

Choice Based Credit System (R16)

REGULATIONS, COURSE STRUCTURE AND SYLLABUS

For

COMPUTER SCIENCE AND ENGINEERING

(I,II, III, & IV YEAR)

B.Tech. FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2016-17)



SWARNANDHRA COLLEGE OF ENGINEERING & TECHNOLOGY

Seetharampuram, Narsapur – 534 280, W.G.Dt.

Andhra Pradesh

(AUTONOMOUS)

Department of Computer Science and Engineering

Vision of the institute

- ❖ To provide the society with Centre of Learning in Technical Education and Research that motivates the students to evolve into dynamic professionals.

Mission of the institute

- ❖ Providing Quality education, student centered teaching learning process and state of the art infrastructure for professional aspirants hailing from both rural and urban areas.
- ❖ Evolving this organization into a centre of Academic and Research Excellence.
- ❖ Imparting Technical Education that encourages independent thinking, develops strong domain knowledge and positive attitude towards holistic growth of young minds

Department of CSE VISION:

To empower Computer Science Engineers as technologically adept, innovative, self-motive and socially responsible professionals by providing multi-dimensional education.

Department of CSE MISSION:

- ❖ **To lay a strong foundation of programming knowledge by concentrating on fundamental concepts of Computer Science and Engineering.**
- ❖ **To develop flair for logical thinking and innovative methods to produce software solutions.**
- ❖ **To strengthen employability and entrepreneurship skills.**
- ❖ **To produce socially responsible software professionals with ethical values.**

PROGRAM EDUCATIONAL OBJECTIVES:

PEO1: LEARN AND INTEGRATE: Graduates shall be proficient in solving computational problems by applying multidisciplinary knowledge.

PEO2: THINK AND CREATE: Graduates shall be capable of developing software based systems.

PEO3: COMMUNICATE: Graduates shall acquire efficient communication and leadership skills.

PEO4: PRACTICE CITIZENSHIP: Graduates shall attain professional and ethical attributes.

PROGRAM OUTCOMES (PO):

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES:

- PSO1: Design and development of software applications by using data mining techniques.**
PSO2: Enrichment of graduates with global certifications to produce reliable software solutions.

ACADEMIC REGULATIONS

1. **INTRODUCTION**

Academic Program of the institute are governed by rules and regulations approved by the Academic Council, which is the highest Academic body of the Institute. These academic rules and regulations are applicable to the students admitted during the academic year 2016-17 into first year of four year undergraduate program offered by the college leading to Bachelor of Technology (B.Tech) degree in the respective discipline.

2. **ADMISSIONS:**

2.1 Admission into first year of any Four Year B. Tech Program of study in Engineering: Admissions into first year of B.Tech Program of Swarnandhra College of Engineering & Technology (**Subsequently referred to as SCET**) will be as per the norms stipulated by Jawaharlal Nehru Technological University Kakinada & Govt. of Andhra Pradesh. Admissions in each program in the Institution are classified into **CATEGORY –A**, through convener, EAMCET and **CATEGORY- B** filled by the college management.

2.2 Admission into the Second year (Lateral Entry) of any Four year B. Tech Program of study in Engineering: The candidates should have passed the qualifying exam. (B.Sc. graduation & Diploma holders) for admission into the 3rd semester directly, based on the rank secured by the candidate at Engineering Common Entrance Test [ECET for (FDH)] in accordance with the instructions received from the Convener, ECET and Government of Andhra Pradesh. The candidate has to satisfy the other eligibility requirements stipulated by the JNT University Kakinada and / or the Government of Andhra Pradesh from time to time.

2.3 Admissions with advance standing: These may arise in the following cases:

- a) When a student seeks transfer from other colleges to SCET and desirous to pursue the study at SCET in an eligible branch of study.
- b) When students of SCET get transferred from one regulation to another regulation or from previous syllabus to revised syllabus.
- c) When a student after long discontinuity rejoins the college to complete his/her Program of study for the award of degree.
- d) When a student is not able to pursue his/her existing Programme of study but wishes to get transferred to another Program of study.

These admissions may be permitted by the Academic Council of SCET as per the norms stipulated by the statutory bodies and Govt. of Andhra Pradesh. In all such cases for admission, when needed, permissions from the statutory bodies are to be obtained and the Program of study at SCET will be governed by the transitory regulations.

3. ROGRAMMES OFFERED (UNDER GRADUATE)

Presently, the college is offering Under Graduate Programs in the following disciplines:

- Computer Science and Engineering (CSE)
- Electronics and communication Engineering (ECE)
- Electrical and Electronics Engineering (EEE)
- Information Technology (IT)
- Mechanical Engineering (ME)
- Civil Engineering(CE)

3.1 Structure of the Program:

Preamble:

It is emphasized in UGC Guidelines on Choice Based Credit System (CBCS), that the important measures taken to enhance academic standards and quality in higher education include innovation and improvements in curriculum, teaching-learning process, examination and evaluation systems, besides governance and other matters. It is also suggested to adopt grading system in place of conventional system of marks and percentages.

The proposed CBCS for Swarnandhra College of Engineering and Technology provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides advantageous approach in which the students can register courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach through open electives.

Key words CBCS, such as Course, credit, credit point, CGPA, SGPA, Grade Point, Letter Grades, Foundation Courses (FC), Program Core Course (PCC) and Elective Courses (EC) as given in UGC guidelines are used in this proposal with the same definitions.

Each Program of a Discipline or branch of study will consist of:

- i). Foundation courses in Basic Sciences, Engineering Sciences and Humanities.
- ii). Program core courses to impart broad based knowledge needed in the concerned branch of study.
- iii). Elective courses from the discipline or interdisciplinary areas /industry related opted by the student based on his/her interest in specialization.

Each Program of study will be designed to have 35-40 theory courses and 20-25 laboratory courses. The distribution and types of courses offered from the above is indicated in the following table.

B.TECH/CSE/2016 (CBCS)

Foundation Courses – Basic Sciences & Humanities
Foundation Courses – Engineering Sciences
Program Core Courses in the branch of study
Elective Courses

Note: All components prescribed in the curriculum of any Program of study will be conducted and evaluated.

Contact hours: Depending on the complexity and volume of the course the number of contact hours per week will be determined.

Credits:

- One teaching hour of theory/tutorial class is equivalent to one credit.
- Two hours of Practical class is equivalent to one credit.
- Each theory or elective course will be (L-T-P-C) equal to 4-0-0-4 or 3-1-0-4 or 3-0-2-4 or 2-0-4-4 or 1-0-4-3. Further, the laboratory courses can be (L-T-P-C) equal to 0-0-2-1 or 0-0-4-2.

3.2 Curriculum for each Program of study:

- The Four year curriculum of any B. Tech Program of study in any branch of Engineering is formulated based on the guidelines mentioned in 3.1 and will be recommended by the concerned Board of Studies and is approved by the Academic council of the college.
- In case of students admitted under lateral entry, the respective regular curriculum contents from 3rd semester onwards are to be pursued by them.
- In case of students admitted under advanced standing, the equivalence will be prepared by the concerned Board of Studies and the Academic Council has to approve the same.
- After approval from the Academic Council, the detailed curriculum will be prepared and made available to all the students along with the academic regulations.

3.3 Maximum duration of study and cancellation of admission:

Maximum duration permitted for any student to successfully complete the four year B. Tech. Program of study will be:

- Eight academic years in sequence from the year of admission for a normal student admitted into first year of any Program.
- Six academic years in sequence from the year of admission for a Lateral entry student admitted into second year of any Program.
- For students admitted with advanced standing, the maximum time for completion of Program of study, will be twice the period in terms of academic years in sequence, stipulated in the Program curriculum defined at the time of admission.

In case, any student fails to meet the above applicable/eligible conditions for the award of degree, his/her admission stands cancelled.

4. **DURATION OF THE PROGRAMME AND MEDIUM OF INSTRUCTION:** The duration of the B. Tech. Program is four academic years consisting of eight semesters. The medium of instruction and examinations are in English. Students, who fail to fulfill all the academic requirements for the award of the degree within the prescribed duration as per article 3.3, will forfeit his/her admission in B.Tech course.

5. **MINIMUM INSTRUCTION DAYS:** Each semester will consist of 22 weeks duration with minimum of 110 working days which includes instruction, Midsemester examinations and Final examinations.

6. **TRANSITORY REGULATIONS:**

For students admitted under advance standing, these transitory regulations will provide the modus operandi. At the time of such admission, based on the Program pursued (case by case)

- Equivalent courses completed by the student are established by the BOS of concerned discipline.
- Marks/Credits are transferred for all such equivalent courses and treated as successfully completed in the Program of study prescribed by SCET.
- A Program chart of residual courses not completed will be derived and a Program of study with duration specified will be prescribed for pursuit at SCET.
- Marks obtained in the previous system, as the case may be, shall be converted to equivalent grades and CGPA..

All other modalities and regulations governing shall be the same as those applicable to the stream of students with whom; such a candidate is merged with current regulations.

7. **DISTRIBUTION AND WEIGHTAGE OF MARKS:**

- (i) In each semester the course of study consists of 5/6 theory subjects + 3 Laboratories. However, in the 8th semester there will be only 2 theory subjects in addition to the major project work.
- (ii) The performance of a student in each semester will be evaluated subject wise with a maximum of 100 marks for both Theory and Laboratories, whereas Seminar, Soft Skills and Aptitude Lab and Mini Project/Internship at the end of respective semesters are evaluated internally for 50 marks each. The Main Project during 8th Semis evaluated for 200 marks.
- (iii) **Seminar:** The seminar is internal evaluation. For the Seminar, the student shall collect the information on a specialized topic (thrust areas) and prepare a report showing his understanding over the topic and submit to the department, which shall be evaluated by the Head of the department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.
- (iv) **Soft Skills and Aptitude Lab:** This lab is internal evaluation. This has two components, Soft Skills and Aptitude. Each will be evaluated separately for 50 marks in a semester and the average of two components shall be taken as the final score. A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.
- (v) **Mini Project/Internship:** This Mini Project/ Internship is internal evaluation. The mini

project/Internship shall be carried out during the summer break for a minimum of 4 weeks after the 6th semester and to be completed before the start of the 7th Semester. A report has to be submitted at the beginning of the 7th semester for assessment by an internal evaluation committee comprising Head of the Department and two faculty of the department including the project Supervisor for 50 Marks. A minimum of 50% maximum marks shall be obtained to earn the corresponding credits.

- (vi) For each theory subject the distribution will be 40 marks for internal evaluation and 60 marks for the end semester examination. The internal evaluation of 40 marks consists of descriptive test for 30 marks and assignment for 10 marks.
- (vii) As part of internal assessment for each theory subject there will be 2 cycles of examinations. Each cycle consists of descriptive test for 30 marks and assignment for 10 marks which will be conducted for three units of syllabus. **Weighted average of two cycle's** performance will be considered for award of internal assessment. A weightage of 80% for the best cycle performance and 20% for second best cycle performance are given for internal evaluation.
- (viii) The **descriptive** examination question paper consists of three questions (at least one question from each unit) and all are need to be answered in 90 minutes.
- (ix) The **end semester** examination will be conducted for 60 marks covering total syllabus of the concerned subjects. In end examination pattern, **Part – A** consists of a compulsory questions from all units (Brainstorming/Thought provoking/Case study) for 12 marks. **Part – B has 6 questions** (one question from each unit) of which **four questions** to be answered and valued for 48 marks.
- (x) End practical examination will be conducted for 60 marks by the teacher concerned and external examiner. For practical subjects there will be a continuous assessment during the semester for 40 internal marks with 20 marks for day-to-day work, including record valuation and 20 marks for internal test.
- (xi) For the subjects of design or drawing such as Engineering Drawing, etc., the distribution will be 40 marks for internal evaluation with 20 marks for day-to-day work, and 20 marks from two internal test (80% of first best + 20% of second best). End examination will be conducted for 60 marks.
- (xii) **Main Project:** The project work carried out by the students during 8th semester is evaluated for internal assessment and external examination.

a) Internal Assessment: Internal Assessment will be carried out by Projects internal assessment committee consisting of 1) Head of the Department 2) Supervisor and 3) Senior faculty member appointed by the Principal.

b) External Examination: External Examination will be conducted by Project external examination committee consisting of 1) Head of the Department 2) Supervisor and 3) External member selected from the panel of examiners.

Total marks to be awarded for Project work is 200, of which 60 marks will be for Internal Evaluation and 140 marks for External examination through presentation / viva - voice by

the student. The internal evaluation will be on the basis of two seminars on the topic of the project.

(xiii) **Mandatory Courses:** Non-Credit Courses: Courses: These courses are mandatory for students and students have to successfully complete these courses.

a. IPR and Ethics in 5th Semester

b. Certificate Course in 6th Semester (MOOCs or Professional Certificate)

The evaluation shall be totally internal and students should get satisfactory result to get B. Tech degree. Students should produce valid certificate for certificate course to get satisfactory result.

(xiv) **Skill Based Lab (Elective):** This shall be conducted in 7th semester on thrust areas of respective departments. Students shall register and put up a minimum of 75% attendance. Based on their performance, examination to be conducted like other Labs.

(xv) **Open Electives:** Students are to choose one Open Elective (OE – I) during 6th Semester and one Open Elective (OE – II) in 8th Semester from the list of Open Electives given in the Course Structure. The student has to choose one Open Elective subject in Sem VI and Sem VIII from the list other than offered by parent Department, which was not studied in earlier semesters.

8. **GAP YEAR CONCEPT:** Outstanding students who wish to pursue entrepreneurship full time can take break of one year, after the 4th Semester with prior approval from the Principal (as per the recommendations of the Central Committee). This may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation.

9. **ATTENDANCE REGULATIONS AND CONDONATION:**

- (i) A student will be eligible to appear for end semester examinations, if he/she acquired a minimum of 75% of attendance in aggregate of all the subjects.
- (ii) Condonation of shortage of attendance in aggregate up to 10% on medical grounds (Above 65% and below 75%) in any semester may be granted by the College Academic Committee.
- (iii) Prescribed Condonation fee shall be payable by the student to appear for the end examination.
- (iv) A Student will not be promoted to the next semester unless he/she satisfies the attendance requirement of the present semester as applicable. They may seek re-admission for that semester as and when offered consecutively by the Department.
- (v) Shortage of Attendance below 65% in aggregate in no case be condoned
- (vi) Students with less than 65% of attendance in any semester are not eligible to take up their end examination of that particular semester and their registration for examination shall be cancelled.
- (vii) Attendance may also be condoned for those who participate in Intercollegiate/university sports, co- and extracurricular activities provided their attendance is in the minimum prescribed range for the purpose (>65%) and recommended by the concerned authority. He/She shall pay the prescribed

condonation fee.

- (viii) A student will be condoned only four times for regular student and three times for lateral entry students during entire course of study.

