoring and user interface – Hypermedia messaging -Mobile messaging – Hypermedia message component – Creating hypermedia message – Integrated multimedia message standards – Integrated document management – Distributed multimedia systems.							
<b>Total (L+T)= 45 Periods</b>							

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Design two dimensional graphics.
CO2	: Apply two dimensional transformation
CO3	: Design and apply three dimensional graphics and transformations.
CO4	: Design various software programs used in the creation and implementation of multi-media (interactive, motion/animation, presentation, etc.).
CO5	: Design hypermedia messaging and distributed multimedia systems.
<b>Text Book:</b>	
1.	Donald Hearn and Pauline Baker M, "Computer Graphics", Prentice Hall, New Delhi, 2007.(Unit I - III).
2.	Andleigh, P. K and Kiran Thakrar, "Multimedia Systems and Design", PHI, 2003.(Unit IV & V)
<b>Reference Books:</b>	
1.	John F. Hughes, Andries Van Dam, Morgan McGuire, David F. Sklar, James D. Foley, Steven K. Feiner and Kurt Akeley, "Computer Graphics: Principles and Practice", , 3rd Edition, Addison Wesley Professional,2013.
2.	Donald Hearn and M. Pauline Baker, Warren Carithers, "Computer Graphics With Open GL", 4th Edition, Pearson Education, 2010.
3.	Judith Jeffcoate, "Multimedia in practice: Technology and Applications", PHI, 1998.

18CSPE707		C# & .NET FRAMEWORKS	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To identify the major elements of the .NET frame work and .NET platform					
2.	To explore the object oriented concepts of C#					
3.	To write C# programs and Web based applications on .NET					
<b>UNIT I INTRODUCTION TO C#</b>						
			9	+	0	
Introducing C#, Understanding .NET, overview of C#, Literals, Variables, Data Types, Operators, checked and unchecked operators, Expressions, Branching, Looping, Methods, implicit and explicit casting, Constant, Arrays, Array Class, Array List, String, String Builder, Structure, Enumerations, boxing and unboxing. Font,						
<b>UNIT II OBJECT ORIENTED ASPECTS OF C#</b>						
			9	+	0	
Class, Objects, Constructors and its types, inheritance, properties, indexers, index overloading, polymorphism, sealed class and methods, interface, abstract class, abstract and interface, operator overloading, delegates, events, errors and exception, Threading.						
<b>UNIT III APPLICATION DEVELOPMENT ON .NET</b>						
			9	+	0	
Building windows application, Creating our own window forms with events and controls, menu creation, inheriting window forms, SDI and MDI application, Dialog Box(Modal and Modeless), accessing data with ADO.NET, DataSet, typed dataset, Data Adapter, updating database using stored procedures, SQL Server with ADO.NET, handling exceptions, validating controls, windows application configuration.						
<b>UNIT IV WEB BASED APPLICATION DEVELOPMENT ON .NET</b>						
			9	+	0	
Programming web application with web forms, ASP.NET introduction, working with XML and .NET, Creating Virtual Directory and Web Application, session management techniques, web.config, web services, passing datasets, returning datasets from web services, handling transaction, handling exceptions, returning exceptions from SQL Server.						
<b>UNIT V CLR AND .NET FRAMEWORK</b>						
			9	+	0	
Assemblies, Versoning, Attributes, reflection, viewing metadata, type discovery, reflection on type, marshalling, remoting, security in .NET						
<b>Total (L+T)= 45 Periods</b>						

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Identify the major elements of the .NET frame work and .NET platform
CO2	: Apply the object oriented concepts of C#
CO3	: Write C# programs and Web based applications on .NET
<b>Text Books:</b>	
1.	Herbert Schildt, "The Complete Reference: C# 4.0", Tata McGraw Hill (Unit I - II)
2.	Christian Nagel et al. "Professional C# 2012 with .NET 4.5",Wiley India .(Unit III-V)
<b>Reference Books:</b>	
1.	Andrew Troelsen , "Pro C# 2010 and the .NET 4 Platform, Fifth Edition, A Press
2.	Ian Griffiths, Matthew Adams, Jesse Liberty, "Programming C# 4.0", Sixth Edition, O'Reilly,

18CSPE708		ADVANCED DATABASES	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To understand the importance of Distributed Databases.					
2.	To impart basic concepts about object oriented databases.					
3.	To understand the importance of Web databases.					
4.	To know about intelligent databases such as active, temporal and deductive and knowledge databases.					
5.	To know about current trends in databases such as mobile databases, multimedia databases, spatial databases, parallel databases etc.,					
<b>UNIT I   DISTRIBUTED DATABASES</b>						
			9	+		0
Distributed DBMS Concepts and Design – Introduction – Functions and Architecture of DDBMS – Distributed Relational Database Design – Transparency in DDBMS – Distributed Transaction Management – Concurrency control – Deadlock Management – Database recovery – The X/Open Distributed Transaction Processing Model – Replication servers – Distributed Query Optimization - Distribution and Replication in Oracle.						
<b>UNIT II   OBJECT ORIENTED DATABASES</b>						
			9	+		0
Object Oriented Databases – Introduction – Weakness of RDBMS – Object Oriented Concepts Storing Objects in Relational Databases – Next Generation Database Systems – Object Oriented Data models – OODBMS Perspectives – Persistence – Issues in OODBMS – Object Oriented Database Management System Manifesto – Advantages and Disadvantages of OODBMS – Object Oriented Database Design – OODBMS Standards and Systems – Object Management Group – Object Database Standard ODMG – Object Relational DBMS –Postgres - Comparison of ORDBMS and OODBMS.						
<b>UNIT III   WEB DATABASES</b>						
			9	+		0
Web Technology And DBMS – Introduction – The Web – The Web as a Database Application Platform – Scripting languages – Common Gateway Interface – HTTP Cookies – Extending the Web Server – Java – Microsoft’s Web Solution Platform – Oracle Internet Platform – Semi structured Data and XML – XML Related Technologies – XML Query Languages.						
<b>UNIT IV   INTELLIGENT DATABASES</b>						
			9	+		0
Enhanced Data Models For Advanced Applications – Active Database Concepts And Triggers – Temporal Database Concepts – Deductive databases – Knowledge Databases.						

<b>UNIT V</b>	<b>CURRENT TRENDS</b>	<b>9</b>	<b>+</b>	<b>0</b>
Mobile Database – Geographic Information Systems – Genome Data Management – Multimedia Database – Parallel Database – Spatial Databases - Database administration – Data Warehousing and Data Mining.				
<b>Total (L+T)= 45 Periods</b>				
<b>Course Outcomes:</b>				
Upon completion of this course, the students will be able to:				
CO1	:	Understand the Distributed Database Process, Architecture, and Design Principles and apply Distributed Query Optimization Techniques and Algorithms.		
CO2	:	Understand the object oriented data models, issues and their design process.		
CO3	:	Develop in-depth knowledge about web database.		
CO4	:	Get familiarized with intelligent databases such as active databases, deductive databases, temporal databases and knowledge databases.		
CO5	:	Understand about the current trends in multimedia database, parallel database, mobile databases and spatial databases and to know the advances in data warehousing and data mining.		
<b>Text Books:</b>				
1.		Thomas M. Connolly, Carolyn E. Begg, —Database Systems - A Practical Approach to Design , Implementation , and Management, Fourth Edition , Pearson Education, 2012 .		
2.		Ramez Elmasri & Shamkant B.Navathe, —Fundamentals of Database Systems, Sixth Edition, Pearson Education, 2011.		
<b>Reference Books:</b>				
1.		M.Tamer Ozsu , Patrick Ualduriel, —Principles of Distributed Database Systems, Second Edition, Pearson Education, 2003.		
2.		C.S.R.Prabhu, —Object Oriented Database Systems, PHI, 2003.		
3.		Peter Rob and Corlos Coronel, —Database Systems – Design, Implementation and Management, Thompson Learning, Course Technology, 5th Edition, 2003.		

18CSPE709		MACHINE LEARNING	L	T	P	C		
			3	0	0	3		
<b>Course Objectives:</b>								
1.	To understand the need for machine learning for various problem solving							
2.	To study the various supervised, semi-supervised and unsupervised learning algorithms in machine learning							
3.	To understand the latest trends in machine learning							
4.	To design appropriate machine learning algorithms for problem solving							
<b>UNIT I</b>	<b>INTRODUCTION</b>					<b>9</b>	<b>+</b>	<b>0</b>
Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.								
<b>UNIT II</b>	<b>NEURAL NETWORKS AND GENETIC ALGORITHMS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.								
<b>UNIT III</b>	<b>BAYESIAN AND COMPUTATIONAL LEARNING</b>					<b>9</b>	<b>+</b>	<b>0</b>
Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.								
<b>UNIT IV</b>	<b>INSTANT BASED LEARNING</b>					<b>9</b>	<b>+</b>	<b>0</b>
K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning.								
<b>UNIT V</b>	<b>ADVANCED LEARNING</b>					<b>9</b>	<b>+</b>	<b>0</b>
Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning.								
<b>Total (L+T)= 45 Periods</b>								



<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Differentiate between supervised, unsupervised, semi-supervised machine learning approaches
CO2	: Discuss the decision tree algorithm and identify and overcome the problem of overfitting
CO3	: Discuss and apply the back propagation algorithm and genetic algorithms to various problems
CO4	: Apply the Bayesian concepts to machine learning and suggest appropriate machine learning approaches for various types of problems
<b>Text Books:</b>	
1.	Tom M. Mitchell, —Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.
<b>Reference Books:</b>	
1.	Ethem Alpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
2.	Stephen Marsland, —Machine Learning: An Algorithmic Perspective, CRC Press, 2009.
3.	Shai Shalev-Shwartz, Shai Ben-David, Understanding Machine Learning From Theory to Algorithms, Cambridge University Press, 2014
4.	Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997
<b>E-References:</b>	
1.	<a href="https://onlinecourses.nptel.ac.in/noc18_cs40/preview">https://onlinecourses.nptel.ac.in/noc18_cs40/preview</a> , (Prof. Sudeshna Sarkar, IIT KHARAGPUR )

18CSPE710		NANO COMPUTING		L	T	P	C
				3	0	0	3
<b>Course Objectives:</b>							
1.	Learn Nano computing challenges						
2.	Be familiar with the imperfections						
3.	Be exposed to reliability evaluation strategies						
4.	Learn Nano scale quantum computing						
5.	Understand molecular computing and optimal computing						
<b>UNIT I   NANO COMPUTING-PROSPECTS AND CHALLENGES</b>							
				9	+	0	
Introduction - History of Computing – Nanocomputing - Quantum Computers – Nano computing Technologies - Nano Information Processing - Prospects and Challenges - Physics of Nano computing : Digital Signals and Gates - Silicon Nano electronics - Carbon Nano tube Electronics - Carbon Nanotube Field-effect Transistors – Nanolithography.							
<b>UNIT II   NANO COMPUTING WITH IMPERFECTIONS</b>							
				9	+	0	
Introduction – Nano computing in the Presence of Defects and Faults - Defect Tolerance -Towards Quadrillion Transistor Logic Systems.							
<b>UNIT III   RELIABILITY OF NANO COMPUTING</b>							
				9	+	0	
Markov Random Fields - Reliability Evaluation Strategies - NANOLAB - NANOPRISM - Reliable Manufacturing and Behavior from Law of Large Numbers.							
<b>UNIT IV   NANOSCALE QUANTUM COMPUTING</b>							
				9	+	0	
Quantum Computers - Hardware Challenges to Large Quantum Computers - Fabrication, Test, and Architectural Challenges - Quantum-dot Cellular Automata (QCA) - Computing with QCA - QCA Clocking - QCA Design Rules.							
<b>UNIT V   QCA DESIGNER SOFTWARE AND QCA IMPLEMENTATION</b>							
				9	+	0	
Basic QCA Circuits using QCA Designer - QCA Implementation - Molecular and Optical Computing: Molecular Computing - Optimal Computing - Ultrafast Pulse Shaping and Tb/sec Data Speeds.							
<b>Total (L)= 45 Periods</b>							

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Discuss Nano computing challenge
CO2	: Handle the imperfections.
CO3	: Apply reliability evaluation strategies.
CO4	: Use Nano scale quantum computing.
CO5	: Utilize Molecular Computing and Optimal Computing.
<b>Text Book:</b>	
1.	Sahni V. and Goswami D., Nano Computing, McGraw Hill Education Asia Ltd. (2008),ISBN (13): 978007024892.
<b>Reference Books:</b>	
1.	Sandeep K. Shukla and R. Iris Bahar., Nano, Quantum and Molecular Computing, Kluwer Academic Publishers (2004), ISBN: 1402080670.
2.	Sahni V, Quantum Computing, McGraw Hill Education Asia Ltd. (2007).
3.	Jean-Baptiste Waldner, Nanocomputers and Swarm Intelligence, John Wiley & Sons,Inc. (2008), ISBN (13): 978-1848210097.

**LIST OF PROFESSIONAL ELECTIVES  
(VIII SEMESTER)**

18CSPE801		INFORMATION SECURITY	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To understand the basics of Information Security					
2.	To understand the common threats faced today					
3.	To know the aspects of risk management					
4.	To understand the Security technology and Intrusion Detection System					
<b>UNIT I   INTRODUCTION</b>			<b>9</b>	<b>+</b>	<b>0</b>	
History, What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.						
<b>UNIT II   SECURITY INVESTIGATION</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues.						
<b>UNIT III   SECURITY ANALYSIS</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Risk Management-Risk Identification, Risk Assessment, Risk Control Strategies.						
<b>UNIT IV   LOGICAL DESIGN</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity.						
<b>UNIT V   PHYSICAL DESIGN</b>			<b>9</b>	<b>+</b>	<b>0</b>	
Security Technology, IDS, Scanning and Analysis Tools, Access Control Devices, Physical Security, Security and Personnel.						
						<b>Total (L+T)= 45 Periods</b>
<b>Course Outcomes:</b>						
Upon completion of this course, the students will be able to:						
CO1	:	Analyze the vulnerabilities in any computing system and hence be able to design a security solution.				
CO2	:	Understand the common threats faced today.				
CO3	:	Analyze the possible security attacks in complex real time systems and their effective countermeasures.				
CO4	:	Design the security architecture, policies, standards and practices.				
CO5	:	Understand the Security technology and Intrusion Detection System.				

**Text Book:**

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|----|--|
| 1. | Michael E Whitman and Herbert J Mattord, —Principles of Information Security, Vikas Publishing House, New Delhi, 2003. |
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**Reference Books:**

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|----|---|
| 1. | Micki Krause, Harold F. Tipton, — Handbook of Information Security Management, Vol 1-3 CRC Press LLC, 2004. |
| 2. | Stuart Mc Clure, Joel Scrambray, George Kurtz, —Hacking Exposed, Tata McGraw-Hill, 2003                     |
| 3. | Matt Bishop, — Computer Security Art and Science, Pearson/PHI, 2002.  |

18CSPE802		BUSINESS INTELLIGENCE AND ITS APPLICATIONS		L	T	P	C		
				3	0	0	3		
<b>Course Objectives:</b>									
1.	To understand the complete context of a Business								
2.	To be familiar with OLAP tools and BI architecture								
3.	To learn the concept of ETL in Data warehousing								
4.	To learn the basics of data modelling, measurement technologies and process.								
<b>UNIT I</b>	<b>INTRODUCTION TO BUSINESS INTELLIGENCE</b>						<b>9</b>	<b>+</b>	<b>0</b>
Business Enterprise Organizations, Functions & core business processes, Baldrige Business Framework, Key purpose of using IT in Business, Connected World Characteristics of Internet Ready IT Application, Information users & its requirements.[Case Study Inclusions].									
<b>UNIT II</b>	<b>BI ARCHITECTURE ROLES AND RESPONSIBILITIES</b>						<b>9</b>	<b>+</b>	<b>0</b>
Introduction to digital data and its types – structured, semi-structured and unstructured, Introduction to OLTP and OLAP (MOLAP, ROLAP, HOLAP), BI Definitions & Concepts, BI Framework, Data Warehousing concepts and its role in BI, BI Infrastructure Components – BI Process, BI Technology, BI Roles & Responsibilities, Business Applications of BI, BI best practices.									
<b>UNIT III</b>	<b>BASICS OF DATA INTEGRATION</b>						<b>9</b>	<b>+</b>	<b>0</b>
Concepts of data integration, needs and advantages of using data integration, introduction to common data integration approaches, Meta data - types and sources, Introduction to data quality, data profiling concepts and applications, introduction to ETL using Pentaho data Integration (formerly Kettle).									
<b>UNIT IV</b>	<b>INTRODUCTION TO MULTI-DIMENSIONAL DATA MODELING</b>						<b>9</b>	<b>+</b>	<b>0</b>
Introduction to data and dimension modeling, multidimensional data model, ER Modeling vs. multi dimensional modeling, concepts of dimensions, facts, cubes, attribute, hierarchies, star and snowflake schema, introduction to business metrics and KPIs, creating cubes using Microsoft Excel.									
<b>UNIT V</b>	<b>BASICS OF ENTERPRISE REPORTING</b>						<b>9</b>	<b>+</b>	<b>0</b>
A typical enterprise, Malcolm Baldrige - quality performance framework, balanced scorecard, enterprise dashboard, balanced scorecard vs. enterprise dashboard, enterprise reporting using MS Access / MS Excel, best practices in the design of enterprise dashboards.									
<b>Total (L+T)= 45 Periods</b>									