10. MINIMUM ACADEMIC REQUIREMENTS:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in **S.No.9**.

- (i) A student will be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or practical design or drawing subject or project if he/she secures not less than a minimum of 35% of marks exclusively in the end semester examinations in each of the subjects, for which the candidate had appeared. However, the candidate should have secured a minimum of 40% marks in both external and internal components put together to declare eligible for pass in the subject.
- (ii) A student will be promoted from first semester to second semester, second semester to third and third to fourth semester, if he/she satisfies the minimum attendance requirement.
- (iii) A student will be promoted from 4th Semester to 5th Semester, if he/she fulfills the academic requirements of 40% of the credits up to 4th Semester from all the examinations (Regular and supplementary) whether or not the candidate takes the examinations.
- (iv) A student will be promoted from 6th to 7th Semester, only if he/she fulfills the academic requirements of 40% of the credits up to 6th Semester from, all the examinations (regular and supply) whether or not the candidate takes the examinations.
- (v) There will be supplementary examinations along with the regular semester examinations enabling the students to give a fair chance to appear in the subject if any failed.
- (vi) Candidate who fails in 8th Semester can appear for Advanced Supplementary Examinations soon after the announcement of result.

11. ELIGIBILITY FOR AWARD OF DEGREE:

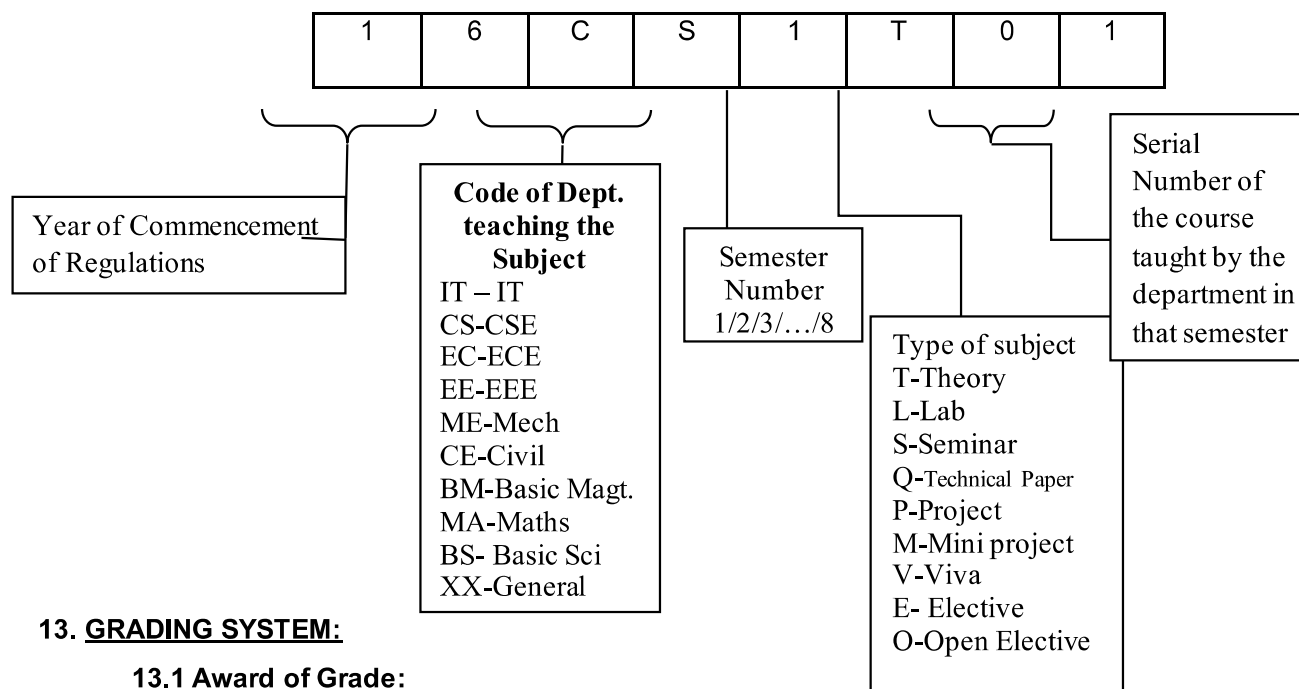
A student shall be eligible for award of the B.Tech. Degree if he/she fulfills all the following conditions:

- (i) Pursued a course of study for a stipulated period of four years and not more than eight years.
- (ii) Registered and successfully completed all the components prescribed in the program of study to which he/she is admitted.
- (iii) Obtained CGPA greater than or equal to 5 (minimum requirements for pass).
- (iv) Has no dues to the institute, hostels, libraries, NCC/NSS etc., and No disciplinary action is pending against him/her

12. COURSE CODE & COURSE NUMBERING SCHEME:

B.TECH/CSE/2016 (CBCS)

The subject codes will be given by the department teaching the subject. Each subject code contains 8 characters. The 8 characters for each subject will be filled as per the following guidelines.



13. GRADING SYSTEM:

13.1 Award of Grade:

(i) Grade Point Average (GPA):

a) The Grade Point Average (GPA) will be calculated according to the formula.

$$GPA = \frac{\sum C_i G_i}{\sum C_i}$$

Where C_i = number of credits for the subject i

G_i = grade points obtained by the student in the subject.

b) To arrive at Cumulative Grade Point Average (CGPA), the formula is used considering the student's performance in all the courses taken in all the semesters completed up to the particular point of time.

$$CGPA = \frac{\sum C_i G_i}{\sum C_i}$$

Where C_i = number of credits for the subject i

G_i = grade points obtained by the student in the subject.

(ii) After a student satisfies the requirements prescribed for the award of UG/PG Program he/she shall be placed in one of the following four grades. The award of the degree is based on CGPA on a grade point scale of 10.

CGPA	Award of Division
$\geq 7.50^*$	First Class with Distinction
≥ 6.50	First Division
≥ 5.50	Second Division
≥ 5.00	Pass Division
< 5.00	Unsatisfactory

* In addition to the required CGPA of 7.50, the student must have necessarily passed all the courses of every semester in the minimum stipulated period for the programme.

13.2 Award of Grade in Each Semester:

- (i) Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester for each subject. The letter grades and the corresponding grade points are as given in the Table.

Percentage of Marks Scored	Letter Grade	Grade points
≥ 90	S	10
80 - 89	A	9
70-79	B	8
60-69	C	7
50-59	D	6
40-49	E	5
< 40	F	Fail

- (ii) A student earns a minimum of 5 grade points (E grade) in a subject is declared to have successfully completed the subject, and is deemed to have earned the credits assigned to that subject. However it should be noted that a pass in any subject/term paper/seminar/project/miniproject shall be governed by the rules mentioned in S.No.7.
- (iii) Grade Sheet: A grade sheet (memorandum) will be issued to each student indicating his/her performance in all courses taken in that semester and also indicating the grades.
- (iv) Transcripts: After successful completion of the total programme of study, a Transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued up to any point of study to any student on request and by paying the stipulated fee in force.

(v) Candidates shall be permitted to apply for revaluation within the stipulated period with payment of prescribed fee.

(vi) The Academic Council has to approve and recommend to the JNTUK, Kakinada for the award of a degree to any student.

14. SUPPLEMENTARY EXAMINATIONS: In addition to the Regular Final Examinations held at the end of each semester, Supplementary Final Examinations will be conducted during the academic year. A student can appear for any number of supplementary examinations till he/she clears all courses which he/she could not clear in the first attempt. However the maximum stipulated period cannot be relaxed under any circumstance.

15. ADVANCED SUPPLEMENTARY EXAMINATIONS: Candidate who fails the subjects in 8th Semester can appear for Advanced Supplementary Examinations.

16. ACADEMIC REGULATIONS FOR B.TECH (LATERAL ENTRY SCHEME):

(i) The students have to acquire 132 credits from 3rd Semester to 8th Semester of B. Tech Program (regular) for the award of the degree.

(ii) Students, who fail to fulfill the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.

(iii) The same attendance regulations are to be adopted as per the rules mentioned in item No.9.

(iv) **Rules for Promotion in to Next Higher Class:** (6th Semester to 7th Semester): A student shall be promoted from 6th Semester to 7th Semester only if he/she fulfills the academic requirements of 40% credits up to 6th Semester.

17. CONDUCT AND DISCIPLINE:

Students admitted in SCET (Autonomous) are to be followed the conduct and discipline of the college and which will be framed from time to time.

18. MALPRACTICES: The Principal shall refer the cases of malpractices in internal assessment tests and Semester-End Examinations, to a Malpractice Enquiry Committee, constituted by him/her for the purpose. The principal shall take necessary action, against such cases based on the recommendations of the committees as per stipulated norms.

19. GENERAL:

a) Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

b) The academic regulation should be read as a whole for the purpose of any interpretation.

c) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of The Principal is final and which is to be ratified by the Chairman of the Governing Body.

d) The college may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

**COMPUTER SCIENCE AND ENGINEERING
COURSE STRUCTURE – UG(CBCS)**

SEMESTER-I

S. No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1	16BS1T01	Proficiency Course in English-I	3		-	3	40	60	100
2	16MA1T01	Differential Equations and Laplace Transforms	3	-	-	3	40	60	100
3	16EE1T01	Basic Electrical and Electronics	3	-	-	3	40	60	100
4	16BS1T03	Engineering Physics	3	-	-	3	40	60	100
5	16CS1T01	Fundamentals of Computers and C-Programming	3	-	-	3	40	60	100
6	16ME1T01	Engineering Drawing	1	-	4	3	40	60	100
7	16BS1L01	English Proficiency Lab	-	-	4	2	40	60	100
8	16BS1L03	Engineering Physics Lab	-	-	4	2	40	60	100
9	16CS1L01	C-Programming Lab	-	-	4	2	40	60	100
		Total	16	-	16	24	360	540	900

SEMESTER-II

S. No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1	16BS2T01	Proficiency Course in English-II	3		-	3	40	60	100
2	16MA2T01	Linear Algebra and Vector Calculus	3	-	-	3	40	60	100
3	16MA2T02	Numerical Methods and Integral Transforms	3	-	-	3	40	60	100
4	16BS2T02	Engineering Chemistry	3	-	-	3	40	60	100
5	16CS2T01	OOPS Through C++	3	-	-	3	40	60	100
6	16BS2T04	Environmental Science	3	-	-	3	40	60	100
7	16BS2L01	English Communication Skills Lab	-		4	2	40	60	100
8	16BS2L02	Engineering Chemistry Lab	-		4	2	40	60	100
9	16CS2L01	OOPS Through C++ Lab	-		4	2	40	60	100
		Total	18		12	24	360	540	900

**COMPUTER SCIENCE AND ENGINEERING
COURSE STRUCTURE – UG**

SEMESTER-III

S. No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1	16EC3T04	Digital Logic Design	3	-	-	3	40	60	100
2	16CS3T01	Data Structures	3	1	-	4	40	60	100
3	16CS3T02	Database Management Systems	3	1	-	4	40	60	100
4	16MA3T01	Discrete Mathematics	3		-	3	40	60	100
5	16CS3T03	Software Engineering	3		-	3	40	60	100
6	16CS3L01	Data Structures Lab using C	-	-	4	2	40	60	100
7	16CS3L02	Database Management Systems Lab	-	-	4	2	40	60	100
8	16CS3L03	Software Engineering Lab	-	-	4	2	40	60	100
		Total				23	320	480	800

SEMESTER-IV

S. No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1	16CS4T01	Java Programming	3	1	-	4	40	60	100
2	16CS4T02	Operating Systems	3	1	-	4	40	60	100
3	16EC4T05	Microprocessors and Microcontrollers	3	-	-	3	40	60	100
4	16CS4T03	Computer Organization	3	-	-	3	40	60	100
5	16BM4T01	Principles of Economics and Management	3	-	-	3	40	60	100
6	16CS4L01	Java Programming Lab	-	-	4	2	40	60	100
7	16CS4L02	Operating Systems Lab	-	-	4	2	40	60	100
8	16EC4L04	Microprocessors Lab	-	-	4	2	40	60	100
		Total				23	320	480	800

**COMPUTER SCIENCE AND ENGINEERING
COURSE STRUCTURE – UG**

SEMESTER – V

S. No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1	16CS5T01	Computer Networks	3	1	-	4	40	60	100
2	16CS5T02	Advanced Java and Web Technologies	3	1	-	4	40	60	100
3	16CS5T03	Formal Language and Automata Theory	3	-	-	3	40	60	100
4	16MA5T01	Probability & Statistics	3	-	-	3	40	60	100
5	Elective-I	16CS5E01: Software Project Management	3	-	-	3	40	60	100
		16CS5E02: Advanced Computer Architecture							
		16CS5E03: Computer Graphics							
		16CS5E04: Soft computing							
6	16CS5L01	Computer Networks Lab	-	-	4	2	40	60	100
7	16CS5L02	Advanced Java and Web Technologies Lab	-	-	4	2	40	60	100
8	16CS5S01	Seminar	-	-	4	2	50	-	50
9		Mandatory Course - Professional Ethics and IPR	-	-	-	-	-	-	-
		Total				23	330	420	750

SEMESTER – VI

S. No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1	16CS6T01	Object oriented Analysis and Design	3	1	-	4	40	60	100
2	16CS6T02	Design and Analysis of Algorithms	3	1	-	4	40	60	100
3	16CS6T03	Compiler Design	3	-	-	3	40	60	100
4	Elective –II	16CS6E01: Software Quality Management	3	-	-	3	40	60	100
		16CS6E02: Cloud Computing							
		16CS6E03: Multimedia & Application Development							
		16CS6E04: Wireless Networks							
5	OE	Open Elective -1	3	-	-	3	40	60	100
6	16CS6L01	Unified Modeling Language Lab	-	-	4	2	40	60	100
7	16CS6L02	Compiler Design Lab	-	-	4	2	40	60	100
8	16BS6L01	Soft Skills & Aptitude Lab	-	-	4	2	50		50
9		Mandatory course - Certificate Course (MOOC's, Professional Certificate)-	-	-	-	-	-	-	-
		Total				23	330	420	750

**COMPUTER SCIENCE AND ENGINEERING
COURSE STRUCTURE – UG**

SEMESTER – VII

S. No.	Subject Code	Subject Title	L	T	P	C	I	E	TM	
1	16CS7T01	Distributed Systems	3	1	-	4	40	60	100	
2	16CS7T02	Cryptography and Network Security	3	1	-	4	40	60	100	
3	16CS7T03	Data Warehousing and Data Mining	3		-	3	40	60	100	
4	Elective – III	16CS7E01: Image Processing	3		-	3	40	60	100	
		16CS7E02: Cyber Security								
		16CS7E03: Internet of Things								
		16CS7E04: Artificial Intelligence								
5	16CS7L01	Distributed Systems Lab	-	-	4	2	40	60	100	
6	16CS7L02	Data Warehousing and Data Mining Lab	-	-	4	2	40	60	100	
7	16CS7LE1	Skill Based Laboratory Elective	-		-	4	2	40	60	100
	16CS7LE2	1. R-Programming Lab								
	16CS7LE3	2. Cloud Computing Technologies Lab								
	16CS7LE4	3. Python Lab 4. Dot Net Technology Lab								
8	16CS7M01	Internship/Industry Oriented Mini Project (This work carried out during summer break after 6 th Sem)	-	-	-	2	50	-	50	
		Total				22	330	420	750	