<b>Course Outcomes:</b>		
Upon completion of this course, the students will be able to:		
CO1	:	Explain the complete context of a Business, BI architecture and various quality performance framework
CO2	:	Illustrate various operations of OLAP on Multidimensional data.
CO3	:	Familiarize with ETL in the context of data warehousing.
CO4	:	Design a data model at conceptual and logical levels.
<b>Text Books:</b>		
1.		R.N.Prasad, Seema Acharya, "Fundamentals of Business Analytics", Wiley Publications, 2011.
<b>Reference Books:</b>		
1.		Business Intelligence by David Loshin .
2.		Business intelligence for the enterprise by Mike Biere .
3.		Business intelligence roadmap by Larissa Terpeluk Moss, Shaku Atre .
4.		Business Intelligence For Dummies – Swain Scheps
5.		Successful Business Intelligence: Secrets to making Killer BI Applications by Cindi Howson
6.		Information dashboard design by Stephen Few
7.		An introduction to Building the Data Warehouse – IBM



18CSPE803		E – COMMERCE		L	T	P	C
				3	0	0	3
<b>Course Objectives:</b>							
1.	To Learn the Various e-commerce business models.						
2.	To Understand how companies, use e-commerce to gain competitive advantages.						
3.	To develop an understanding of electronic market and market place						
4.	To Familiarize with the planning and execution of e-commerce projects.						
5.	To develop an understanding of business standards						
<b>UNIT I ELECTRONIC COMMERCE</b>				9	+	0	
Frame work, anatomy of E-Commerce applications - E- Commerce Consumer applications - E-Commerce organization applications.							
<b>UNIT II CONSUMER ORIENTED ELECTRONIC COMMERCE</b>				9	+	0	
Mercantile Process models-Electronic payment systems: Digital Token-Based - Smart Cards - Credit Cards - Risks in Electronic Payment systems.							
<b>UNIT III MOBILE ELECTRONIC COMMERCE</b>				9	+	0	
Wireless Industry Standards - Wireless Communication Platforms for LANs - Wireless WANs - Facilitators of a Wireless Environment - Concerns for the Mobile Enterprise.							
<b>UNIT IV E-COMMERCE APPLICATIONS DEVELOPMENT</b>				9	+	0	
The Changing Face of Application Development - Enterprise Development Needs - Enhanced Web Server-Based E-Commerce Site Business Objectives - Categories of Business Value - Assessing a Site's Current Business Value - Improving Business Value - Managed Solutions.							
<b>UNIT V E-COMMERCE SECURITY</b>				9	+	0	
Types of Security Technologies: The Internet - The Internet Is Big Business - The New Economy - Where Old Meets New - Flawed Infrastructure - Emergence of Cyber Crime - Outside Attacks - Inside Attacks - Threats Due to Lack of Security - Cyber Security Need - Internet Security Education - E-Commerce Application Security Technology Essentials.							
<b>Total (L+T)= 45 Periods</b>							
<b>Course Outcomes:</b>							
Upon completion of this course, the students will be able to:							
CO1	:	Develop an understanding of the foundations and importance of E-commerce					
CO2	:	Analyze the impact of E-commerce on business models and strategies					
CO3	:	Discuss legal issues and privacy in E-Commerce					
CO4	:	Describe Internet trading relationships including Business to Consumer, Business-to-Business, Intra-organizational.					
CO5	:	Understand the business standards.					

**Text Books:**

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|----|---|
| 1. | Ravi Kalakota and Andrew B Whinston, "Frontiers of Electronic Commerce", Addison Wesley, 2008.(UNIT I - II) |
| 2. | Pete Loshin, John Vacca, "Electronic Commerce", IV Edition, Firewall Media, 2005.(UNIT III-V).              |

**Reference Books:**

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|----|--|
| 1. | Efraim Turban , Electronic Commerce, fourth edition, Pearson, 2006.  |
| 2. | Jeffrey F Rayport, Bernard J Jaworski , Introduction to E-Commerce, second edition, Tata McGraw Hill, 2003.      |
| 3. | Gary P Schneider ,E-commerce: Strategy, Technology and Implementation, eleventh edition, Cengage Learning, 2011. |
| 4. | Kamlesh K Bajaj, DebjaniNag ,E-Commerce: The Cutting Edge of Business, second edition, Tata McGraw Hill, 2005.   |

18CSPE804		MOBILE COMPUTING	L	T	P	C		
			3	0	0	3		
<b>Course Objectives:</b>								
1.	To understand the basic concepts of mobile computing							
2.	To familiarize with the network protocol stack							
3.	To acquire the basics of mobile telecommunication system							
4.	To expose the Adhoc networks							
5.	To gain the knowledge about different mobile platforms and application development							
<b>UNIT I</b>	<b>INTRODUCTION</b>					<b>9</b>	<b>+</b>	<b>0</b>
Mobile Computing – Mobile Computing Vs wireless Networking – Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application. MAC Protocols – Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes.								
<b>UNIT II</b>	<b>MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER</b>					<b>9</b>	<b>+</b>	<b>0</b>
Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization. Overview of TCP/IP – Architecture of TCP/IP- Adaptation of TCP Window – Improvement in TCP Performance.								
<b>UNIT III</b>	<b>MOBILE TELECOMMUNICATION SYSTEM</b>					<b>9</b>	<b>+</b>	<b>0</b>
Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS).								
<b>UNIT IV</b>	<b>MOBILE ADHOC NETWORKS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Adhoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols – Popular Routing Protocols – Vehicular Adhoc networks ( VANET) – MANET Vs VANET – Security.								
<b>UNIT V</b>	<b>MOBILE PLATFORMS AND APPLICATIONS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Mobile Device Operating Systems – Special Constrains & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – M-Commerce – Structure – Pros & Cons – Mobile Payment System – Security Issues.								
<b>Total (L)= 45 Periods</b>								
<b>Course Outcomes:</b>								
At the end of the course students will be able to								
CO1	:	Explain the basics of mobile telecommunication system						
CO2	:	Decide the required functionality at each layer for given application						
CO3	:	Identify solution for each functionality at each layer						
CO4	:	Use simulator tools and design Adhoc networks						
CO5	:	Develop a mobile application.						

<b>Text Books:</b>	
1.	Prasant Kumar Pattnaik, Rajib Mall, "Fundamentals of Mobile Computing", PHI Learning Pvt. Ltd, New Delhi – 2012.
<b>Reference Books:</b>	
1.	Jochen H. Schiller, "Mobile Communications", Second Edition, Pearson Education, New Delhi, 2007.
2.	Dharma Prakash Agarwal, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
3.	Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.
4.	William.C.Y.Lee, "Mobile Cellular Telecommunications-Analog and Digital Systems", Second Edition, Tata Mc Graw Hill Edition ,2006.
5.	C.K.Toh, "AdHoc Mobile Wireless Networks", First Edition, Pearson Education, 2002.
6.	Android Developers : <a href="http://developer.android.com/index.html">http://developer.android.com/index.html</a>
7.	Apple Developer : <a href="https://developer.apple.com/">https://developer.apple.com/</a>
8.	Windows Phone Dev Center : <a href="http://developer.windowsphone.com">http://developer.windowsphone.com</a> 9. BlackBerry Developer : <a href="http://developer.blackberry.com/">http://developer.blackberry.com/</a>

18CSPE805		DEEP LEARNING	L	T	P	C		
			3	0	0	3		
<b>Course Objectives:</b>								
1.	To gain the fundamentals of neural networks as well as some advanced topics such as recurrent neural networks, long short term memory cells and convolutional neural networks							
<b>UNIT I</b>	<b>INTRODUCTION</b>					<b>9</b>	<b>+</b>	<b>0</b>
<p><b>Basics:</b> Biological Neuron, Idea of computational units, McCulloch–Pitts unit and Thresholding logic, Linear Perceptron, Perceptron Learning Algorithm, Linear separability. Convergence theorem for Perceptron Learning Algorithm.</p> <p><b>Feedforward Networks:</b> Multilayer Perceptron, Gradient Descent, Backpropagation, Empirical Risk Minimization, regularization, autoencoders.</p>								
<b>UNIT II</b>	<b>DEEP NEURAL NETWORKS</b>					<b>9</b>	<b>+</b>	<b>0</b>
<p><b>Deep Neural Networks:</b> Difficulty of training deep neural networks, Greedy layerwise training.</p> <p><b>Better Training of Neural Networks:</b> Newer optimization methods for neural networks (Adagrad, adadelta, rmsprop, adam, NAG), second order methods for training, Saddle point problem in neural networks, Regularization methods (dropout, drop connect, batch normalization).</p>								
<b>UNIT III</b>	<b>RECURRENT NEURAL NETWORKS</b>					<b>9</b>	<b>+</b>	<b>0</b>
<p><b>Recurrent Neural Networks:</b> Back propagation through time, Long Short Term Memory, Gated Recurrent Units, Bidirectional LSTMs, Bidirectional RNNs</p> <p><b>Convolutional Neural Networks:</b> LeNet, AlexNet.</p>								
<b>UNIT IV</b>	<b>GENERATIVE MODELS</b>					<b>9</b>	<b>+</b>	<b>0</b>
<p><b>Generative models:</b> Restrictive Boltzmann Machines (RBMs), Introduction to MCMC and Gibbs Sampling, gradient computations in RBMs, Deep Boltzmann Machines.</p>								
<b>UNIT V</b>	<b>RECENT TRENDS</b>					<b>9</b>	<b>+</b>	<b>0</b>
<p>Recent trends: Variational Autoencoders, Generative Adversarial Networks, Multi-task Deep Learning, Multi-view Deep Learning</p>								
<b>Total (L+T)= 45 Periods</b>								
<b>Course Outcomes:</b>								
At the end of the course students will be able to								
CO1	:	Understand the fundamentals of neural networks as well as some advanced topics such as recurrent neural networks, long short term memory cells and convolutional neural networks						
<b>Text Books:</b>								
1.	Deep Learning, Ian Goodfellow and Yoshua Bengio and Aaron Courville, MIT Press, 2016.							
<b>Reference Books:</b>								
1.	Neural Networks: A Systematic Introduction, Raúl Rojas, 1996							
2.	Pattern Recognition and Machine Learning, Christopher Bishop, 2007							

18CSPE806		AD HOC AND SENSOR NETWORKS	L	T	P	C		
			3	0	0	3		
<b>Course Objectives:</b>								
1.	To understand the design issues in ad hoc and sensor networks							
2.	To learn the different types of MAC protocols							
3.	Be familiar with different types of adhoc routing protocols							
4.	Be expose to the TCP issues in adhoc networks							
5.	To learn the architecture and protocols of wireless sensor network							
<b>UNIT I</b>	<b>INTRODUCTION</b>					<b>9</b>	<b>+</b>	<b>0</b>
Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel -mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs): concepts and architectures. Applications of Ad Hoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks								
<b>UNIT II</b>	<b>MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols- Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11								
<b>UNIT III</b>	<b>ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks								
<b>UNIT IV</b>	<b>WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Single node architecture: hardware and software components of a sensor node - WSN Network architecture: typical network architectures-data relaying and aggregation strategies -MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4								
<b>UNIT V</b>	<b>WSN ROUTING, LOCALIZATION &amp; QOS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues								
<b>Total (L+T)= 45 Periods</b>								

<b>Course Outcomes:</b>		
Upon completion of this course, the students will be able to:		
CO1	:	Explain the concepts, network architectures and applications of ad hoc and wireless sensor networks
CO2	:	Analyze the protocol design issues of ad hoc and sensor networks
CO3	:	To identify and understand security issues in ad hoc and sensor networks
CO4	:	Design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues
CO5	:	Evaluate the QoS related performance measurements of ad hoc and sensor networks
<b>Text Books:</b>		
1.		C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Prentice Hall Professional Technical Reference, 2008
<b>Reference Books:</b>		
1.		Carlos De Moraes Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2006
2.		Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication - 2002
3.		Holger Karl and Andreas Willig "Protocols and Architectures for Wireless Sensor Networks", Wiley, 2005
4.		Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks-Technology, Protocols, and Applications", John Wiley, 2007
5.		Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003

18CSPE807		CLOUD COMPUTING	L	T	P	C		
			3	0	0	3		
<b>Course Objectives:</b>								
1.	To introduce the broad perspective of Parallel Computing, Distributed Computing and Cloud Computing							
2.	To understand the concept of Virtualization							
3.	To identify the approaches of SLA and programming model in Cloud							
4.	To understand the Cloud Platforms in Industry and Software Environments							
5.	To learn to design the trusted Cloud Computing system							
<b>UNIT I</b>	<b>INTRODUCTION</b>					<b>9</b>	<b>+</b>	<b>0</b>
Principles of Parallel and Distributed Computing – Elements of Parallel and Distributed Computing, Technologies for Distributed Computing; Vision of Cloud, Defining a Cloud, characteristics and benefits; Cloud Computing Architecture- Cloud Reference Model, Types of Clouds, Open Challenges.								
<b>UNIT II</b>	<b>VIRTUALIZATION</b>					<b>9</b>	<b>+</b>	<b>0</b>
Introduction, Characteristics of Virtualized environments, Virtualization techniques-Machine Reference Model, Hardware-Level Virtualization, Programming Language-Level Virtualization, Application-Level Virtualization , Other types of Virtualization, Virtualization and Cloud computing, Pros and cons of Virtualization, Technology examples-Xen: Paravirtualization, VMware: Full Virtualization.								
<b>UNIT III</b>	<b>SLA MANAGEMENT IN CLOUD COMPUTING AND PROGRAMMING MODEL</b>					<b>9</b>	<b>+</b>	<b>0</b>
Traditional Approaches to SLA Management, Types of SLA, Life Cycle of SLA, SLA Management in Cloud; Data Intensive Computing - Technologies for Data Intensive Computing, MapReduce Programming Model.								
<b>UNIT IV</b>	<b>CLOUD INDUSTRIAL PLATFORMS AND SOFTWARE ENVIRONMENTS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Cloud Platforms in Industry - Amazon Web Service, Google App Engine; Cloud Software Environments – Eucalyptus, OpenNebula; Aneka Cloud Application Platform-Aneka Framework Overview, Anatomy of Aneka Container.								
<b>UNIT V</b>	<b>CLOUD SECURITY AND APPLICATIONS</b>					<b>9</b>	<b>+</b>	<b>0</b>
An Introduction to the Idea of Data Security, The Current State of Data Security in the Cloud, Cloud Computing and Data Security Risk, Cloud Computing and Identity; The Cloud, Digital Identity, and Data Security, Content Level Security, Pros and Cons; Cloud Scientific Applications.								
<b>Total (L+T)= 45 Periods</b>								



**Course Outcomes:**

Upon completion of this course, the students will be able to:

CO1	:	Explain the main concepts and architecture of Parallel computing, Distributed Computing and Cloud Computing
CO2	:	Analyze the concept of Virtualization
CO3	:	Identify the approaches of SLA and programming model in Cloud
CO4	:	Analyze the Cloud Platforms in Industry and Software Environments
CO5	:	Identify the security issues in scientific and real time applications

**Text Books:**

1.	Rajkumar Buyya, Christian Vecchiola, S.Tamarai Selvi, 'Mastering Cloud Computing-Foundations and Applications Programming', TMGH,2013.(Unit- I,II & IV)
2.	RajKumar Buyya, James Broberg, Andrezei M.Goscinski, "Cloud Computing: Principles and paradigms", 2011(Unit-III & V)

**Reference Books:**

1.	Kai Hwang.Geoffrey C.Fox.Jack J.Dongarra, " Distributed and Cloud Computing ,From Parallel Processing to The Internet of Things", 2012 Elsevier
2.	Barrie Sosinsky, "Cloud Computing Bible", Wiley Publisher, 2011

18CSPE808		SERVICE ORIENTED ARCHITECTURE	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To learn service oriented analysis techniques					
2.	To learn technology underlying the service design					
3.	To learn advanced concepts such as service composition, orchestration and choreography					
4.	To know about various WS specification standards					
<b>UNIT I SOA FUNDAMENTALS</b>						
			9	+		0
Roots of SOA, Characteristics of SOA, Comparing SOA to client, server and distributed internet architectures, Anatomy of SOA, How components in an SOA interrelate, Principles of service orientation.						
<b>UNIT II SOA AND WEB SERVICE</b>						
			9	+		0
Web services, Service descriptions, Messaging with SOAP, Message exchange Patterns, Coordination, Atomic Transactions, Business activities, Orchestration, Choreography, Service layer abstraction, Application Service Layer, Business Service Layer, Orchestration Service Layer.						
<b>UNIT III SOA DESIGN</b>						
			9	+		0
Service oriented analysis, Business-centric SOA, Deriving business services, service modeling- Service Oriented Design, WSDL basics ,SOAP basics ,SOA composition guidelines,Entity-centric business service design ,Application service design ,Task - centric business service design.						
<b>UNIT IV SOA PLATFORMS</b>						
			9	+		0
SOA platform basics , SOA support in J2EE , Java API for XML based web services (JAX-WS) ,Java architecture for XML binding (JAXB) ,Java API for XML Registries (JAXR) ,Java API for XML based RPC (JAX-RPC) , Web Services Interoperability Technologies (WSIT) , SOA support in .NET , Common Language Runtime , ASP.NET web forms , ASP.NET web services , Web Services Enhancements (WSE).						
<b>UNIT V BUSINESS PROCESS DESIGN</b>						
			9	+		0
WS-BPEL basics, WS-Coordination overview, WS-Choreography, WS-Policy, WS- Security.						
<b>Total (L+T)= 45 Periods</b>						
<b>Course Outcomes:</b>						
Upon completion of this course, the students will be able to:						
CO1	:	Understand the basic principles of software oriented architectures, its components and techniques.				
CO2	:	Develop web services using technology elements.				
CO3	:	Understand technology underlying the service design.				
CO4	:	Develop SOA platforms.				
CO5	:	Build SOA-based applications for intra-enterprise and inter-enterprise applications.				