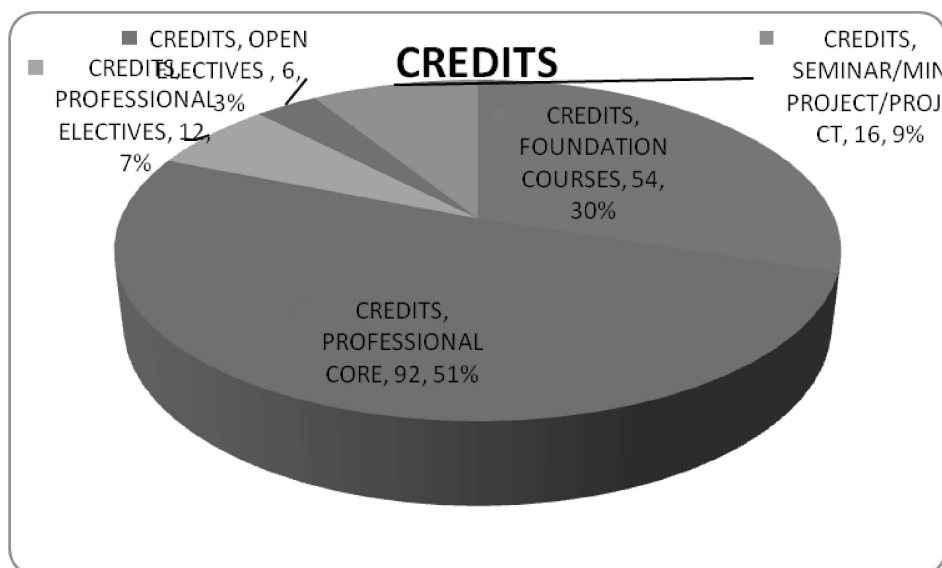
SEMESTER – VIII

S. No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1	Elective –IV	16CS8E01: Machine Learning	3	-	-	3	40	60	100
		16CS8E02: Web Services & SOA							
		16CS8E03: Information Retrieval Systems							
		16CS8E04: Big Data Analytics							
2	OE	Open Elective – II	3	-	-	3	40	60	100
3	16CS8P01	Project Work	-	-	24	12	60	140	200
		Total				18	140	260	400

LIST OF OPEN ELECTIVES

S.No.	Course Code	Name of the Course	Offering Dept.
1	16CEXO01	Green Buildings and Infrastructure	CIVIL
2	16CEXO02	Disaster Management	
3	16EEXO01	Electrical Safety Management	EEE
4	16EEXO02	Non-Conventional Energy Sources	
5	16MEXO01	Composite Materials	MECH
6	16MEXO02	Introduction to Operation Research	
7	16ECXO01	Introduction to Nanotechnology and its Applications	ECE
8	16ECXO02	Introduction to Global Positioning and Navigation Satellite Systems	
9	16CSXO01	Introduction to Data Base Management Systems	CSE
10	16CSXO02	Introduction to Big Data Analytics	
11	16ITXO01	Introduction to Software Project Management	IT
12	16ITXO02	Introduction to Internet of Things (IoT)	
13	16BMXO01	Innovations and Entrepreneurship	MBA
14	16BMXO02	Industrial Sociology & Psychology	

Note: The student has to choose one Open Elective subject in Sem VI and Sem VIII from the above list other than offered by parent Department, which was not studied in earlier semesters.



B. TECH 1st SEMESTER	L	T	P	C
	3	-	-	3
16BS1T01: Proficiency Course in English –I				

COURSE OBJECTIVES

1. To improve the language proficiency of technical under graduates in English with emphasis on LSRW Skills.
2. To provide learning environment to practice Listening, Speaking, Reading and Writing Skills within and beyond the classroom environment.
3. To assist students to carry on the tasks and activities through guided instructions and materials.
4. To effectively integrate English language learning with employability skills and training.
5. To design the main course material and exercises with authentic materials drawn from everyday use to cater to everyday needs.
6. To provide hands-on experience through case –studies, mini –projects, group and individual presentations.

COURSE OUTCOMES

- A) Reading Skills.
- Addressing explicit and implicit meaning of a text.
 - Understanding the context.
 - Learning new words and phrases.
 - Using words and phrases in different contexts.
- B) Writing Skills:
- Using the basic structure of a sentence.
 - Applying relevant writing formats to create paragraphs, essays, letters, e-mails, reports and presentations.
 - Retaining a logical flow while writing.
 - Planning and executing an assignment creatively.
- C) Interactive skills:
- Analyzing a topic of discussion and relating to it.
 - Participating in discussions and influencing them.
 - Communicating ideas effectively.
 - Presenting ideas coherently within a stipulated time.
- D) Grammar in context
- Enable the skills of grammar using in a situation
 - Identifying the needs of apt grammar in life related situation
 - Promoting discourse with grammar effectively

Syllabus:

S No	Content	Hours
UNIT-I	The Power of Prayer One word substitutes Nouns – Pronouns	8
UNIT-II	Is progress real? Commonly Confused words Verbs	8
UNIT-III	Secret of Work Collocations Adjectives ,Adverbs and Articles	8
UNIT-IV	An Astrologer's Day GRE words Prepositions and Sentences	8
UNIT-IV	Marriage Proposal Idioms Conjunctions and Interjections	8
UNIT-VI	The Road not Taken Phrasal Verbs Tenses	8
		48

Text Book: Proficiency Course in English, Semester –I by Maruti Publications.

B. TECH 1st SEMESTER	L	T	P	C
	3	-	-	3
16MA1T01: Differential Equations and Laplace Transforms				

Prerequisites

Knowledge of differentiation, integration, logarithms, hyperbolic functions, and trigonometry is necessary. Concept of functions and their types, partial differentiation is also needed.

COURSE OBJECTIVES

1. The study of differential equations is introduced to make the students how to solve the problems in first order and first degree differential equations.
2. The study of second and higher order differential equations with constant coefficients.
3. To transform a given problem from one domain into another so that solving the corresponding problem becomes easier, Laplace transforms are introduced.
4. To know various physical and geometrical problems involving two or more independent variables, partial differential equations will be studied.

COURSE OUTCOMES

The students are able to

1. Solve linear differential equations of all orders.
2. Solve the first order partial differential equations.
3. Apply the knowledge to find the expansions of functions using Taylors and Maclaurin's series.
4. Solve many problems in engineering with the knowledge of Laplace transforms.

Syllabus:

UNIT -I Differential equations of first order and first degree

Linear – Bernoulli – Exact - Reducible to exact - Newton's Law of cooling-Law of natural growth and Decay - Orthogonal Trajectories.

UNIT -II Linear differential equations of higher order

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax}V(x)$, $xV(x)$. Method of Variation of parameters for solving second order linear differential equations.

UNIT -III Partial Derivatives

Taylor series and Maclaurin's series expansions of functions of single and two variables (without Proofs) - Jacobian, Functional dependence.

UNIT -IV Partial Differential Equations

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations-Solutions of Linear Partial differential equations with constant coefficients by the method of separation of Variables.

UNIT -V Laplace transforms

Laplace transforms of standard functions-Shifting Theorems, Transforms of derivatives and integrals – Unit step function –Dirac’s delta function.

UNIT -VI Inverse Laplace transforms

Inverse Laplace transforms -Convolution theorem (without proof).

Application: Solutions of ordinary differential equations using Laplace transforms.

Books:

1. **B.S. GREWAL**, Higher Engineering Mathematics, 42nd Edition, Khanna Publishers.
2. **B.V. RAMANA**, Higher Engineering Mathematics, Tata McGraw Hill.

Reference Books:

1. **ERWIN KREYSZIG**, Advanced Engineering Mathematics, 9th Edition, Wiley-India

B. TECH 1st SEMESTER	L	T	P	C
	3	-	-	3
16EE1T01: Basic Electrical and Electronics				

COURSE OBJECTIVES

The student able to Understand:

- To study the concepts of various electrical elements, various network reduction techniques and AC circuits.
- To understand the principle of operation and performance of DC and AC machines.
- To study the principle of operation and working of various types of measuring instruments.
- To study the construction details, operation and characteristics of various semiconductor devices, digital and logic operations.

COURSE OUTCOMES

Students are able to

- Solve electrical networks with network topology concepts.
- Analyze the characteristics and performance of DC and AC machines.
- Choose right type of instrument for measurement of various electrical parameters.
- Explain the operation and characteristics of various semiconductor devices and concepts of digital and logic operations.

UNIT – I

Introduction To Electrical Engineering: Basic Electrical circuit elements (Resistor, Inductor and capacitor)-voltage and current sources-Ohm's Law-Kirchhoff's Laws-series circuits-equivalent resistance-star/delta conversion- Node and mesh analysis of DC circuits - Simple problems.

Network Theorems (DC Excitation)-Superposition-Thevenin's-Norton's-Maximum Power Transfer Theorem-Simple problems

UNIT – II

Ac Fundamentals: Introduction to AC circuits-RMS value-average value-form and peak factors – Real and reactive power – Apparent power- power factor- Behavior of R, L, and C in AC Circuits-Introduction to three phase circuits- phase and line parameters-three phase balanced and unbalanced systems-Simple problems.

UNIT – III

Electrical Machines: DC Machines: Classification of DC Machines-DC Generator and Motor-Construction-Principle of operation –EMF Equation-Performance Characteristics-Simple problems

AC Machines: Classification of AC Machines-Transformers-Synchronous Machines, Induction motor-Performance Characteristics-Starting Methods-Simple problems.

UNIT – IV

Measurement and Measuring Instruments: Introduction – Analog and Digital Instruments – Passive and Active Instruments – Static

Characteristics – Linear and Non-linear Systems – Dynamic Characteristics – Classification of the Instrument System – Measurement of Error – Indicating type Instruments – Measurement of Power-Voltmeter and Ammeter method- two and three wattmeter method-Measurement of Energy.

UNIT-V

Semi Conductor Devices And Its Characteristics : Characteristics of PN Junction Diode — Zener Diode- Intrinsic and Extrinsic Semiconductors – Semiconductor Diodes– Bipolar Junction Transistors-CB, CE, CC Configurations and Characteristics – FET – MOSFET – Silicon-controlled Rectifier – DIAC – TRIAC-Half wave and Full wave Rectifiers- Voltage Regulation.

UNIT – VI

Introduction To Digital Electronics : Binary Number System – Logic Gates – Boolean Algebra -De Morgan's Theorem- Simplification of Boolean Expressions using De Morgan's Theorem – Half and Full Adders – A/D and D/A Conversion.

Text Books:

1. Electrical and Electronic Principles and Technology-John Bird, Published by Elsevier Ltd
2. Engineering Circuit Analysis – William H. Hayt & Jack E. Kemmerly, Tata McGraw-Hill Company, 7th Edition.

Reference Books:

1. Basic Electrical and Electronics Engineering – S. K. Bhattacharya, Pearson Publications.
2. Basic Electrical & Electronics Engineering – J. B. Gupta, S. K. Kataria & Sons Publications.
3. A Course in Electrical and Electronic Measurements and Instrumentation – A. K. Sawhney, Dhanpat Rai & Co.
4. Electronic Devices and Circuit Theory – Robert L. Boylestad & Louis Nashelsky, Prentice-Hall of India, 6th Edition.
5. Electrical & Electronics Engineering – J. B. Gupta, S. K. Kataria & Sons Publications.

B. TECH 1st SEMESTER	L	T	L	C
	3	-	-	3
16BS1T03: Engineering Physics				

COURSE OBJECTIVES

- 1) **Understand** the basic *concepts, definitions, characteristics and phenomena*.
- 2) **Recognize** the *classical ideas and physical phenomena* and also *define and analyze* the concepts.
- 3) **Assess the role of Science** and in particular, *physics*, in helping us better understanding the *complex, technological* society of which we are apart.
- 4) **Investigate** and understand physical behavior in the lab using *scientific reasoning and logic* and interpret the result of simple *experiments and demonstration* of physical principles and also *evaluate* the impact of physical discoveries on how we view the world.
- 5) **Solve** a variety of basic *problems and given word problems*, student will identify the physical principle required to solve the problem, *formulate the equation* necessary to solve the problem.
- 6) **Effectively communicate** *experimental results and solutions* to application problems through oral and written reports.
Explain physical phenomena using *realistic mathematical modeling* at the level of general physics

COURSE OUTCOMES

Student able to understand:

1. Basic crystal systems and determination of crystal structures.
2. Proper choice of Magnetic/Dielectric Materials as per the functionality of appliance could be realized.
3. Concept of Magnetic Induction and Maxwell's equations.
4. Application of Schrodinger equation and Concept of band theory of solids.
5. Pure & doped Semiconductor devices for better utility.
6. Optical properties of solids and super conducting properties of solids and their applications.

Syllabus

UNIT-I CRYSTALLOGRAPHY AND X-RAY DIFFRACTION

Introduction – Space lattice – Basis – Unit Cell – Lattice parameters – Bravais lattices – Crystal systems – Structures and packing fractions of SC,BCC and FCC-Directions and planes in crystals – Miller indices – Separation between successive (h k l) planes – Bragg's law- Bragg's Spectrometer.

UNIT-II MAGNETIC AND DIELECTRIC PROPERTIES

MAGNETIC PROPERTIES: Origin of magnetic moment-Magnetic Materials: Classification of Magnetic Materials and properties - Hysteresis Loop of ferromagnetic material.

DIELECTRIC PROPERTIES: Introduction - Electronic, ionic and orientational (Qualitative) polarizations - Internal fields in solids – Clausius - Mossotti equation.

UNIT-III ELECTROMAGNETISM

Introduction-Concept of Electric Flux - Gauss's Law – Integral and Differential forms - Magnetic Field –The Biot-Savart's Law - Ampere's Law - B for a Solenoid - Faraday's Law of induction - Lenz's law - Displacement Current - Maxwell's Equations.

UNIT –IV QUANTUM MECHANICS AND BAND THEORY OF SOLIDS:

De Broglie concept of matter waves, Schrodinger Time Independent wave equation – Application to a Particle in a box- Defects of Classical free electron theory of metals – Quantum free electron theory – concept of Fermi energy - Bloch theorem (qualitative) – Kronig – Penney model – Origin of energy band formation in solids – Classification of materials into conductors, semiconductors & insulators.

UNIT – V SEMICONDUCTOR PHYSICS

Introduction – Intrinsic semiconductor and carrier concentration – Equation for conductivity – Extrinsic semiconductor and carrier concentration – Drift and diffusion currents – Einstein's equations - Hall Effect and its applications.

UNIT-VI LASERS AND SUPER CONDUCTIVITY

LASERS: Introduction– Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion - Three level and four level laser pumping schemes - Ruby laser – Helium-Neon laser- Applications of Laser.

SUPERCONDUCTIVITY: General properties – BCS Theory of Superconductivity - Meissner effect – Type-I and Type-II superconductors – Flux quantization – Josephson effects – Applications of Superconductors.

Text Books

- 1 A text book of Engineering Physics by M-N- Avadhanulu & P.G. Kshirasagar (S-Chand publications)
- 2 Engineering Physics by R.K. Gaur and S.L. Gupta.

Reference Books

- 1 Engineering Physics" by Palanisamy (Scitech Publishers)
- 2 Engineering Physics by Mani Naidu S (Pearson Publications)
- 3 Introduction to solid state physics" by Charles Kittel (Wiley India Pvt-Ltd)
- 4 Applied Physics" by T. Bhimasenkaram (BSP BH Publications)
- 5 Applied Physics" by M. Arumugam (Anuradha Agencies)
- 6 Physics by David Halliday and Robert Resnick – Part I and Part II

B. TECH 1st SEMESTER	L	T	P	C
	3	-	-	3
16CS1T01: Fundamentals of Computers and C Programming				

Prerequisites

Basic Mathematical Problems and their Solutions

COURSE OBJECTIVES

- 1) To enable the student to learn about the major components of a computer system.
- 2) To introduce the basic structure of the Algorithm and Flowchart.
- 3) To know the concepts of conditional & loop statements.
- 4) To implement the different user defined and pre-defined functions.
- 5) To know the pointers, structures and unions concept used in various areas.
- 6) To provide practical, hands-on training in C programming.

COURSE OUTCOMES

The student will be proficient in the following:

- 1) Identification and Usage of each part of a computer system.
- 2) The Evolution and Purpose of Programming.
- 3) Mastering in basic programming concepts and logic implementations.
- 4) Knowledge in file I/O operations (i.e. open, close, read, write, seek)
- 5) Ability to identify and implement appropriate Solution for a given Problem.
- 6) Know the terms "Structured Programming", "Algorithm", "Flowchart", "Data Types", "Control Statements", "Arrays", "Functions", "Pointers", "Structures", "Unions", "File I/O" and where they are applicable.

Syllabus

UNIT-I COMPUTER FUNDAMENTALS

Computer System: definition, block diagram, **Hardware:** components, mother board layout, block diagram of mother board, **Software:** definition, types of software, **Algorithm:** definition, properties of algorithm, algorithms on basic problems, **Flowchart:** definition, symbols used in flow charts, flow charts for basic problems, types of computer Languages, bits, bytes, binary system.

UNIT-II FUNDAMENTALS OF C LANGUAGE

Character Set, Tokens, Identifiers, Constants, Basic Data Types and Sizes, Arithmetic Operators, Relational Operators, Logical Operators, Conditional Operator, Increment and Decrement Operators, Assignment Operators, Bit-wise Operators, Special Operators, Expressions, Operator Precedence and Order of Evaluation, Evaluation of Expressions, Type Conversions: Implicit and Explicit, Structure of C Program.

UNIT-III CONTROL STRUCTURES

Selection Statements: Simple if, if-else Statement, Nested if Statement, else-if Ladder, switch Statement.

Iterative Statements: while, do-while and for loops, break and continue statements, goto statement.

ARRAYS

Array definition, declaration, initialization and accessing array elements of 1-D and 2-D arrays.

STRINGS

String definition, declaration, initialization and accessing, string handling functions in **string.h**

UNIT-IV FUNCTIONS

Introduction to Function, Types of Functions, Return Statement, Declaration, Definition and Calling a Function, Parameter Passing Techniques, Storage Classes, Passing 1-D Array to Functions.

Recursion: Types of recursion, rules of recursion, recursive solutions for factorial of a number, Fibonacci Series and GCD of two numbers.

C Preprocessors: File Inclusion and Macro Substitution.

UNIT-V POINTERS

Pointer Definition, Declaration, Initialization and Accessing a Pointer, void pointer, null pointer, Pointer Arithmetic, Pointer to Pointer, Dynamic Memory Management Functions.

STRUCTURES AND UNIONS

Definition, Declaration and Initialization of Structures, Accessing Structures, Nested structures, Array of Structures, Pointer to structures

Definition, Declaration and Initialization of Unions, difference between structures and unions

UNIT-VI FILES

Introduction to Files, File I/O functions, File opening modes, sequential and random accessing files, file operations.

Text Books

- | | | |
|--------------------------|-----------------|-----|
| 1. Programming in ANSI C | E. Balagurusamy | TMH |
|--------------------------|-----------------|-----|

Reference Books

- | | | |
|--------------------------------------|--------------------------|---------|
| 1. Programming with ANSI and Turbo C | Ashok N. Kamthane | Pearson |
| 2. Let us C | Yashwant Kanetkar | BPB |
| 3. The C Programming Language | Kernighan & Ritchie | PHI |
| 4. Programming in C | Pradip Dey & Manas Ghosh | Oxford |

B. TECH 1st SEMESTER	L	T	P	C
	1	-	4	3
16ME1T01: Engineering Drawing				

COURSE OBJECTIVE

Engineering drawing is the principle method of communication for engineers. The objective to introduce the students, the techniques of constructing the various types of polygons and curves. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

COURSE OUTCOMES

1. Usage of drawing instruments and construct polygons.
2. Understand the orthographic projections of points, lines and planes in different positions.
3. Understand the orthographic projections of Solids.
4. Convert the Orthographic projections into Isometric and vice versa.

UNIT - I

INTRODUCTION: Engineering Drawing and Plane Curves, Use of Drawing Instruments and Conventions.

GEOMETRICAL CONSTRUCTIONS: Constructions of Polygons using General Method.

CONICS: Construction of Ellipse, Parabola and Hyperbola by Eccentricity Method.

CYCLOIDAL CURVES: Construction of Cycloid, Epi-Cycloid and Hypo-Cycloid.

UNIT - II

PROJECTIONS OF POINTS AND LINES: Introduction to Orthographic Projections - Projection of Points.

PROJECTION OF STRAIGHT LINES: Parallel to both the Planes, Parallel to One Plane and Inclined to Other Plane, Inclined to Both the Planes.

UNIT – III

PROJECTIONS OF PLANES: Introduction to Perpendicular Planes, Perpendicular to both the Reference Planes, Perpendicular to One Plane and Parallel to Other Plane, Perpendicular to One Plane and Inclined to Other Plane, Inclined to Both the Reference Planes.

UNIT – IV

PROJECTIONS OF SOLIDS: Projections of Simple Solids like Prism, Cylinder, Pyramids and Cones. Projections of Solids with Axis Perpendicular to one Plane, Projections of Solids with Axis Parallel to Both the Planes.

UNIT – V

PROJECTIONS OF SOLIDS – AXIS INCLINED TO ONE PLANE: Projections of Solids with Axis inclined to one plane and parallel to other Plane (Axis inclined to the VP and Parallel to the HP, Axis Inclined to the HP and Parallel to the VP).

UNIT – VI

ISOMETRIC PROJECTIONS: Principles of Isometric Projections - Isometric Scale, Isometric Projections of Planes, Simple Solids, Conversion of Isometric to Orthographic Views and Vice Versa.

Text Books:

1. Engineering Drawing by N.D. Bhatt, Charotar Publishers.
2. Engineering Drawing by K.L. Narayana & P. Khannaiah., SCIETECH Publishers.

Reference Books:

1. Engineering Drawing by M.B. Shah & B.C. Rana., Pearson's Publishers.
2. Engineering Drawing by K. Venugopal., NEW AGE Publications.

B. TECH 1st SEMESTER	L	T	P	C
	-	-	4	2
16BS1L01: English Proficiency Lab				

ENGLISH PROFICIENCY LAB

COURSE DESCRIPTION

Communicating in a language is also a skill. So a student has to look for an opportunity to practice English language in order to acquire proficiency in English. 'Strengthen your Communication Skills: Part - A' is designed to provide opportunities for engineering students to revise and consolidate the basic skills in listening, speaking, reading and writing in addition to giving ample practice in various communicative functions and Life skills.

PREREQUISITES

The student is expected to have basic knowledge in English language and must be able to write in English. He is also expected to possess fundamental knowledge of general English grammar and vocabulary.

COURSE OBJECTIVES

1. To improve the language proficiency of technical under graduates in English with emphasis on LSRW Skills.
2. To provide learning environment to practice Listening, Speaking, Reading and Writing Skills within and beyond the classroom environment.
3. To assist students to carry on the tasks and activities through guided instructions and materials.
4. To effectively integrate English language learning with employability skills and training.
5. To design the main course material and exercises with authentic materials drawn from everyday use to cater to everyday needs.
6. To provide hands-on experience through case-studies, mini-projects, group and individual presentations.

COURSE OUTCOMES

a) Reading Skills.

- Addressing explicit and implicit meaning of a text.
- Understanding the context.
- Learning new words and phrases.
- Using words and phrases in different contexts.

b) Writing Skills:

- Using the basic structure of a sentence.
- Applying relevant writing formats to create paragraphs, essays, letters, E-Mails, reports and presentations.
- Retaining a logical flow while writing.
- Planning and executing an assignment creatively.

c) Interactive skills:

- Analyzing a topic of discussion and relating to it.

- Participating in discussions and influencing them.
- Communicating ideas effectively.
- Presenting ideas coherently within a stipulated time.

d) Life Skills and Core Skills:

- Examining self-attributes and identifying areas that require improvement self diagnosis, self-motivation.
- Adopting to a given situation and developing a functional approach to find solutions-adaptability, problem-solving.
- Understanding the importance of helping others-community service, enthusiasm.

Syllabus

WEEK	TOPIC
1	UNIT- 1 Section-A Introduction to syllabus Greeting, Introducing and taking leave
2	UNIT- 1 Section-B Pure Vowels
3	UNIT- II Section-A Giving Information and Asking for information
4	UNIT- II Section-B Diphthongs
5	UNIT- III Section-A Inviting, Accepting and Declining Invitations
6	UNIT- III Section-B Consonants
7	UNIT- IV Section-A Commands, Instructions and Requests
8	UNIT- IV Section-B Accent and Rhythm
9	UNIT- V Section-A Suggestions and Opinions
10	UNIT- V Section-B Intonation
10WEEKS	TOTAL

Text Books:

Strengthen Your Communication Skills: Part – A by Maruthi Publications.

Reference Books:

- 1) INFOTECH English (Maruthi Publications)
- 2) Personality Development and Soft Skills (Oxford University Press, New Delhi)

B. TECH 1 st SEMESTER	L	T	P	C
	-	-	4	2

16BS1L03: Engineering Physics Lab

List of Experiments

Any Ten Experiments of the Following

A. Mechanics:

1. Determination of the Rigidity Modulus of given material wire using Torsional Pendulum.
2. Determination of the Acceleration due to Gravity and Radius of Gyration using Compound Pendulum.
3. Determination the Frequency of vibration in Transverse and Longitudinal Modes using Melde's Apparatus.
4. Determination Frequency of A.C supply by using Sonometer

B. Optics:

5. Determination of wavelength of Laser using diffraction grating.
6. Determination of Numerical Aperture of an Optical Fiber.
7. Determination of the Planck's constant using Photo-Cell.

C. Electro-Magnetism and Electronics:

8. Study the variation of Magnetic Field along the axis of a solenoid coil using Stewart-Gee's Apparatus.
9. Determination of the Time Constant for a C-R Circuit.
10. Determination of the Band Gap of a Semiconductor using a p-n junction diode.
11. Study of Characteristic curves (I/V) of a Zener diode to determine its Breakdown voltage.
12. Determination of Thermoelectric coefficient of a Thermistor by using its Characteristic curve.

Reference Book:

1. Engineering Physics Lab Manual Prepared by Physics Faculty.

B. TECH 1st SEMESTER	L	T	P	C
	-	-	4	2
16CS1L01: C Programming Lab				

COURSE OUTCOMES

Having successfully completed the module, student be able to:

- Write, Compile and Debug basic C programs using an IDE and using a workstation
- Write basic C programs using
 - Selection statements
 - Repetitive statements
 - Arrays
 - Functions
 - Pointers
 - Strings
 - Structures
 - Unions
 - Files

EXERCISE-I

- 1) Identify different components of a computer system. Write about them.
- 2) Prepare block diagram of mother board of a PC and describe each component.
- 3) Prepare algorithm for sequence and selection control structures.
- 4) Prepare algorithm for iterative control structure
- 5) Draw flowcharts for control structures (sequence, selection & iterative).

EXERCISE-II

- 1) Demonstrate the structure of C program
- 2) Write a C program to find the size of basic data types in C language.
- 3) Write a C program to find the biggest of three numbers using ternary operator.
- 4) Write a C program to convert decimal number to binary number using bitwise operators.

EXERCISE-III

- 1) Write a C program to find the biggest of three numbers using nested if-else statement.
- 2) Write a C Program to find the roots of a quadratic equation.
- 3) Write a C program to perform arithmetic operations using switch statement.
- 4) Write a C program to calculate the electricity bill using else-if ladder statement.
- 5) Write a C program to find the sum of elements of an integer array.

EXERCISE-IV

- 1) Write a C program to find the smallest and largest elements of an integer array.
- 2) Write a C program to perform matrix addition by checking compatibility.
- 3) Write a C program to perform matrix multiplication by checking compatibility.

- 4) Write a C program to generate the prime numbers up to n.

EXERCISE-IV

- 1) Write a C program to find given number is Armstrong number or not
- 2) Write a C program to find the length of the string without using string functions.
- 3) Write a C program to check the given string is palindrome or not without using string functions.
- 4) Write a C program to perform string operations using string handling functions.

EXERCISE-VI

- 1) Write a C program to find the square of a number using function and macro.
- 2) Write a C program to demonstrate the use of static storage class.
- 3) Write a C program to pass array to function and count the sum of elements in the array.

EXERCISE-VII

- 1) Write C functions to generate Fibonacci series with and without using recursion.
- 2) Write C functions to factorial with and without using recursion.
- 3) Write C functions to GCD of two numbers with and without using recursion.

EXERCISE-VIII

- 1) Write a C program to find address of a variable and a pointer variable.
- 2) Write a C functions to swap two numbers using call by value and call by reference
- 3) Write a C program to print employee details using structures and array of structures.

EXERCISE-IX

- 1) Write a C program to read and write individual characters to a file.
- 2) Write a C program to copy contents of one file to another.
- 3) Write a C program to reverse the contents in a file.
- 4) Write a C program to merge two files into third file.

B. TECH 2 nd SEMESTER	L	T	P	C
	3	-	-	3

16BS2T01: Proficiency Course in English -II

COURSE OBJECTIVES

1. To improve the language proficiency of technical under graduates in English with emphasis on LSRW Skills.
2. To provide learning environment to practice Listening, Speaking, Reading and Writing Skills within and beyond the classroom environment.
3. To assist students to carry on the tasks and activities through guided instructions and materials.
4. To effectively integrate English language learning with employability skills and training.
5. To design the main course material and exercises with authentic materials drawn from everyday use to cater to everyday needs.
6. To provide hands-on experience through case –studies, mini –projects, group and individual presentations.

CORUSE OUTCOMES

a) Reading Skills.

- Addressing explicit and implicit meaning of a text.
- Understanding the context.
- Learning new words and phrases.
- Using words and phrases in different contexts.

b) Writing Skills:

- Using the basic structure of a sentence.
- Applying relevant writing formats to create paragraphs, essays, letters, e-mails, reports and presentations.
- Retaining a logical flow while writing.
- Planning and executing an assignment creatively.

c) Interactive skills:

- Analyzing a topic of discussion and relating to it.
- Participating in discussions and influencing them.
- Communicating ideas effectively.
- Presenting ideas coherently within a stipulated time.

d) Grammar in context

- Enable the skills of grammar using in a situation
- Identifying the needs of apt grammar in life related situation
- Promoting discourse with grammar effectively

Syllabus:

S No	Content	Hours
UNIT-I	Inspiring speech One word substitutes Subject- verb agreement Describing objects	8
UNIT-II	Dial 000 Commonly confused words Voice Paragraph writing	8
UNIT-III	My Struggle for Education Collocations Reported speech Letter writing	8
UNIT-IV	A Snake in the grass GRE words Conditional clauses Note making and note taking	8
UNIT-V	Lithuania Idioms Degrees of comparison Resume	8
UNIT-VI	Virtue Phrasal verbs Simple compound and complex sentences Report writing	8
	Total	48

Text Book: Proficiency Course in English -II by Maruti Publications.