**Text Books:**

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| 1. | Thomas Erl, —Service-Oriented Architecture: Concepts, Technology, and Design, Prentice Hall Publication, 2005. |
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**Reference Books:**

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| 1. | Norbert Bieberstein, Sanjay Bose, Marc Fiammante, Keith Jones, Rawn Shah, —Service-Oriented Architecture Compass: Business Value, Planning, and Enterprise Roadmap, IBM Press Publication, 2005. |
| 2. | Sandy Carter, —The New Language of Business: SOA & Web 2.0, IBM Press, 2007.   |
| 3. | Thomas Erl, —Service-Oriented Architecture: A Field Guide to Integrating XML and Web Services, Prentice Hall Publication, 2004.  |
| 4. | Dave Chappell, —Enterprise Service Bus, O'Reilly Publications, 2004.   |

18CSPE809		FREE AND OPEN SOURCE SOFTWARE	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To understand concepts, strategies, and methodologies related to open source software development.					
2.	To comprehend the business models, economic aspects, policies and regulations of open source software.					
<b>UNIT I INTRODUCTION</b>						
			9	+	0	
An Introduction to Open Source - Paradigm Shift in Hardware and software – Internet application platform - Commoditization of software - Customizable systems and architectures - Network-enabled Collaboration						
<b>UNIT II BUSINESS MODEL</b>						
			9	+	0	
Business Model Thoughts for Commodity Software - Hidden Service Business Models in Open Source Software – Platforms, types and standards						
<b>UNIT III OPEN SOURCE SOFTWARES</b>						
			9	+	0	
Economic theory about open source software – Programmer’s participation – open source projects – reaction of commercial vendors to open source project – supportive technological characteristics to open source development – optimal licensing – coexistence of commercial and open source software						
<b>UNIT IV OPEN SOURCE BUSINESS STRATEGIES</b>						
			9	+	0	
Open source business strategies – optimization strategy – dual license strategy – support strategy – consulting strategy – patronage strategy – hosted strategy – embedded strategy. Case study: IBM open source						
<b>UNIT V OPEN SOURCE POLICIES</b>						
			9	+	0	
Government Policy About Open Source - Regulations of Open Source/Open Source as a Global Phenomenon - Enforceability of Open Source Licenses						
						<b>Total (L+T)= 45 Periods</b>
<b>Course Outcomes:</b>						
Upon completion of this course, the students will be able to:						
CO1	:	Explain concepts, and strategies related to open source software development.				
CO2	:	Choose a business model based on the type of open source software.				
CO3	:	Recall policies, regulations and economic aspects of open source software.				

<b>Text Books:</b>	
1.	Karl Fogel, "Producing Open Source Software: How to Run a Successful Free Software Project", O'Reilly Publication, 2005.
<b>Reference Books:</b>	
1.	Eric S. Raymond, "The Cathedral and the Bazaar: Musing on Linux and Open Source by an Accidental Revolutionary", O'Reilly Publication, 2001.
<b>E-References:</b>	
1.	"Open source paradigm shift," Tim O'Reilly
2.	"The Simple Economics of Open Source" Josh Lerner and Jean Tirole
3.	"Seven Open source Business Strategies for Competitive Advantage," John Koenig
4.	" IBM's Pragmatic Embrace of Open Source," Pamela Samuelson
5.	"Politics And Programming: Government Preferences for Promoting Open Source Software," David S. Evans
6.	"The Limits in Open Code: Regulatory Standards & the Future of the Net," Lawrence Lessig
7.	"Legal Implications of Open Source Software," David McGowan

18CSPE810		NATURAL LANGUAGE PROCESSING		L	T	P	C
				3	0	0	3
<b>Course Objectives:</b>							
1.	This course introduces the fundamental concepts and techniques of natural language processing (NLP).						
2.	Students will gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information.						
3.	The course examines NLP models and algorithms using both the traditional symbolic and the more recent statistical approaches.						
<b>UNIT I INTRODUCTION</b>							
				9	+	0	
Semantics and Knowledge Representation - Natural Language Processing - Information Extraction - Main Challenges in Information Extraction - Approaches to Information Extraction - Performance Measures - General Architecture for Information Extraction.							
<b>UNIT II DATA GATHERING, PREPARATION AND ENRICHMENT</b>							
				9	+	0	
Process Overview -Tokenization and Sentence Boundary Detection -Representative Tools: Punkt and iSentenizer -Morphological Analysis and Part-of-Speech Tagging -Representative Tools: Stanford POS Tagger, -SVM Tool, and TreeTagger -Syntactic Parsing -Representative Tools: Epic, StanfordParser, -MaltParser, TurboParser -Representative Software Suites -Stanford NLP - Natural Language Toolkit (NLTK) -GATE.							
<b>UNIT III IDENTIFYING THINGS, RELATIONS AND SEMANTIZING DATA</b>							
				9	+	0	
Identifying the Who, the Where, and the When -Relating Who, What, When, and Where -Getting Everything Together -Ontology -Ontology-Based Information Extraction (OBIE).							
<b>UNIT IV EXTRACTING RELEVANT INFORMATION USING A GIVEN SEMANTIC</b>							
				9	+	0	
Introduction -Defining How and What Information Will Be Extracted -Architecture -Implementation of a Prototype Using State-of-the-Art Tools -Natural Language Processing -Domain Representation -Semantic Extraction and Integration.							
<b>UNIT V APPLICATIONS</b>							
				9	+	0	
Selecting and Obtaining Software Tools -Tools Setup -Processing the Target Document -Using for Other Languages and for Syntactic Parsing -Application Example 2: IE Applied to Electronic Government -Goals -Documents -Obtaining the Documents -Application Setup -Making Available Extracted Information Using a Map -Conducting Semantic Information Queries.							
<b>Total (L+T)= 45 Periods</b>							

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Understand approaches to syntax and semantics in NLP.
CO2	: Have a basic understanding of a variety of NLP tools.
CO3	: Understand approaches to discourse, generation, dialogue and summarization within NLP.
CO4	: Understand current methods for statistical approaches to machine translation.
CO5	: Understand machine learning techniques used in NLP, including hidden Markov models and probabilistic context-free grammars, clustering and unsupervised methods, log-linear and discriminative models, and the EM algorithm as applied within NLP.
<b>Text Books:</b>	
1.	“Advanced Applications of Natural Language Processing for Performing Information Extraction”,-Mário Rodrigues, AntónioTeixeira.
<b>Reference Books:</b>	
1.	“Analyzing Discourse and Text Complexity for Learning and Collaborating_ A Cognitive Approach Based on Natural Language Processing”,-MihaiDascălu.
2.	“Natural Language Processing for Social Media”,-Farzindar, Atefeh_ Inkpen, Diana
3.	“Natural Language Processing and Cognitive Science”,-Bernadette Sharp, Rodolfo Delmonte.

**LIST OF OPEN ELECTIVES OFFERED  
TO OTHER DEPARTMENTS**



18CSOE01		OBJECT ORIENTED PROGRAMMING USING C++	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To understand and develop the object oriented programming concepts.					
2.	To familiarize and design the template functions and classes					
3.	To disseminate and apply exception handling mechanisms.					
4.	To learn and exploit steam classes.					
<b>UNIT I INTRODUCTION</b>						
			9	+	0	
Procedure oriented programming paradigm - Object oriented programming paradigm - Basic concepts of object oriented programming, benefits of OOP, application of OOP - C++ fundamentals –structure of C++ program, tokens, data types - Operators and expressions - Control structures - Functions.						
<b>UNIT II CLASSES AND OBJECTS</b>						
			9	+	0	
Classes and objects - friend functions- constructors and destructors- Operator overloading – binary and unary operator overloading using member function and friend function - Type Conversion.						
<b>UNIT III INHERITANCE AND VIRTUAL FUNCTIONS</b>						
			9	+	0	
Inheritance – defining derived classes, types, virtual base classes, abstract classes, constructor in derived classes - Pointers- pointers to objects, this pointer, pointer to derived classes - Virtual functions.						
<b>UNIT IV TEMPLATES AND EXCEPTION HANDLING</b>						
			9	+	0	
Generic Classes – class template, class templates with multiple parameters - Generic Functions - function templates, function templates with multiple parameters, member function templates - Exception handling – basics, exception handling mechanism, rethrowing an exception.						
<b>UNIT V CONSOLE I/O AND FILE HANDLING</b>						
			9	+	0	
C++ Stream Classes – unformatted I/O operations, formatted console I/O operations, manipulators - Files- classes for file operation, opening and closing a file, detecting end of file, files modes, sequential file operations, random file operations.						
<b>Total (L+T)= 45 Periods</b>						

**Course Outcomes:**

Upon completion of this course, the students will be able to:

CO1	:	Construct the object oriented programming concepts.
CO2	:	Familiarize and build the template functions and classes
CO3	:	Disseminate and apply exception handling mechanisms.
CO4	:	Depict and exploit steam classes.