B. TECH 2nd SEMESTER	L	T	P	C
	3	-	-	3
16MA2T01: Linear Algebra & Vector Calculus				

PREREQUISITES

The two year intermediate course of Mathematics.

OBJECTIVES

1. To train the students for finding Rank –Echelon form, Normal form, and solution of liner systems – Direct Methods- Gauss Elimination, Gauss Jordon.
2. To train the student effectively how to find Eigen values, Eigen vectors and their properties.
3. To make the student to know the Cayley Hamilton Theorem-Applications: Finding Inverse and powers of a matrix by using Cayley-Hamilton theorem.
4. To evaluate many improper integrals easily by using Beta and Gamma functions.

OUTCOMES

The students are able to

1. Apply the knowledge of matrices for solving linear system of equations
2. Find the powers of the matrices by using Cayley Hamilton theorem.
3. Apply the knowledge of evaluate improper integrals by using Beta and Gamma functions.
4. Apply the knowledge of Vector Differentiation and Vector Integration in finding work done by a force.

Syllabus:

UNIT I: Linear systems of equations

Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods- Gauss Elimination, Jacobi and Gauss Seidel Method.

UNIT II: Eigen values - Eigen vectors

Eigen values - Eigen vectors - Properties (without proof)-Cayley-Hamilton Theorem (without proof) Applications: Finding Inverse and powers of a matrix by using Cayley-Hamilton theorem.

UNIT III: Special functions

Beta and Gamma functions - Properties - Relation between Beta and Gamma functions Application: Evaluation of improper integrals.

UNIT IV: Multiple integrals

Multiple integrals - Double and triple integrals - Change of variables - Change of order of Integration. Application: Applications of Integration to Lengths, Volumes and Surface areas of solids of revolution in Cartesian Coordinates.

UNIT V: Vector Differentiation

Gradient-Divergence- Curl - Laplacian and second order operators -Vector identities.

UNIT VI: Vector Integration

B.TECH/CSE/2016 (CBCS)

Line integral - work done - Potential function - area - surface and volume integrals.

Vector integral theorems: Greens, Stokes and Gauss Divergence Theorems (without proof) and related problems.

Application: Work done by a force

Text Books:

1. **B.S. GREWAL**, Higher Engineering Mathematics, 42nd Edition, Khanna Publishers
2. **B.V. RAMANA**, Higher Engineering Mathematics, Tata McGraw Hill

Reference books:

1. ERWIN KREYSZIG, Advanced engineering Mathematics, 9th Edition, Wiley-India

B. TECH 2nd SEMESTER	L	T	P	C
	3	-	-	3
16MA2T02: Numerical Methods & Integral Transforms				

PREREQUISITES

The two year intermediate course of Mathematics.

COURSE OBJECTIVES

1. To give a good training to the student in each topic and method.
2. To get the good results of the student in competitive examinations like GRE, GATE etc., by training in this context.
3. To develop the skills of the student to solve the different mathematical methods efficiently to meet the needs of solving the different mathematical models involving in real world process and engineering.
4. To motivate the student for innovating ideas by learning mathematical methods in the context of the real world applications and the need of the world.
5. To produce the competent engineers and professional, to meet the needs of industries in the context scenario.

COURSE OUTCOMES

Students are able to

1. Solve the algebraic and transcendental equations by different methods and also know the different interpolation formulae to find a polynomial or the value of the polynomial at a given point.
2. Find the quadrature, the solutions of ODEs by different formulae.
3. Solve the problems on Z-transforms and Fourier transforms.
4. Interpret a function as a Fourier series.

Syllabus

UNIT-I

Solution of Algebraic and Transcendental Equations: Introduction - Bisection Method - Method of False Position - Iteration Method - Newton Raphson Method.

UNIT-II

Interpolation: Introduction - Finite differences - Forward Differences Backward differences - Central differences - Symbolic relations, Differences of a polynomial - Newton's formulae for interpolation - Lagrange's Interpolation formula for unevenly spaced points.

UNIT-III

Numerical integration and solution of ordinary differential equations: Numerical Integration: Trapezoidal rule - Simpson's 1/3 rule - Simpson's 3/8 rule, Numerical Solution of Ordinary Differential Equations: Solution by Taylor's series method - Euler's Method - Euler's Modified Method - IV order Runge Kutta Method

UNIT-IV

Z-Transform: Introduction - properties - Damping rule - Shifting rule - Initial and final value theorems - Inverse z transform- -Convolution theorem.

Applications: Solution of difference equations by Z-transforms.

UNIT – V

Fourier Series: Introduction- Determination of Fourier coefficients - even and odd functions - change of interval - Half-range sine and cosine series

UNIT – VI

Fourier Transforms: Fourier integral theorem (statement only) - Fourier Transforms, Fourier sine and cosine transforms - properties - inverse transforms - Finite Fourier transforms.

Text Books:

1. **B.S. GREWAL**, Higher Engineering Mathematics, 42nd Edition, Khanna Publishers.
2. **B.V. RAMANA**, Higher Engineering Mathematics, Tata McGraw Hill.

Reference Books:

1. S. S. Sastri (PHI), Introductory Methods of Numerical Analysis 5th Edition.
2. ERWIN KREYSZIG, Advanced Engineering Mathematics, 9th Edition, Wiley-India

B. TECH 2nd SEMESTER	L	T	P	C
	3	-	-	3
16BS2T02: Engineering Chemistry				

COURSE OUTCOMES

1. Student able to understand how to produce soft water by various methods.
2. Student can learn about nature and working various electrodes and cells.
3. Student can able to understand how to protect metals from the environment
4. Student can able to know how to check the quality of coal, by using proximate and ultimate analysis. Student can calculate the various fuels HCV & LCV. Student can know how to about liquid and gaseous fuels and its characteristics.
5. Student can able to understand the properties of polymers, plastics and Elastomers and wide usage of polymers in their daily life.
6. Student can able to understand how to preparation, properties and applications of carbon Nanotubes. Student can able to know the Basic Principles in Green Chemistry.
7. Student can able understand how to cement taking place the hardening and softening of cement. Student can know the types, properties and working of Refractories at various temperatures. Student can able to know that the solar energy used in the various fields

Syllabus

UNIT I WATER TECHNOLOGY

Hard Water – Estimation of Hardness By EDTA Method – **Potable Water**- Sterilization and Disinfection – Boiler Feed Water – **Boiler Troubles** – Priming And Foaming , Scale Formation, Boiler Corrosion, Caustic Embrittlement – **Softening of Water** - By Lime Soda, Zeolite Processes – Ion Exchange Process – Desalination Process by - Reverse Osmosis – Electro Dialysis.

UNIT II ELECTRO CHEMISTRY

Electro Potential –Determination of single electrode potential –Standard electrode potential - Nernst Equation(problems)–Electro Chemical cell (Galvanic Cell) -**Reference Electrodes**-Standard Hydrogen Electrode, Calomel Electrode Determination of pH and conductivity – Applications (Strong Acid Vs Strong Base) - **Batteries** – Primary Cell: Dry Cell – Secondary Cell: Lead Acid Accumulator, Lithium Ion Battery – **Fuel Cells** – Hydrogen – Oxygen Fuel Cell, Methanol – Oxygen Fuel Cell.

UNIT III CORROSION

Introduction - **Theories of Corrosion**(i) Dry Corrosion (Pilling Bed worth rule) (ii) Wet Corrosion – Galvanic Series – **Types of Corrosion**: Galvanic Corrosion, Differential Aeration Corrosion, Pitting Corrosion, Stress Corrosion – Factors Influencing Corrosion – Nature of The Metal , Nature of The Environment – **Corrosion Control**: Material Selection & Design –Cathodic Protection- Surface Coatings – Methods of Applications on Metals -Hot Dipping , Electroplating, Electroless Plating – Paints – Their Constituents & Their Function.

UNIT-IV FUELS

Introduction to Fuels – Classification – **Solid Fuels** Merits & Demerits - Calorific Value – HCV and LCV – Bomb Calorimeter - Problems Based on Calorific Values – Analysis of Coal (Proximate and Ultimate

Analysis) – Numerical Problems Based on Analysis – **Liquid Fuels** Merits & Demerits – Petroleum – Refining – Cracking(types) –Petrol – Diesel Knocking – Octane Number, Cetane Number - **Gaseous Fuels** Merits & Demerits – Natural Gas – LPG, CNG.

UNIT-V POLYMERS SCIENCES & TECHNOLOGY

POLYMERS- introduction – Types of Polymers – Mechanism of Polymerization (Addition and Condensation) – Determination of Molecular weight by weight and number average methods - Individual Polymers (Preparation Properties and uses of PS, PVC and Bakelite) – Biodegradable polymers – Ziegler Natta Catalysis. **PLASTICS** – Types – Compounding of Plastics – Moulding (Four Types) - Bullet Proof Plastics – Engineering Applications.

RUBBER & ELASTOMERS: Introduction –Preparation – Vulcanization – Compounding of Rubber – Preparation, Properties Uses of Buna-S, Buna-N and Thiokol-Engineering Applications.

UNIT VI ENGINEERING MATERIALS, GREEN AND NANO CHEMISTRY

Refractories (Types, Properties Applications) – **Cement**-Hardening and Setting-Deteriorations of cement concrete – **Solar Energy Materials** – Introduction - Advantages and Disadvantages – Construction and Working of Photovoltaic cell – Solar Reflectors - **Carbon Nano tubes** - Preparation (Arc discharge, Laser Ablation, Chemical Vapor Deposition (CVD) methods), Properties & Applications – **Green Chemistry** – Principles -Engineering Applications.

Text Books:

1. N. Y. S. Murthy, V. Anuradha, K Ramana Rao” A Text Book of Engineering Chemistry”, Matuthi.
2. K.Sesha Maheswaramma and Mridula chugh (2013) A Text Book of Engineering Chemistry, Pearson Publications.

Reference Books:

1. Shashi Chawal “A Text Book of Engineering Chemistry, Dhanpat Rai Publishing company Ltd.
2. S. S. Dara (2013) Text Book of Engineering Chemistry, S. Chand Technical Series.

B. TECH 2nd SEMESTER	L	T	P	C
	3	-	-	3
16CS2T01: Object Oriented Programming Through C++				

COURSE DESCRIPTION

This course is a comprehensive hands-on introduction to object oriented programming in C++ for students. Emphasis is placed on the features of C++ that support effective modeling of the problem domain and reuse of code and provides in-depth coverage of object-oriented programming principles and techniques using C++. Topics include classes, overloading, data abstraction, information hiding, encapsulation, inheritance, polymorphism, file processing, and exceptions.

PREREQUISITES

Knowledge of C programming.

COURSE OBJECTIVES

1. To enable the student to learn Object oriented technology.
2. To enable the student to understand concepts of objects and their importance in real world.
3. To Design classes and inheritances
4. To know how to handle Data through files
5. To know how to handle exceptions.
6. To provide practical, hands-on training in C++ programming.

COURSE OUTCOMES

The student will be proficient in the following:

1. Principles of object oriented technology.
2. The Evolution and Purpose of Object Oriented Programming.
3. Mastering in basic Object Oriented programming concepts and logic implementations.
4. Knowledge in file I/O operations and exceptions
5. Ability to identify and implement appropriate Solution for a given Problem.\
6. Know the terms "Object oriented Programming", "Class" ,"Object" ,"Constructor", "Destructor", "friend", "static" , "Data Abstraction", "Encapsulation", " Inheritance", " Polymorphism", " File I/O", " Exceptions" and where they are applicable.

Syllabus

UNIT-I

INTRODUCTION: The Object Oriented Technology, Disadvantages of Conventional Programming, Advantages of OOP. Structure of a C++ Program, Differences between C and C++, Header Files and Libraries.

INPUT AND OUTPUT IN C++: Streams, Stream Classes Hierarchy, Bit Fields, Manipulators.

UNIT-II

Tokens in C++, Variable Declaration and Initialization, Data Types, Constants, L Value and R Values, Operators in C and C++, Scope Access Operator, Comma Operator, This Operator, Reference Variable, Decision and Loop Statements.

B.TECH/CSE/2016 (CBCS)

FUNCTIONS IN C++: Structure of a Function, Passing Arguments, Return by Reference, Default Arguments, Const Arguments, Inputting Default Arguments, Inline Functions, Function Overloading, Recursion.

UNIT-III

CLASSES AND OBJECTS: Class Definition, Declaring Objects, Access Specifiers and their scope, Member functions, Outside member functions as inline, Data Hiding or Encapsulation, Memory for Class and Objects, Static Member variables, Static Member Functions, Static Object, Array of Objects, Objects as Function Arguments, Friend Functions, Friend class, Local class, Empty Class, Qualifiers and Nested Classes, Member Function and Non-Member Function.

UNIT-IV

CONSTRUCTORS AND DESTRUCTORS: Introduction of Constructor, Characteristics, Applications, Parameterized Constructors, Overloading Constructors, Constructor with Default Arguments, Copy Constructor and Destructors.

OPERATOR OVERLOADING: Introduction of Overloading, Overloading Unary Operators, Constraint on Increment and Decrement Operators, Overloading Binary Operators, Overloading with Friend Functions, Overloading Assignment Operator, Rules for Overloading Operators.

UNIT-V

INHERITANCE : Introduction of Inheritance, Access Specifiers, Protected Data with Private Inheritance, Types of Inheritances, Virtual Base Class, Constructors and Destructors in Inheritance, Constructor and Destructor in Derived Class, Advantages and Disadvantages of Inheritance.

POLYMORPHISM: Polymorphism, Types, Pointer and Inheritance, Virtual and Pure Virtual Functions, Abstract Classes.

UNIT-VI

APPLICATIONS WITH FILES: File Stream Classes, File Opening Modes, File Pointers and Manipulators, Sequential Access Files, Binary and ASCII Files, Random Access Files.

EXCEPTION HANDLING: Principles of Exception Handling, Keywords, Exception Handling Mechanism, Multiple Catch Statements, Catching Multiple Exceptions.

Text Books:

1. Programming in C++, Ashok N Kamthane, Pearson 2nd Edition

References Books:

1. Object Oriented Programming C++, Joyce Farrell, Cengage.
2. Mastering C++, Venugopal, Raj Kumar, Ravi Kumar TMH.
3. Object Oriented Programming with C++, 2nd Ed, SouravSahay, and OXFORD.

B. TECH 2 nd SEMESTER	L	T	P	C
	3	-	-	3

16BS2T04: Environmental Science

COURSE OBJECTIVES

The objectives of the course is to impart

1. Overall understanding of the natural resources.
2. Basic understanding of the ecosystem and its diversity.
3. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
4. An understanding of the environmental impact of developmental activities.
5. Awareness on the social issues, environmental legislation and global treaties.

COURSE OUTCOMES

After completion of the course student able to understand:

1. The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources.
2. The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web.
3. The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity.
4. Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
5. Social issues both rural and urban environment and the possible means to combat the challenges.
6. The environmental legislations of India and the first global initiatives towards sustainable development.
7. About environmental assessment and the stages involved in EIA and the environmental audit.

Syllabus:

UNIT – I

Multidisciplinary nature of Environmental Science: Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion.

UNIT - II

Natural Resources: Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT – III

Ecosystem and its conservation: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT-IV

Biodiversity and its management: Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT –V

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies.