**Text Books:**

1. E. Balagurusamy "Object –Oriented Programming with C++" Sixth Edition Tata McGraw-Hill

**Reference Books:**

1. Herbert Schildt, "The Complete Reference C++", Fifth Edition, Tata McGraw Hill
2. Bjarne Stroustrup, "The C++ programming language", Fourth Edition Addison Wesley
3. K.R. Venugopal, Rajkumar Buyya "Mastering in C++" Second Edition, Tata McGraw Hill

18CSOE02		OPERATING SYSTEMS	L	T	P	C		
			3	0	0	3		
<b>Course Objectives:</b>								
1.	To understand the structure and functions of Operating systems							
2.	To understand the process concepts and scheduling algorithms							
3.	To understand the concept of process synchronization and deadlocks							
4.	To learn various memory management schemes							
5.	To illustrate various file systems and disk management strategies							
<b>UNIT I</b>	<b>INTRODUCTION AND OPERATING SYSTEM STRUCTURES</b>					<b>9</b>	<b>+</b>	<b>0</b>
Main frame Systems, Desktop Systems, Multiprocessor Systems, Distributed Systems, Clustered Systems, Real Time systems, Hand held Systems; Operating Systems Structures - System Components, Operating System Services, System calls, System Programs, System Design and Implementation.								
<b>UNIT II</b>	<b>PROCESS MANAGEMENT</b>					<b>9</b>	<b>+</b>	<b>0</b>
Processes-Process Concepts, Process Scheduling, Operation on Processes, Co-Operating Processes, Inter Process Communication; Threads- Multithreading Models, Threading Issues; CPU Scheduling-Basic Concepts, Scheduling Criteria, Scheduling Algorithms.								
<b>UNIT III</b>	<b>PROCESS SYNCHRONIZATION AND DEADLOCKS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Process Synchronization- The Critical Section Problem, Semaphores, Classical Problem of Synchronization, Monitors; Deadlocks- Deadlock Characterization, Methods for handling Deadlocks, Deadlock Prevention, Deadlock Avoidance ,Deadlock Detection, Recovery from Deadlock.								
<b>UNIT IV</b>	<b>MEMORY MANAGEMENT AND VIRTUAL MEMORY</b>					<b>9</b>	<b>+</b>	<b>0</b>
Memory Management- Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging; Virtual Memory - Demand paging, Page Replacement, Thrashing.								
<b>UNIT V</b>	<b>FILE SYSTEM AND MASS-STORAGE STRUCTURE</b>					<b>9</b>	<b>+</b>	<b>0</b>
File System Interface - File Concepts, Access methods, Directory Structure, File Sharing, File Protection; File System Implementation - File System Structure and Implementation, Directory Implementation, Allocation Methods, Free Space Management; Mass-Storage Structure - Disk Structure, Disk scheduling, Disk Management, RAID Structure.								
<b>Total (L+T)= 45 Periods</b>								

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Identify the components and their functionalities in the operating system
CO2	: Apply various CPU scheduling algorithms to solve problems
CO3	: Analyze the needs and applications of process synchronization and deadlocks
CO4	: Apply the concepts of memory management including virtual memory and page replacement to the issues that occur in real time applications
CO5	: Solve issues related to file system implementation and disk management
<b>Text Books:</b>	
1.	Abraham Silberschatz, P.B.Galvin, G.Gagne —Operating System Concepts 6 <sup>th</sup> edition, John Wiley & Sons, 2003.
<b>Reference Books:</b>	
1.	Andrew S. Tanenbaum, —Modern Operating Systems, PHI , 2nd edition, 2001
2.	D.M.Dhamdhere, "Systems Programming and Operating Systems ", 2 <sup>nd</sup> edition, Tata McGraw Hill Company, 1999.
3.	Maurice J. Bach, —The Design of the Unix Operating System, 1 <sup>st</sup> edition, PHI, 2004.

18CSOE03		COMPUTER NETWORKS	L	T	P	C		
			3	0	0	3		
<b>Course Objectives:</b>								
1.	To study the concepts of data communications and functions of different ISO/OSI reference architecture							
2.	To understand the error detection and correction methods and also the types of LAN							
3.	To study the concepts of subnetting and routing mechanisms							
4.	To understand the different types of protocols and congestion control							
5.	To study the application protocols and network security							
<b>UNIT I</b>	<b>DATA COMMUNICATIONS AND PHYSICAL LAYER</b>					<b>9</b>	<b>+</b>	<b>0</b>
Data Communication; Networks- Physical Structures (Types of Connections, Physical Topology), Categories of Networks, Interconnection of Networks: Internetwork; Protocols and Standards; Network Models-The OSI Model, Layers in the OSI Model, Addressing; Transmission media-Guided Media, Unguided Media.								
<b>UNIT II</b>	<b>DATA LINK LAYER</b>					<b>9</b>	<b>+</b>	<b>0</b>
Introduction-Types of errors, Redundancy, Detection versus Correction -Error Detection and Correction (VRC, LRC, CRC, Checksum, Hamming Code); Data link Control- Flow Control (Stop-and-Wait, Sliding Window), Error Control (Automatic Repeat Request, Stop-and-wait ARQ, Sliding Window ARQ); Local Area Networks- Ethernet, Token Bus, Token Ring, FDDI.								
<b>UNIT III</b>	<b>NETWORK LAYER</b>					<b>9</b>	<b>+</b>	<b>0</b>
Network Layer services-Packet Switching-Network Layer Performance-IPv4 addresses-IPv6 addressing-Subnetting-Bridges-Gateways- Routers-Routing Algorithm-Distance Vector Routing, Link State Routing.								
<b>UNIT IV</b>	<b>TRANSPORT LAYER</b>					<b>9</b>	<b>+</b>	<b>0</b>
Duties of the Transport layer-User Datagram Protocol-Transmission Control Protocol- Congestion Control and Quality of Service-Congestion, Congestion Control, Quality of Service, Techniques to improve QoS.								
<b>UNIT V</b>	<b>PRESENTATION LAYER AND APPLICATION LAYER</b>					<b>9</b>	<b>+</b>	<b>0</b>
Translation, Encryption/Decryption, Authentication, Data Compression; Domain Name System – FTP-SMTP-HTTP- World Wide Web.								
<b>Total (L+T)= 45 Periods</b>								

**Course Outcomes:**

Upon completion of this course, the students will be able to:

CO1	:	Classify the fundamentals of data communications and functions of layered architecture
CO2	:	Apply the error detection and correction methods and also identify the different network technologies
CO3	:	Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and routing technologies
CO4	:	Illustrate the transport layer principles and reliable data transfer using protocols
CO5	:	Analyze the application layer protocols and also the use of network security

**Text Books:**

1. Behrouz A.Ferouzan, "Data Communications and Networking", 4th Edition, Tata McGraw-Hill, 2007

**Reference Books:**

1. Andrew S. Tanenbaum, "Computer networks "PHI, 4<sup>th</sup> edition 2008
2. William Stallings," Data and computer communications", 10<sup>th</sup> edition,PHI, 2012
3. Douglas E. Comer," Internetworking with TCP/IP-Volume-I", 6<sup>th</sup> edition,PHI, 2008

18CSOE04		PYTHON PROGRAMMING		L	T	P	C
				3	0	0	3
<b>Course Objectives:</b>							
1.	To Learn Python data structures, conditional and control structures and files.						
2.	To study Python Modules, packages, Functions and Exceptions.						
3.	To Describe Object oriented programming features and Regular Expressions.						
<b>UNIT I   INTRODUCTION</b>				9	+	0	
Python: Features - The Basics-Numbers, Sequence: Strings, Lists and Tuples, Mapping and set types.							
<b>UNIT II   CONDITIONS,CONTROL STRUCTURES AND FILES</b>				9	+	0	
Conditionals and loops-if statement-else statement-elif-Conditional Expressions-while statement-for statement-break-continue –pass-Iterators-list Comprehensions-Generator Expressions; Files and Input/ Output.							
<b>UNIT III   PYTHON EXCEPTIONS MODULES AND PACKAGES</b>				9	+	0	
Errors and Exceptions-Introduction-Detecting and handling Exceptions-Context Management-Raising Exceptions-Assertions-Standard Exceptions- Modules-Packages.							
<b>UNIT IV   FUNCTIONS</b>				9	+	0	
Functions-Calling functions-Creating functions-Passing Functions-Formal Arguments-Variable length arguments-variable scope-Recursion-map, filter , reduce and list comprehensions-Operator Module-The itertools and collection modules.							
<b>UNIT V   OBJECT ORIENTED PROGRAMMING AND REGULAR EXPRESSION</b>				9	+	0	
Introduction-Classes-class Attributes-Instances-Instances attributes-Building and Method Invocation-Static methods and class Methods-Inheritance-Operator overloading-Regular Expression.							
				<b>Total (L+T)= 45 Periods</b>			
<b>Course Outcomes:</b>							
Upon completion of this course, the students will be able to:							
CO1	:	Develop programs using control structures and files.					
CO2	:	Create own Python Modules, packages , functions and Exceptions.					
CO3	:	Illustrate Object oriented Programming features and Regular Expressions.					
<b>Text Books:</b>							
1.	Wesley J.Chun-“Core Python Programming” –Prentice Hall, Second Edition, 2006.						
<b>Reference Books:</b>							
1.	Swaroop C N, “ A Byte of Python “, ebsshelf Inc., 1st Edition, 2013						
2.	“A Practical Introduction to python programming”, Brian Heinold,Mount St.Mary’s University,2012						
3.	Learning to Program with Python,” Richard L. Halterman”, Southern Adventist University						
<b>E-References:</b>							
1.	Introduction to Python Programming NPTEL video lectures by Dr. Sudip Misra , IIT Kharagpur 2017.						

18CSOE05		JAVA PROGRAMMING	L	T	P	C		
			3	0	0	3		
<b>Course Objectives:</b>								
1.	To familiarize and apply the Object Oriented concepts and java features							
2.	To write the standalone applications and applet applications							
3.	To build simple chart application and Database Connectivity							
<b>UNIT I</b>	<b>INTRODUCTION TO JAVA</b>					<b>9</b>	<b>+</b>	<b>0</b>
Fundamentals of object oriented programming- java features, comparing JAVA with C and C++, JAVA environment; Overview of java language - java program structure, java tokens, java statements, implementing java program, java virtual machine, command line arguments; constants, variables and data types - Operators and expressions - Decision making – branching and looping.								
<b>UNIT II</b>	<b>JAVA FEATURES</b>					<b>9</b>	<b>+</b>	<b>0</b>
Classes, objects methods – arrays, Strings and Vectors– Interfaces – Packages - Multithreaded programming - Exception handling.								
<b>UNIT III</b>	<b>APPLET AND EVENT HANDLING</b>					<b>9</b>	<b>+</b>	<b>0</b>
Applet programming- build applet code, applet life cycle, creating executable applet, designing a web page, applet tag, running the applet; Graphics programming – graphics class, lines, rectangles, circles, ellipses, arcs and polygons;								
<b>UNIT IV</b>	<b>EVENTS AND AWT CONTROLS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Event handling – two event handling Mechanisms, delegation event model, event classes, sources of events, event listener interfaces; AWT - AWT controls, Layout Managers, Menu Bars and Menus, Dialog Boxes, FileDialogs;								
<b>UNIT V</b>	<b>I/O FILES AND JDBC</b>					<b>9</b>	<b>+</b>	<b>0</b>
I/O Files- concepts of stream, stream classes, byte stream classes, character stream classes, file classes, creation of files, reading and writing characters and bytes; Design of JDBC - JDBC drivers; JDBC programming concepts - Database concepts, making connection, executing SQL commands, managing connections, statements, and result sets; Query execution - Prepared Statements.								
<b>Total (L+T)= 45 Periods</b>								



<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Familiarize and apply the Object Oriented concepts and java features
CO2	: Build the standalone applications and applet applications
CO3	: Develop simple application using files and Database
<b>Text Books:</b>	
1.	E. Balaguruswamy, "Programming with java", Fifth, TMH (Unit- I-III)
2.	PatricNaughton , Herbert Schildt, "The Complete Reference Java 2" , Eighth edition Tata McGraw Hills , (Unit IV - V)
<b>Reference Books:</b>	
1.	Cay S. Horstmann, Gary Cornell " Core Java 2" Eighth Edition, Pearson Education
2.	Graham Hamilton , Rick Cattell, Maydene Fisher , "JDBC Database access with java".
3.	PaulDeitel and Harvey Deitel, "Java How to Program", Tenth Edition, Pearson Prentice Hall 2014.

18CSOE06		COMPUTER ORGANIZATION AND ARCHITECTURE	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To understand the basic structure and operations of digital computer					
2.	To learn the working of different arithmetic operations					
3.	To understand the different types of control and the concept of pipelining					
4.	To study the hierarchical memory system including cache memory and virtual memory					
5.	To understand the different ways of communication with I/O devices and standard I/O interfaces					
<b>UNIT I INTRODUCTION</b>						
			9	+	0	
Computer Types - Functional units - Basic Operational Concepts - Bus Structure - Numbers, Arithmetic Operations and Characters - Memory Locations and Addresses - Memory Operations - Instruction and Instruction Sequencing - Addressing modes.						
<b>UNIT II ARITHMETIC UNIT</b>						
			9	+	0	
Addition and Subtraction of Signed Numbers - Design of Fast Adders - Multiplication of Positive Numbers, Booth Algorithm - Fast Multiplication - Integer Division - Floating point number operations.						
<b>UNIT III PROCESSOR UNIT AND PIPELINING</b>						
			9	+	0	
Fundamental Concepts - Execution of Instruction - Multi Bus Organization - Hardwired control - Micro programmed control - Basic Concepts of pipelining - Data Hazards - Instruction Hazards - Data path & Control Considerations - Superscalar Operation.						
<b>UNIT IV MEMORY SYSTEMS</b>						
			9	+	0	
Basic Concepts - Semiconductor RAM - ROM - Cache memory - Improving Cache Performance - Virtual memory - Memory Management requirements - Secondary Storage Device.						
<b>UNIT V INPUT AND OUTPUT ORGANIZATION</b>						
			9	+	0	
Accessing I/O devices - Programmed I/O- Interrupts - Direct Memory Access - Interface circuits - Standard I/O Interfaces (PCI, SCSI, USB).						
<b>Total (L+T)= 45 Periods</b>						

<b>Course Outcomes:</b>		
Upon completion of this course, the students will be able to:		
CO1	:	Explain the working principle and implementation of computer hardware components and its various functional units
CO2	:	Apply the operations of arithmetic unit to perform specific task
CO3	:	Analyze the different types of control and the concept of pipelining
CO4	:	Illustrate various memory components including Cache memory and Virtual memory
CO5	:	Explain the different ways of communication with I/O devices and standard I/O interfaces
<b>Text Books:</b>		
1.		Carl Hamacher V., Zvonko G. Vranesic, Safwat G. Zaky, " Computer organization ", Tata McGraw Hill, 5th Edition, 2008.
<b>Reference Books:</b>		
1.		Patterson and Hennessey, "Computer Organization and Design ". The Hardware/Software interface, Harcourt Asia Morgan Kaufmann, 3rd Edition, 2007
2.		Hayes, "Computer Architecture and Organization ", 3 <sup>rd</sup> edition, Tata McGraw Hill, 2006
3.		Heuring V.P., Jordan H.F., " Computer System Design and Architecture ", 6 <sup>th</sup> edition ,Addison Wesley, 2008

18CSOE07		DATA STRUCTURES USING C++	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To comprehend the fundamentals of object oriented programming, particularly in C++					
2.	To use object oriented programming to implement data structures					
3.	To introduce linear, non-linear data structures and their applications					
<b>UNIT I DATA ABSTRACTION &amp; OVERLOADING</b>						
			9	+	0	
Overview of C++ – Structures – Class Scope and Accessing Class Members – Reference Variables – Initialization – Constructors – Destructors – Member Functions and Classes – Friend Function – Dynamic Memory Allocation – Static Class Members – Container Classes and Integrators – Overloading: Function overloading and Operator Overloading.						
<b>UNIT II INHERITANCE AND POLYMORPHISM</b>						
			9	+	0	
Base Classes and Derived Classes – Protected Members – Casting Class pointers and Member Functions – Overriding – Public, Protected and Private Inheritance – Constructors and Destructors in derived Classes – Implicit Derived – Class Object to Base – Class Object Conversion – Virtual functions – this Pointer – Abstract Base Classes and Concrete Classes – Virtual Destructors – Dynamic Binding						
<b>UNIT III LINEAR DATA STRUCTURES</b>						
			9	+	0	
Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation – singly linked lists –Polynomial Manipulation – Stack ADT – Queue ADT – Evaluating arithmetic expressions.						
<b>UNIT IV NON-LINEAR DATA STRUCTURES</b>						
			9	+	0	
Trees – Binary Trees – Binary tree representation and traversals – Application of trees – Binary Search Tree - Heaps - Operations of Heaps - Binary Heap - Max Heap - Min Heap - Graph and its representations – Graph Traversals – Representation of Graphs – Breadth-first search – Depth-first search.						
<b>UNIT V SORTING AND SEARCHING</b>						
			9	+	0	
Sorting algorithms: Insertion sort – Quick sort – Merge sort – Searching: Linear search –Binary Search						
<b>Total (L+T)= 45 Periods</b>						
<b>Course Outcomes:</b>						
Upon completion of this course, the students will be able to:						
CO1	:	Explain the concepts of Object oriented programming				

CO2	:	Write simple applications using C++.
CO3	:	Discuss the different methods of organizing large amount of data.
<b>Text Books:</b>		
1.		Deitel and Deitel, "C++, How To Program", Fifth Edition, Pearson Education, 2005 (Unit I & II)
2.		Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Third Edition, Addison Wesley, 2007- (Unit – III,IV &V)
<b>Reference Books:</b>		
1.		Bhushan Trivedi, "Programming with ANSI C++, A Step-By-Step approach", Oxford University Press, 2010.
2.		Goodrich, Michael T., Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++", 7th Edition, Wiley. 2004.
3.		Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Second Edition, Mc Graw Hill, 2002.
4.		Bjarne Stroustrup, "The C++ Programming Language", 3rd Edition, Pearson Education, 2007.
5.		Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, "Fundamentals of Data Structures in C++", Galgotia Publications, 2007.