Solid Waste Management: Sources, classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products.

UNIT - VI

Social Issues: Population growth and explosion, effects. Water conservation, rain water harvesting. Role of information Technology in Environment and human health. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act – Motor Vehicle Act - Issues involved in enforcement of environmental legislation.

Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Field work: visit to an industrial area/ecosystem area (Forest, Grassland, Desert, and Aquatic)

Text Books:

1. Environmental Studies by K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada
2. A text book of Environmental Studies by C. P. Kaushik & Anubha Kaushik, New Age International Publishers.

Reference Books:

1. Text Book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. A text book of Environmental Studies by Shaashi Chawla, TMH, New Delhi.

B. TECH 2nd SEMESTER	L	T	P	C
	-	-	4	2
16BS2L01: English Communication Skills Lab				

COURSE DESCRIPTION

Communicating in a language is also a skill. So a student has to look for an opportunity to practice the language he is learning in order to acquire communication skills. 'Strengthen your Steps' is designed to provide opportunities for engineering students to revise and consolidate communication skills in different contexts formal and informal. It prepares the student for facing Interviews, participating in group discussions and making presentations.

PREREQUISITES

The student is expected to have basic knowledge in English language and must be able to write in English. He is also expected to possess fundamental knowledge of general English grammar and vocabulary.

Syllabus and Lesson Plan

No. of Sessions	Name of the Topic
2	Unit - 6 Body Language
2	Unit - 7 Dialogues
2	Unit - 8 Presentation Skills
2	Unit - 9 Group Discussion
2	Unit - 10 Interviews and Telephonic interviews.
2	Unit - 11 Debates
12	Total

Text Book:

1. Strengthen Your Communication Skills – Maruthi Publications.

Reference Books:

1. Effective technical communication – Ashraf Rizvi.
2. A course in English communication – Madhavi Apte.

B. TECH 2nd SEMESTER	L	T	P	C
	-	-	4	2
16BS2L02: Engineering Chemistry Lab				

List of Experiments

S. No	TITLE
	Introduction to chemistry lab
1	Estimation of HCl using standard Na ₂ CO ₃
2	Determination of Total hardness of water
3	Estimation of Ferric iron
4	Estimation of KMnO ₄ using standard H ₂ C ₂ O ₄
5	Estimation of Dissolved Oxygen by Winkles Method
6	Determination of pH by pH – Meter and universal indicator Method
7	Conductometric titration of Strong acid Vs Weak base
8	Conductometric titration of strong acid Vs Strong base
9	Potentiometric titration of Strong acid Vs Strong base
10	Potentiometric titration of Strong acid Vs Weak base
11	Preparation of Phenol-Formaldehyde Resin
12	Determination of saponification value of oils
13	Determination of Pour and Cloud point of oils

Text Books:

1. Engineering Chemistry Lab Manual Prepared by Chemistry Faculty.

Reference Book:

1. Dr. Jyotsna Cherukuis(2012)Laboratory Manual of Engineering Chemistry-II, VGS Techno Series
2. K. Mukkanti (2009) Practical Engineering Chemistry, B. S. Publication .

B. TECH 2nd SEMESTER	L	T	P	C
	-	-	4	2
16CS2L01: Object Oriented Programming Through C++ Lab				

EXERCISE-1

- 1) Write a CPP Program to demonstrate the structure of a C++ program.
- 2) Write a CPP Program to display the names of header files, definitions and list of functions supported.
- 3) Write a program to show the base of a numeric value of a variable using **Hex, Oct** and **Dec** manipulator functions.
- 4) Write a CPP Program to use of the standard manipulators normally used in the stream classes.
- 5) Write a CPP Program to demonstrate the usage of bit fields.

EXERCISE-2

- 1) Write a CPP Program to define constant pointer and pointer to constant and perform possible operations.
- 2) Write a CPP Program access a variable in different scopes by using scope resolution operator and the use of comma operator.
- 3) Write a CPP Program to swap two numbers using call by value, call by address, call by reference and return by reference.
- 4) Write a CPP Program to calculate square and cube of a number using inline functions and macros. (Demonstrate the use of inline functions compared to macros).
- 5) Write a CPP Program to find the area of a rectangle, a triangle and surface area of a sphere using function overloading.

EXERCISE-3

- 1) Write a CPP Program to declare all members of a class as public, Access the members using objects. (Use public, protected, private).
- 2) Write a CPP Program to access the member functions inside and outside a class.
- 3) Write a CPP Program to access private data using non-member functions. (Use friend function).
- 4) Write a CPP Program to pass objects to functions by pass by value method.
- 5) Write a CPP Program to declare main () function as member function and overload it.

EXERCISE-4

- 1) Write a CPP Program to show that “for each object constructors is called separately” and read the values through keyboard (Use Constructor).
- 2) Write a CPP Program to create constructor with arguments and pass the arguments to constructor.
- 3) Write a CPP Program to create object and release them using destructor.
- 4) Write a CPP Program to perform addition, subtraction, multiplication of two objects using operator keyword.
- 5) Write a CPP Program to overload unary and binary operator overloading with friend function.

EXERCISE-5

- 1) Write a CPP Program to derive a class publicly from base class. Declare base class members under public, private and protected.
- 2) Write a CPP Program to derive single and multiple inheritances.
- 3) Write a CPP Program to declare virtual base class. Derive a class using two virtual classes.
- 4) Write a CPP Program to implementation of Virtual Function.
- 5) Write a CPP Program to Implementation of Pure Virtual Function.

EXERCISE-6

- 1) Write a CPP Program to write and read text in a file. Use of stream and if stream classes.
- 2) Write a CPP Program to open a file for writing and reading purpose. Use open () function.
- 3) Write a CPP Program write text in a file. Read the text from the file from EOF. Display the contents in reverse order.
- 4) Write a CPP Program to demonstrate that the data is read from file using ASCII format.
- 5) Write a CPP Program to find the factorial of a number. Throw multiple exceptions and define multiple catch statements to handle exceptions.

B. TECH 3 rd SEMESTER	L	T	P	C
	3	-	-	3

16EC3T04: Digital Logic Design

COURSE OBJECTIVES

The course is designed with the objective to:

1. To solve a typical number base conversions
2. To optimize logic gates for digital circuits using various techniques
3. To apply knowledge of adders for higher order digital circuits.
4. To develop advanced sequential circuits
5. To identify new areas for applying the knowledge of flip-flops

COURSE OUTCOMES

After the successful completion of this course, students will be able to

1. Be able to distinguish number systems and digital codes.
2. Be able to explain the function of various logic gates.
3. Become adept at solving logic functions for economical design of logic circuits.
4. Learn to analyze and design various types of combinational and sequential circuits.

UNIT -I

Number Systems: Binary, Octal, Decimal, Hexadecimal Number Systems. Conversion Of Numbers from One Radix to another Radix, r 's Complement and $(r-1)$'s Complement Subtraction Of Unsigned Numbers, Problems, Signed Binary Numbers, Weighted and Non-weighted codes.

Logic Gates and Boolean Algebra: Basic Gates: NOT, AND, OR, Boolean Theorems, Universal Gates, EX-OR and EX-NOR Gates, Complement and dual of logic functions. Minimizations Of Logic Functions, Multilevel Realization Of Logic Functions.

UNIT-II

Gate-Level Minimization: Karnaugh Map Method (K-Map): Minimization Of Boolean Functions up to four variables, POS and SOP Simplifications with don't care conditions using K map

Combinational Arithmetic Logic Circuits: Design Of Half Adder, Full Adder, Half Subtractor, Full Subtractor, Ripple Adders and Subtractors, Ripple Adder/Subtractor, Carry Look Ahead Adder, Binary Multiplier.

UNIT-III

Combinational Logic Circuits: Design of Decoders, Encoders, Multiplexers, Demultiplexers, Higher Order Demultiplexers and Multiplexers, Realization Of Boolean Functions Using Decoders and Multiplexers, Priority Encoders, Code Converters, Magnitude Comparator.

UNIT-IV

Programmable Logic Devices: PLA, PAL, PROM. Realization of Switching Functions Using PROM, PAL and PLA. Comparison of PLA, PAL and PROM. Programming Tables of PLA, PAL and PROM.

UNIT-V

Introduction to Sequential Logic Circuits: Classification, Basic Sequential Logic Circuits: Latch and Flip-Flop, RS- Latch. RS, JK, T and D Flip flops, truth tables & excitation tables. Conversion of Flip Flops. Flip Flops with Asynchronous Inputs (Preset and Clear).

UNIT-VI

Registers and Counters: Design of Registers, Buffer Register, Control Buffer Registers, Bidirectional Shift Registers, Universal Shift Register, Design of Ripple Counters, Synchronous Counters and Variable Modulus Counters, Ring Counter, Johnson Counter.

Text Books:

1. Digital Design ,4/e, M.Morris Mano, Michael D Ciletti, PEA
2. Fundamentals of Logic Design, 5/e, Roth, Cengage

Reference Books:

1. Switching and Finite Automata Theory,3/e,Kohavi, Jha, Cambridge.
2. Digital Logic Design, Leach, Malvino, Saha,TMH
3. Verilog HDL primer, Jaya Bhaskar, PEA.

B. TECH 3rd SEMESTER	L	T	P	C
	3	1	-	4
16CS3T01: Data Structures				

COURSE OBJECTIVES

1. To impart the basic concepts of data structures and algorithms.
2. To gain knowledge of linear and non-linear data structures.
3. To familiarize with different sorting and searching techniques.

COURSE OUTCOMES

At the end of the course student able to

1. Implement single, circular and double linked list.
2. Implement stacks and queues using arrays and linked lists.
3. Implement various operations on binary trees.
4. Apply appropriate sorting and searching techniques for the given data.
5. Implement various operations on Graphs.

UNIT – I

Introduction- Concept of data structures, overview of data structures, implementation of data structures. Searching: Linear Search, Binary Search, Fibonacci search. Sorting (Internal): Basic concepts, Sorting by: insertion (Insertion sort), selection (selection sort), exchange (Bubble sort, quick sort), distribution (radix sort) and merging (merge sort).

UNIT – II

Stacks Representation using Arrays and Linked List, operations on stack, factorial calculation, evaluation of arithmetic expression.

UNIT – III

Queues Representation using Arrays and Linked List, operations on queues, circular queue, queue using stack.

UNIT – IV

Linked lists: Linked Lists- Single linked list, Circular linked list, Double linked list, Circular double linked list.

UNIT – V

Trees Binary Trees: Basic tree concepts, Properties, Representation of Binary Trees using Arrays and Linked List, Binary Tree Traversals, threaded binary tree. Binary search trees: Basic concepts, BST operations: Search, insertion, deletion and traversals, Creation of binary search tree from in-order and pre (post)order traversals.

UNIT – VI

Graphs Basic concepts, representations of graphs, operations on graphs- vertex insertion, vertex deletion, find vertex, edge addition, edge deletion, graph traversals (BFS & DFS)(No Programs required)

Text Books:

1. Richard F, Gilberg , Forouzan, Data Structures, 2nd edition, , Cengage.
2. Debasis samanta, Classic Data Structures, PHI, 2 nd edition, 2011.

Reference Books:

1. Seymour Lipschutz, Data Structure with C, TMH.
2. G. A. V. Pai, Data Structures and Algorithms, TMH, 2008.
3. Horowitz, Sahni, Anderson Freed, Fundamentals of Data Structure in C, University Press, 2nd edition.

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B. TECH 3rd SEMESTER	L	T	P	C
	3	1	-	4
16CS3T02: Database Management Systems				

COURSE OBJECTIVES

1. To understand the basic concepts and the applications of database systems.
2. To master the basics of SQL and construct queries using SQL.
3. To understand the relational database design principles.
4. To become familiar with the basic issues of transaction processing and concurrency control.
5. To become familiar with database storage structures and access techniques.

COURSE OUTCOMES

At the end of the course student able to

1. To understand the different issues involved in the design and implementation of a database system
2. Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data.
3. An ability to use different concurrency control techniques while implementing real time applications
4. An ability to Show how various kind of secondary storage devices to store data

UNIT-I

History of DBMS, File Systems vs DBMS, Advantages of DBMS, Describing and Storing Data in DBMS, Transaction Management, Structure of a DBMS, people who work with Databases, Database Design and ER Diagrams, Entities, Attributes and Entity Sets, Relationships and Relationship sets

UNIT-II

Additional Features of ER Models, Conceptual Design with ER Models, Conceptual Design for Large Enterprise. Relational Model- Introduction to Relational Model, Integrity constraints over relations, Enforcing Integrity constraints, Logical Database Design, Views.

UNIT-III

Relational Algebra-Selection and projection, Set Operators, Renaming, joins, divisions. Form of Basic SQL Query, Nested Queries, Correlated Nested Queries, Set Comparison Operators, Aggregate Operators, Logical Connectivity Operators, Joins and Types, introduction to Triggers.

UNIT-IV

Introduction to Schema Refinement, functional Dependencies, Normal forms-1NF, 2NF,3NF, BCNF, Properties of decompositions, Multivalued Dependencies, Fourth Normal Form and Fifth Normal Form, Transaction Management-ACID properties, Transaction and schedules, concurrent execution of transactions.

UNIT –V

Lock based Concurrency Control-Strict 2PL, Dead Locks. Concurrency Control without Locking, Crash Recovery-Introduction to ARIES, LOG, Write a Head Log Protocol, Check Point, Recovery from a System Crash.

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UNIT-VI

Data on External Storage, File Organization and indexing, Index Data Structures, Comparison of File Organizations, Tree structured indexing-Indexed Sequential Access Method, B+ trees.

Text Books:

1. Database Management Systems- Raghurama Krishnan, Johannes Gehrke, Tata McGraw-Hill., 3rd Edition.

Reference Books:

1. Database System Concepts, Silberschatz, Korth, McGraw hill, 5th edition.
2. Database Management Systems, Elmasri Navathe-5th Edition.

B. TECH 3rd SEMESTER	L	T	P	C
	3	-	-	3
16MA3T01: Discrete Mathematics				

Prerequisites

Subject needs the knowledge in fundamentals of sets and propositions, basic operations of sets, Basic counting principles, basic properties of binary operations.

COURSE OBJECTIVES

1. Enable the students to understand and create mathematical arguments and solving them with logical skills.
2. Enable the students to learn Recurrence Relations, how to solve and frame recurrence relation from real world problems and phenomena.
3. Enable the students to learn Set Theory, Graph Relations which are used in data structures and basic concepts of Graph Theory .
4. Enable the students to learn some basic concepts of Graph theory which is applied in diverse fields such as social, science, linguistics, etc.

COURSE OUTCOMES

At the end of the course students are able to

1. Differentiate and select either the direct method or contradiction method is suitable in order to prove a mathematical statement effectively.
2. Construct the problem in the language of sets and perform set operations on it to solve.
3. Apply various methods to solve Recurrence relations.
4. Solve problems using graphs and trees both quantitatively and qualitatively.

UNIT-I

Mathematical Logic: Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence, implication, Normal forms, Theory of inference for the statement calculus, Rules of inference, Consistency of premises and indirect method of proof.

UNIT-II

Predicate calculus: Predicates, statement functions, variables and quantifiers, predicate formulas, free & bound variables, universe of discourse, inference theory of predicate calculus.