18CSOE08		NEURAL NETWORKS	L	T	P	C		
			3	0	0	3		
<b>Course Objectives:</b>								
1.	To gain exposure in the field of neural networks and relate the human neural system into the digital world							
2.	To provide knowledge of computation and dynamical systems using neural networks							
<b>UNIT I</b>	<b>INTRODUCTION</b>					<b>9</b>	<b>+</b>	<b>0</b>
Architecture- Single-Neuron Perceptron- Multi-Neuron Perceptron- Perceptron								
<b>UNIT II</b>	<b>PERCEPTRON</b>					<b>9</b>	<b>+</b>	<b>0</b>
Perceptron Learning Rule- Constructing Learning Rules- Training Multiple-Neuron Perceptrons.								
<b>UNIT III</b>	<b>ASSOCIATIVE NETWORKS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Simple Associative Networks- Unsupervised Hebb Rule- Hebb Rule with Decay-Instar Rule-Outstar Rule- Kohonen Rule.								
<b>UNIT IV</b>	<b>ADALINE NETWORK &amp; BACK PROPAGATION</b>					<b>9</b>	<b>+</b>	<b>0</b>
Adaline Network- Madaline Network -Mean Square Error- LMS Algorithm- Back Propagationa Neural networks – Hopfield Networks								
<b>UNIT V</b>	<b>ADAPTIVE FILTERING</b>					<b>9</b>	<b>+</b>	<b>0</b>
Adaptive Filtering- Adaptive Noise Cancellation- Forecasting – Neural control applications – Character recognition.								
<b>Total (L+T)= 45 Periods</b>								
<b>Course Outcomes:</b>								
Upon completion of this course, the students will be able to:								
CO1	:	Acquire skill set to innovate and build a smart and intelligent engineering application using ANN						

**Text Books:**

- |    |  |
|----|--|
| 1. | Hagan Demuth Beale, 'Neural network design', PWS publishing company, 1995  |
| 2. | Freeman, J.A and Skapura, D.M., 'Neural networks-Algorithms, applications and programming techniques' Addison Wesley, 1991 |
| 3. | Satish Kumar, Neural Networks – A classroom approach', Tata McGraw-Hill Publishing Company Limited, 2004                   |

**Reference Books:**

- |    |   |
|----|---|
| 1. | Patterson and Hennessey, "Computer Organization and Design ". The Hardware/Software interface, Harcourt Asia Morgan Kaufmann, 3rd Edition, 2007 |
| 2. | Hayes, "Computer Architecture and Organization ", 3 <sup>rd</sup> edition, Tata McGraw Hill, 2006   |
| 3. | Heuring V.P., Jordan H.F., " Computer System Design and Architecture ", 6 <sup>th</sup> edition ,Addison Wesley, 2008                           |

18CSOE09		SOFT COMPUTING	L	T	P	C
			3	0	0	3
<b>Course Objectives:</b>						
1.	To learn the basic concepts of Soft Computing					
2.	To become familiar with various techniques like neural networks, genetic algorithms and fuzzy systems.					
3.	To apply soft computing techniques to solve problems.					
<b>UNIT I INTRODUCTION TO SOFT COMPUTING</b>						
			9	+	0	
Introduction-Artificial Intelligence-Artificial Neural Networks-Fuzzy Systems-Genetic Algorithm and Evolutionary Programming-Swarm Intelligent Systems-Classification of ANNs-McCulloch and Pitts Neuron Model-Learning Rules: Hebbian and Delta- Perceptron Network-Adaline Network-Madaline Network.						
<b>UNIT II ARTIFICIAL NEURAL NETWORKS</b>						
			9	+	0	
Back propagation Neural Networks – Kohonen Neural Network -Learning Vector Quantization -Hamming Neural Network – Hopfield Neural Network- Bi-directional Associative Memory -Adaptive Resonance Theory Neural Networks- Support Vector Machines – Spike Neuron Models.						
<b>UNIT III FUZZY SYSTEMS</b>						
			9	+	0	
Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets – Classical Relations and Fuzzy Relations - Membership Functions -Defuzzification – Fuzzy Arithmetic and Fuzzy Measures-Fuzzy Rule Base and Approximate Reasoning – Introduction to Fuzzy Decision Making.						
<b>UNIT IV GENETIC ALGORITHMS</b>						
			9	+	0	
Basic Concepts- Working Principles -Encoding- Fitness Function – Reproduction - Inheritance Operators – Cross Over – Inversion and Deletion -Mutation Operator – Bit- wise Operators -Convergence of Genetic Algorithm.						
<b>UNIT V HYBRID SYSTEMS</b>						
			9	+	0	
Hybrid Systems -Neural Networks, Fuzzy Logic and Genetic -GA Based Weight Determination – LR-Type Fuzzy Numbers – Fuzzy Neuron – Fuzzy BP Architecture – Learning in Fuzzy BP- Inference by Fuzzy BP – Fuzzy ArtMap: A Brief Introduction – Soft Computing Tools – GA in Fuzzy Logic Controller Design – Fuzzy Logic Controller						
<b>Total (L+T)= 45 Periods</b>						



<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Apply suitable soft computing techniques for various applications and integrate various soft computing techniques for complex problems.
<b>Text Books:</b>	
1.	N.P.Padhy, S.P.Simon, "Soft Computing with MATLAB Programming", Oxford University Press, 2015.
2.	S.N.Sivanandam , S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt. Ltd., 2nd Edition, 2011.
3.	S.Rajasekaran, G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications ", PHI Learning Pvt. Ltd., 2017.
<b>Reference Books:</b>	
1.	Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, —Neuro-Fuzzy and Soft Computing, Prentice-Hall of India, 2002
2.	KwangH.Lee,—FirstcourseonFuzzyTheoryandApplications, Springer, 2005.
3.	GeorgeJ.KlirandBoYuan,—FuzzySetsandFuzzyLogic-TheoryandApplications, Prentice Hall, 1996.
4.	JamesA.FreemanandDavidM.Skapura,—NeuralNetworksAlgorithms, Applications, and Programming Techniques, Addison Wesley, 2003.

<b>18CSOE10</b>		<b>ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>			
<b>Course Objectives:</b>								
1.	To learn the various characteristics of Intelligent agents, different search strategies and represent knowledge in solving AI problems							
2.	To understand the need for machine learning for various problem solving							
3.	To study the various supervised, semi-supervised and unsupervised learning algorithms in machine learning							
<b>UNIT I</b>	<b>INTRODUCTION</b>					<b>9</b>	<b>+</b>	<b>0</b>
Introduction–Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents–Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.								
<b>UNIT II</b>	<b>PROBLEM SOLVING METHODS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Problem solving Methods – Search Strategies- Uninformed – Informed – Heuristics – Local Search Algorithms and Optimization Problems – Searching with Partial Observations – Constraint Satisfaction Problems – Constraint Propagation – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning.								
<b>UNIT III</b>	<b>KNOWLEDGE REPRESENTATION</b>					<b>9</b>	<b>+</b>	<b>0</b>
First Order Predicate Logic – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation – Ontological Engineering-Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories – Reasoning with Default Information.								
<b>UNIT IV</b>	<b>LEARNING PROBLEMS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search								
<b>UNIT V</b>	<b>NEURAL NETWORKS AND GENETIC ALGORITHMS</b>					<b>9</b>	<b>+</b>	<b>0</b>
Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.								
<b>Total (L+T)= 45 Periods</b>								

<b>Course Outcomes:</b>	
Upon completion of this course, the students will be able to:	
CO1	: Use appropriate search algorithms for any AI problem
CO2	: Represent a problem using first order and predicate logic
CO3	: Differentiate between supervised, unsupervised, semi-supervised machine learning approaches
CO4	: Discuss the decision tree algorithm and identify and overcome the problem of overfitting
<b>Text Books:</b>	
1.	S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, Third Edition, 2009
2.	I. Bratko, —Prolog: Programming for Artificial Intelligence, Fourth edition, Addison-Wesley Educational Publishers Inc., 2011
3.	Tom M. Mitchell, —Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.
<b>Reference Books:</b>	
1.	M. Tim Jones, —Artificial Intelligence: A Systems Approach(Computer Science), Jones and Bartlett Publishers, Inc.; First Edition, 2008
2.	Nils J. Nilsson, —The Quest for Artificial Intelligence, Cambridge University Press, 2009
3.	William F. Clocksin and Christopher S. Mellish, Programming in Prolog: Using the ISO Standard, Fifth Edition, Springer, 2003
4.	Shai Shalev-Shwartz, Shai Ben-David, Understanding Machine Learning From Theory to Algorithms, Cambridge University Press, 2014
5.	Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997
<b>E-References:</b>	
1.	<a href="https://builtin.com/artificial-intelligence">https://builtin.com/artificial-intelligence</a>
2.	<a href="https://science.howstuffworks.com/robot6.htm">https://science.howstuffworks.com/robot6.htm</a>
3.	<a href="https://onlinecourses.nptel.ac.in/noc18_cs40/preview">https://onlinecourses.nptel.ac.in/noc18_cs40/preview</a> , (Prof. Sudeshna Sarkar, IIT KHARAGPUR )