UNIT-III

Set theory & Relations: Introduction, Relations and ordering, Properties of binary Relations, Equivalence, Compatibility Relations, Partial ordering, Hasse diagram, Principle of Inclusion-Exclusion, Pigeonhole Principle and its applications.

UNIT-IV

Recurrence Relations: Generating Function of Sequences, Calculating Coefficient of generating functions, Recurrence relations, Solving recurrence relation by substitution and Generating functions, the method of Characteristic roots, Solution of Inhomogeneous Recurrence Relation.

UNIT-V

Graph Theory: Basic Concepts, Representation of Graph, Sub graphs, Multigraphs, Euler Paths, Euler circuits, Hamiltonian Graphs and Graph Isomorphism and its related Problems.

UNIT-VI

Graph Theory and Applications: Chromatic Numbers, Spanning Trees, minimal Spanning Trees, BFS, DFS, Kruskal's Algorithm, Prim's Algorithm, Binary trees, Planar Graphs.

Text Books:

1. Discrete Mathematical Structures with Applications to computer science J.P Trembley, R. Manohar, TMH
2. Discrete Mathematical for computer Scientists & Mathematicians "J.L.Molt, A.Kandel, T.P.Baker, PHI

Reference Books:

1. Discrete Mathematics and its Applications, Kenneth .H. Rosen, 5th ed, T MGraw-Hill,2006.
2. Discrete Mathematical Structures, Kolman, Busby, Ross, 6th ed., PHI,2009
3. Discrete Mathematics with Combinatorics and Graph Theory, Santha, Cengage Learning, 2009

B. TECH 3rd SEMESTER	L	T	P	C
	3	-	-	3
16CS3T03: Software Engineering				

COURSE OBJECTIVES

1. To make the students learn about the basic concepts on software engineering methods and practices and their appropriate application in software industry.
2. To develop an understanding of software process models and Software Development Life Cycle.
3. To provide an idea on software testing techniques.
4. To teach an understanding role of the different aspects of Software Project Management.
5. To develop an approach on ethical and professional issues those are important for software project management.

COURSE OUTCOMES

At the end of the course student able to

1. Identify, formulate, and solve software engineering problems.
2. Elicit, analyze and specify software requirements with various stakeholders of a software development project.
3. Participate in design, development, deployment and maintenance of a medium scale software development project.
4. Convey technical material through oral presentation and interaction with an audience.
5. Evaluate the impact of potential solutions to software engineering problems in a global society, using the knowledge of models, tools, and techniques.

UNIT-I

Introduction to Software Engineering: The evolving role of software, Software Characteristics, Changing Nature of Software, Software myths.

A Generic view of Process: Software engineering- A layered technology, a Process framework, The Capability Maturity Model Integration (CMMI), Process assessment, Product and Process.

UNIT-II

Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

Software Requirements: User requirements, System requirements, Functional and non-functional requirements, the Software Requirements Document (SRS).

UNIT-III

Requirements Engineering Process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

Project planning and estimation: Project Planning Activities, Software Metrics and Measurements, Project Size Estimation, Effort Estimation Techniques: COCOMO, PERT/CPM method.

UNIT-IV

Design Engineering: Design process and Design quality, Design concepts, Software Architecture, Architectural Styles and Patterns.

Object-Oriented Design: Objects and object classes, An Object-Oriented design process, Design evolution

UNIT-V

Performing User Interface Design: Golden Rules, User interface analysis and design, interface design steps, Design evaluation.

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Validation testing, System testing , the art of Debugging, Black-Box and White-Box testing.

UNIT-VI

Risk management: Reactive vs Proactive risk strategies, Software risks, RMMM, RMMM Plan.

Quality Management : Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards, Metrics for software quality.

Text Books:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc GrawHill International Edition.
2. Software Engineering- Sommerville , 9th edition, Pearson education.
3. Software Engineering, concepts and practices, Ugrasen Suman, Cengage learning

Reference Books:

1. Software Engineering- K.K. Agarwal&Yogesh Singh, New Age International Publishers
2. Software Engineering, an Engineering approach- James F. Peters, WitoldPedrycz, John Wiely.
3. Systems Analysis and Design- ShelyCashmanRosenblatt,Thomson Publications.
4. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.

B. TECH 3rd SEMESTER	L	T	P	C
	-	-	4	2
16CS3L01: Data Structures Lab Using C				

COURSE OBJECTIVES

1. Develop program to implement linked lists, stacks, queues and binary search trees.
2. Implement searching and sorting algorithms.

COURSE OUTCOMES

At the end of the lab students are able to

1. Demonstrate the implementation of linked lists.
2. Implement stack and queue using arrays and linked lists.
3. Demonstrate applications of stack.
4. Demonstrate the implementation of binary search trees.
5. Implement different searching and sorting algorithms.

Note: Student has to complete at least 10 programs.

Write a c program for the following

Exercise – I

1. Use both recursive and non recursive functions to perform Linear search for a Key value in a given list.
2. Use both recursive and non recursive functions to perform Binary search for a Key value in a given list.

Exercise – II

3. Implement following techniques to sort a given list of integers in ascending order (i) Insertion sort (ii) Bubble sort (iii) Selection sort

Exercise - III

4. Implement following techniques to sort a given list of integers in ascending order. (i) Quick sort (ii) Merge sort

Exercise - IV

5. Implement stack (its operations) using arrays.

Exercise – V

6. To evaluate postfix expression.
7. To Convert infix expression into postfix expression.

Exercise – VI

8. Implement queue (its operations) using arrays.

Exercise – VII

9. Use functions to
 - (i) Create a singly linked list.
 - (ii) Insert an element into a singly linked list.

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(iii) Delete an element from a singly linked list.

Exercise - VIII

10. Implement stack (its operations) using Linked list
11. Implement Queue (its operations) using linked lists.

Exercise - IX

12. To reverse elements of a single linked list.
13. Use functions to
 - (i) Create a circular linked list.
 - (ii) Insert an element into a circular linked list.
 - (iii) Delete an element from a circular linked list.

Exercise - X

14. Use functions to
 - (i) Create a Doubly linked list.
 - (ii) Insert an element into a doubly linked list.
 - (iii) Delete an element from a doubly linked list.

Exercise - XI

15. To create a Binary Search Tree of integers, insert, delete and search integers into (from) Binary search tree.

Exercise - XII

16. Use recursive functions to traverse a binary search tree in preorder, inorder and postorder.

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	-	-	4	2
16CS3L02: Database Management Systems Lab				

List of Experiments

1. DDL and DML Commands.
2. Restricting and sorting the Data Base.
3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING Clause .
4. Queries using Conversion functions (to char, to number and to date), string functions (Concatenation, lpad , rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next day, add months, last day, months between, least, greatest, trunc, round, to char, to date).
5. Key constraints, Set operators, controlling user access commands .
6. Displaying Data from Multiple Tables
 - i) Equi join
 - ii) Non-Equi joins
 - iii) Outer joins
 - iv) Self joins
 - v) Cross joins
7. Sub queries, Views.
8. Creation of simple PL/SQL program which includes declaration section, executable section and Exception handling section.
9. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT-IN Exceptions, User defined Exceptions, RAISE- APPLICATION ERROR.
10. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.
11. Develop Programs using Triggers.
12. Develop programs using Cursors.

B. TECH 3rd SEMESTER	L	T	P	C
	-	-	4	2
16CS3L03: Software Engineering Lab				

COURSE OBJECTIVE

The Software Engineering lab will facilitate the students to develop a preliminary and practical understanding of software development process and tools .

COURSE OUTCOME

After completion of this lab student will be able to know about preparing SRS and how to generate test cases for software testing.

Take any real time problem and do the following experiments

1. Do the Requirement Analysis and Prepare SRS.
2. Draw the use case and class diagrams.
3. Using COCOMO model estimate effort.
4. Calculate effort using FP oriented estimation model.
5. Analyze the Risk related to the project and prepare RMMM plan.
6. Develop Time-line chart and project table using PERT or CPM project scheduling methods.
7. Draw E-R diagrams, DFD, CFD and structured charts for the project.
8. Design of Test cases based on requirements and design.
9. Prepare FTR

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	3	1	-	4
16CS4T01: Java Programming				

COURSE OBJECTIVES

1. Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc
2. Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc
3. Be aware of the important topics and principles of software development
4. Be able to use the Java SDK environment to create, debug and run simple Java programs.

COURSE OUTCOMES

At the end of the course student able to

1. An understanding of the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements.
2. Develop confidence for self education and ability for life-long learning needed for advanced java technologies.
3. Students will learn how to develop secure java applications
4. Demonstrate an ability to design and develop java programs, analyze, and interpret object oriented data and report results.

UNIT -I

Basics of Object Oriented Programming: Introduction to OOP: Paradigms of Programming Languages - Basic concepts of Object Oriented Programming – Differences between Procedure Oriented Programming and Object Oriented Programming - Objects and Classes – Data abstraction and Encapsulation, Inheritance, Polymorphism, Dynamic binding, Message communication – Benefits of OOP – Application of OOPs. Introduction to Java : History – Java features, Creating and Executing a Java program – Java Tokens: Keywords, Character set, Identifiers, Literals, Comments in Java program Separator – Java Virtual Machine (JVM).

UNIT -II

Java Basics Data types, variables, scope and life time of variables, arrays, operators, expressions, control Statements, type conversion and casting, simple java program, classes and objects – concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion and string handling methods.

UNIT -III

Inheritance: Defining a subclass – Deriving a sub class – Single Inheritance – Multilevel Inheritance – Hierarchical Inheritance – Overriding methods – Final variables and methods – Final classes - Abstract methods and classes – Visibility Control: public access, private access, protected. Member access rules, super keyword and abstract keyword.

UNIT-IV

Packages and Interfaces:

Packages: Defining, Creating and Accessing a Package, Understanding Class path, importing packages.

Interfaces: Defining an interface, implementing interface, Differences between classes and interfaces, variables in interface and extending interfaces.

UNIT-V

Exception handling: Concepts of exception handling, benefits of exception handling, exception hierarchy, usage of try, catch, throw, throws and finally keywords, built-in and user defined exceptions.

UNIT-VI

Multithreading: Define thread, Differences between multi threading and multitasking, Creating Threads, Running Thread, Life Cycle of a Thread, Thread Methods, ThreadPriority, Synchronization, Implementing runnable interface and thread groups.

Text Books:

1. Herbert Schildt: "Java The complete reference", 7th Edition, Tata McGraw Hill, 2011.
2. E.Balaguruswamy: "Programming with Java A Primer", 4th Edition, Tata McGraw Hill, 2009.

Reference Books:

1. Programming in Java by saurabh chaudhary , sachin malhotra, oxford edition.
2. Java: How to Program, 8/e, Dietal, Dietal, PHI
3. JAVA Programming, K.Rajkumar, Pearson.
4. Core JAVA, Black Book, NageswaraRao, Wiley, Dream Tech.

B. TECH 4th SEMESTER	L	T	P	C
	3	1	-	4
16CS4T02: Operating Systems				

COURSE OUTCOMES

At the end of the course student are able to

- 1: Define the Basic concepts about operating system and its functions.
- 2: Describe process management and CPU scheduling.
- 3: Explain concurrency control mechanisms.
- 4: Analyze memory management.
- 5: State Deadlocks and Write solution to it.
- 6: Describe file systems interface and Implementation

UNIT-I

Computer System and Operating System Overview: Overview of computer operating systems, operating systems functions, protection and security, distributed systems, special purpose systems, operating systems structures and systems calls, operating systems generation.

UNIT-II

Process Management: Process concept- process scheduling, operations, Inter process communication. Multi Thread programming models. Process scheduling criteria and algorithms, and their evaluation.

UNIT-III

Concurrency: Process synchronization, the critical- section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors, Synchronization examples

UNIT-IV

Memory Management: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation

Virtual Memory Management: Virtual memory, demand paging, page-Replacement, algorithms, Allocation of Frames, Thrashing

UNIT-V

Principles of deadlock: System model, deadlock characterization, deadlock prevention, detection and avoidance, recovery form deadlock,

UNIT-VI

File system Interface: The concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

File System implementation- File system structure, allocation methods, free-space management
Mass-storage structure overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling

Text Books:

1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Gagne 7th Edition, John Wiley.
2. Operating Systems' – Internal and Design Principles Stallings, Sixth Edition–2005, Pearson education

Reference Books:

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-BANG/Operating%20Systems/New_index1.html
2. Operating systems- A Concept based Approach-D.M.Dhamdhere, 2nd Edition, TMH
3. Operating System A Design Approach-Crowley, TMH.
4. Modern Operating Systems, Andrew S Tanenbaum 3rd edition PHI.

B. TECH 4th SEMESTER	L	T	P	C
	3	-	-	3
16EC4T05: Microprocessors and Microcontrollers				

COURSE OBJECTIVES

1. To impart the basic concepts of microprocessors and interfacing.
2. To give an understanding about the assembly level programming.
3. To introduce microcontrollers & advanced processors.

COURSE OUTCOMES

At the end of the course student able to

1. recall details about various microprocessors/microcontrollers architecture.
2. interface various peripherals to microprocessors/microcontrollers.
3. write assembly language programs.
4. build basic systems using microprocessor/microcontroller.

UNIT-1

Introduction and 8085 microprocessor: Introduction to Microprocessors and Microcomputers, Family of Intel processors. 8085 microprocessor – Features, Architecture, Register organization, Timing diagrams.

UNIT-II

8086 Microprocessor: Features, Architecture, Memory organization, Pin diagram, Minimum mode and Maximum mode of operations.

UNIT-III

8086 Programming: Addressing modes, Instruction set, Assembler directives, Procedures and Macros, Assembly language programming, Example programs.

UNIT-IV

Interfacing: 8255 PPI, Interfacing with 8086 – ADC, DAC, DC motor and stepper motor.

UNIT-V

8051 Microcontroller: Microprocessor Vs Microcontroller, 8051 – Features, Architecture, Pin diagram, Ports, Memory organization.

UNIT-VI

ARM Processor: ARM processors – introduction to 16/32 bit processors, ARM architecture and organization, Thumb programming model, thumb instruction set and development tools.

Text Books:

1. Microprocessor Architecture, Programming, and Applications with the 8085 Ramesh S. Gaonkar, 4th Edition, Penram International, 1999
2. Advanced microprocessor & Peripherals – A K Ray and K M Bhurchand TMH, 2000
3. Microcontrollers: Architecture, Programming, Interfacing and System Design: 2nd Edition by Raj Kamal, Pearson Education India, 2011

Reference Books:

1. Microcomputer Systems: 8086/8088 Family - Architecture, Programming and Design, by Yu-Cheng Liu and Glenn A. Gibson, PHI, 1986
2. Microprocessors And Interfacing 2E by Douglas V. Hall, Tata McGraw-Hill Education, 1974

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B. TECH 4 th SEMESTER	L	T	P	C
	3	-	-	3

16CS4T03: Computer Organization

COURSE OBJECTIVES

- To become familiar in following topics:
 - How Computer Systems work & its basic principles
 - How to analyze the system performance.
 - Concepts behind advanced pipelining techniques.
 - The current state of art in memory system design
 - How I/O devices are being accessed and its principles.
- To provide the knowledge on Instruction Level Parallelism

COURSE OUTCOMES

At the end of the course student able

- To apply the knowledge of performance metrics to find the performance of systems.
- To create an assembly language program to program a microprocessor system.
- To deal with different types of computers
- To identify the problems in components of computer.

UNIT-I

Basic Structure of Computers: Basics of computer, Von Neumann Architecture, Generation of Computers, Types of Computers, Functional unit, Basic Operational Concepts and Bus Structures.

UNIT-II

Register Transfer Language and Micro Operations: Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer Instructions, Timing and control, Instruction Cycle, Memory – Reference, Input – Output and Interrupt Instructions. Design of basic computer, Design of Accumulator logic.

UNIT-III

Central Processing Unit: General Register Organization, STACK organization. Instruction formats. Addressing modes. DATA Transfer and manipulation, Program control, Reduced Instruction Set Computer.

Micro Programmed Control: Control Memory, Address sequencing, micro program example, design of control unit.

UNIT-IV

Computer Arithmetic: Addition and Subtraction, multiplication algorithms, Division Algorithms. Floating point arithmetic operations. Decimal Arithmetic unit, Decimal arithmetic operations.

UNIT-V

Input- Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes

of Transfer, Priority Interrupts, Direct memory Access.

The Memory System: Memory Hierarchy, Main Memory, Auxiliary memory, Associative Memory, Cache Memory and Virtual Memory.

UNIT-VI

Parallel Processing and Vector Processing: Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.

Text Books:

1. Computer System Organization, M.Moris Mano, 3rd Edition, Pearson / PHI
2. Computer Organization, Carl Hamacher, Zvonks Vranesic, SafeaZaky, 5th Edition, McGraw Hill.
3. Computer Organization, a quantitative approach, John L.Hennessy and David A.Patterson, Fourth Edition Elsevier

Reference Books:

1. Computer Organization and Architecture - William Stallings Sixth Edition, Pearson / PHI
2. Structured Computer Organization - Andrew s. Tanenbaum, 4th Edition, PHI/ Pearson.
3. Fundamentals of Computer Organization and Design, - Sivaraama Dandamudi, Springer Int. Edition.

B. TECH 4 th SEMESTER	L	T	P	C
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16BM4T01: Principles of Economics and Management

COURSE OUTCOMES

At the end of the course the student should be able to

1. Differentiate between Micro and Macro Economics and apprise the nitty gritty of demand function.
2. Identify various kinds of markets, the pricing methods used and solve the basic problems using BEP analysis.
3. Comprehend the basic concepts of Management and Human Resource Management.
4. Apply the basic concepts of Production Management and Marketing Management in planning the production and distribution of products.
5. Evaluate the basic forms of organization best suited for entrepreneurship and appreciate the importance of Financial Management in a firm.

UNIT I:

Introduction to Economics: Concept, Nature & Scope of Economics-Macro and Micro Economics- Demand Analysis: Demand Determinants- Law of Demand& its exceptions- Elasticity of Demand-Types –Demand Forecasting-Methods.

UNIT II:

Market Structures: Types of Markets-Price output determination in Perfect Competition, Monopoly, Monopolistic Competition, Oligopoly - Pricing methods - Break – Even Analysis (simple problems).

UNIT III:

Introduction to Management: Concept - Functions of Management - Scientific Management-Principles of Management- Leadership Styles - Functional areas of Management.

Human Resource Management: Definition, Significance and Functions - PM Vs HRM – Recruitment, Selection, Training and Development -Job Analysis - Role and position of HR department – Performance Appraisal.

UNIT IV:

Marketing Management : Needs- Wants - Products - Market- Marketing- Production Concept, Product Concept, Sales Concept, Marketing Concept, Societal Marketing Concept- Organizing the Marketing Department - **Marketing Mix:** Product, Price, Place, Promotion (in brief)

Production Management: Concept of production management-Types of Production processes- Plant Location & Layout, Statistical Quality Control.

UNIT V:

Financial Management: Financial Statements – Contents of Trading Account, Profit and Loss Account – Balance Sheet (Theory only) - Analysis of Financial statements : Ratio analysis (simple problems) - Concept of Finance - Objectives of Finance-Wealth Maximization Vs. Profit Maximization - Functions of Finance - Role of financial manager - Organization of finance function.

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UNIT VI:

Forms of Business Organizations- Sole Proprietorship, Partnership, Joint Stock Company -Private limited and Public limited Companies, Public enterprises and their types, Business Cycles.

Entrepreneurship- Entrepreneur – Qualities of good entrepreneur - Entrepreneurial Functions, Entrepreneurial Development: Objectives, Training, Benefits - Phases of Installing a Project.

Text Books:

- 1.P.G.Ramanujam, B.V.R.Naidu & PVR Sastry, **Management Science**, Himalaya Publishing House, Mumbai.
2. A.R. Aryasri, **Managerial Economics and Financial Analysis**, Tata Mc Graw- Hill, New Delhi.

Reference Books:

1. M.Y.Khan & P.K.Jain, **Financial Management**, TATA McGraw-Hill, New Delhi.
2. Koontz O Donnel, **Management**, TATA McGraw-Hill, New Delhi.
3. K. Aswathappa, **Production Mangement**, Himalaya Publishing House, Mumbai.
4. P.Subba Rao, **Human Resource Management**, Himalaya Publishing House, Mumbai.
5. Philip Kotler, **Marketing Management**, Pearson Prentice Hall, New Delhi.
6. Vasant Desai, **Entrepreneurship**, Himalaya Publishing House, Mumbai.
7. Varshini &Maheswari, **Managerial Economics**, SChand & Co, New Delhi.

B. TECH 4th SEMESTER	L	T	P	C
	-	-	4	2
16CS4L01: Java Programming Lab				

COURSE OBJECTIVES

1. Understand the concept of OOP as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading.
2. Able to implement Exception Handling in java.

COURSE OUTCOMES

At the end of the lab student able to

1. Develop solutions for a range of problems using object-oriented programming.
2. Create Java programs that solve simple business applications.

- Note:**
1. Use JDK 1.5 or above on any platform.
 2. Student has to complete at least 16 experiments.

LAB EXPERIMENTS

1. Installation of JDK, setting Class path and Executing simple java programs.
2. Write a program that displays welcome dear user followed by user name. Accept username from the user.
3. Write a Java Program to develop a class for Rational numbers.
4. Write a Java program to create a class Rectangle. The class has attributes length and width. It should have methods that calculate the perimeter and area of the rectangle. It should have read Attributes method to read length and width from user
5. Write a Java program that checks whether a given string is a palindrome or not. Ex: MALAYALAM is a palindrome. Using command line arguments.
6. Write a Java Program to implement array of objects.
7. Write a Java program to practice using String class and its methods.
8. Write a Java Program to implement multilevel inheritance by applying various access controls to its data members and methods.
9. Write a Java program to Create an inheritance hierarchy of Rodent, Mouse, Gerbil, Hamster etc. In the base class provide methods that are common to all Rodents and override these in the derived classes to perform different behaviors, depending on the specific type of Rodent. Create an array of Rodent, fill it with different specific types of Rodents and call your base class methods.
10. Write a Java program to create and Manage bank account using inheritance concept.
11. Write a Java program to Develop with suitable hierarchy, classes for Point, Shape, Rectangle, Square, Circle, Ellipse, Triangle, Polygon, etc. Design a simple test application
12. Write a Java Program to define a class, describe its constructor, overload the Constructors and instantiate its object
13. Write a Java program to develop a vehicle class hierarchy in Java to demonstrate the concept of polymorphism.
14. Write a Java program to Design a package to contain the class Student that contains data members such as name, roll number and another package contains the interface Sports which contains some sports

information. Import these two packages in a package called Report which process both Student and Sport and give the report.

15. Write a Java program to find the account balance using package
16. Write a Java program to demonstrate super key word.
17. Write a Java program to create an abstract class named Shape, that contains an empty method named numberOfSides(). Provide three classes named Trapezoid, Triangle and Hexagon, such that each one of the classes contains only the method numberOfSides(), that contains the number of sides in the given geometrical figure.
18. Write a Java program that reads two numbers from the user to perform integer division into Num1 and Num2 variables. The division of Num1 and Num2 is displayed if they are integers. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception
19. Write a Java program to create user defined package and interface.
20. Write a Java program to create a multi-threaded to print all numbers below 100,000 that are both prime and Fibonacci number (some examples are 2, 3, 5, 13, etc.). Design a thread that generates prime numbers below 100,000 and writes them into a pipe. Design another thread that generates fibonacci numbers and writes them to another pipe. The main thread should read both the pipes to identify numbers common to both.
21. Write a java program to read the names of users, number of units consumed and print out the charge using default. An electricity board charges the following rates to domestic users to discourage large conceptions of energy. 100 units Rs 1.50 p/unit 200 units Rs 1.80 p/unit Beyond 200 Rs 2.50 p/unit All users are charged a minimum of Rs 50/-. If the total amount is more than 300 then an additional surcharge of 15% is added.
22. Write a Java program that creates 3 threads by extending Thread class. First thread displays “Good Morning” every 1 sec, the second thread displays “Hello” every 2 seconds and the third displays “Welcome” every 3 seconds. (by implementing Runnable interface).

Text Books:

1. Herbert Schildt: “Java The complete reference”, 7th Edition, Tata McGraw Hill, 2011.
2. E.Balaguruswamy: “Programming with Java A Primer”, 4th Edition, Tata McGraw Hill, 2009.

B. TECH 4th SEMESTER	L	T	P	C
	-	-	4	2

16CS4L02: Operating Systems Lab

COURSE OUTCOMES

At the end of the lab student able to

1. Describe CPU scheduling and Write programs on it.
2. Explain Disk allocation methods and Write programs on it.
3. Describe Page Replacements algorithms and Write programs on it.
4. State Free space management to reuse disk and to write program on it.
5. Demonstrate Bankers Algorithm for Dead Lock Avoidance.
6. Describe MFT and MVT and write programs on it.

LIST OF PROGRAMS

1. Simulate First Come First Serve CPU scheduling algorithm.
2. Simulate Shortest Job First CPU scheduling algorithm.
3. Simulate Priority CPU scheduling algorithm.
4. Simulate Round Robin CPU scheduling algorithm.
5. Simulate Sequential file allocation strategy.
6. Simulate Linked file allocation strategy.
7. Simulate Indexed file allocation strategy.
8. Simulate First In First Out page replacement algorithm.
9. Simulate Least Recently used page replacement algorithm.
10. Simulate optimal page replacement algorithm.
11. Write Programs to simulate free space management.
12. Simulate Bankers Algorithm for Dead Lock Avoidance.

B. TECH 4 th SEMESTER	L	T	P	C
	-	-	4	2

16EC4L04: Microprocessors Lab

COURSE OUTCOMES

At the end of the lab student able to

1. Understand MASM/ TASM.
2. Develop microprocessor based programs for various problems.
3. Interface microprocessor to external devices like keyboard, DAC, Stepper motor.

LIST OF PROGRAMS

I. Microprocessor 8086:

1. Introduction to MASM/TASM.
2. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.
3. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
4. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, and String comparison.
5. DOS/BIOS programming: Reading keyboard (Buffered with and without echo) – Display characters, Strings.

II. Interfacing 8086:

1. Interfacing DAC to generate various waveforms using 8255
2. Interfacing Stepper motor using 8255

III. Microcontroller 8051

1. Introduction to Embedded C and Keil IDE.
2. Reading and Writing parallel ports
3. Interfacing Switches and LEDs/Display

Equipment required for Laboratories:

1. 8086 μ P Kits
2. 8051 Micro Controller kits
3. Interfaces/peripheral subsystems
 - i) 8255 PPI
 - ii) Stepper motor
 - iii) DAC

Software Tools: TASM/MASM Keil IDE

FIFTH SEMESTER

B. TECH 5th SEMESTER	L	T	P	C
	3	1	-	4
16CS5T01: Computer Networks				

COURSE OUTCOMES

At the end of the course students are able to

1. Differentiate network reference models such as OSI, TCP/IP and ATM
2. Classify various Data Link Layer protocols such as sliding window, HDLS, PPP
3. Distinguish various MAC sub Layer Protocols, such as ALOHA, CSMA, CSMA/CD
4. Differentiate various Network layer protocols and Its Applications
5. Distinguish various Transport layer protocols and its applications
6. Illustrate various application layer protocols such as www And HTTP etc.

UNIT 1:

Data communication Components: Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division.

UNIT 2:

Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction -Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols - Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA.

UNIT 3:

Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

UNIT 4:

Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT 5:

Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP,

UNIT-6:

SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography, Concepts on spread spectrum.

Suggested books

B.TECH/CSE/2016 (CBCS)

1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGrawHill.
2. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.

Suggested reference books

1. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.
2. Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall of India.
3. TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America.

B. TECH 5th SEMESTER	L	T	P	C
	3	1	-	4
16CS5T02: Advanced Java and Web Technologies				

COURSE OUTCOMES: At the end of the course students are able to

1. Distinguish various static web pages and dynamic web pages using html and java script.
2. Write a well formed / valid XML document.
3. Review on xml data storage.
4. Work on web servers with servlets
5. Write a server side java application called Servlet to catch form data sent from client, process it and store it on database.
6. Design web applications by using database connectivity.

UNIT-I: HTML

Introduction to html, structure of a html page, HTML basic tags, formatting tags, Lists, nested lists, Tables, nested tables, Images, image mapping, links, forms, Frames, Cascading style sheets.

UNIT-II: Java script

Client side scripting with JavaScript, variables, functions, conditions, loops and repetition, Pop up boxes, Advance JavaScript: JavaScript and objects, JavaScript own objects, the DOM and web browser environments, Manipulation using DOM, forms and validations, DHTML: Combining HTML, CSS and JavaScript, Events and buttons.

UNIT III: XML

Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, Using XML with application. Transforming XML using XSL and XSLT, DOM and SAX.

UNIT IV: Web Servers and Servlets:

Installation and configuration of Tomcat web server, introduction to Servlets: Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servlet Package, Reading Servlet parameters, and Reading Initialization parameters. The javax.servlet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues.

UNIT V: JSP

Understanding JSP, Describing the JSP life cycle, JSP Application Design with MVC. Generating Dynamic Content Using Scripting Elements, Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling.

UNIT VI: Database Access:

Database Programming using JDBC, Studying Javax.sql.* package, Accessing a Database from a JSP Page, Application – Specific Database Actions.

TEXT BOOKS:

- T1: Web Technologies-Black Book , Kogent Learning solutions Inc sol. Dreamtech press.
- T2: The Complete Reference, Java 2, 7th Edition by Patrick Naughton, Herbert Schildt, TMH
- T3: An Introduction to Web Design + Programming, Wang, Katila , CENGAGE

REFERENCE BOOKS:

- R1: Web Technologies Uttam K Roy-Oxford
- R2: Head First Java-Kathy sierra-Orielly

B. TECH 5th SEMESTER	L	T	P	C
	3	-	-	3
16CS5T03: Formal Language and Automata Theory				

Course Outcomes:

At the end of the course students are able to

1. Analyze and Understand fundamentals in design of Finite Automata
2. Classify the devices according to their computational power
3. Analyze the concepts of the Formal grammars and languages
4. Identify the concept and the techniques in Push down Automata
5. Explain the Turing machine concept and the techniques applied in computers
6. Remember the basic complexity classes like P & NP

Syllabus:

UNIT 1

Finite state machine: Definitions, finite automation model, acceptance of strings and languages, DFA and NFA, transition diagrams and language recognizers. NFA with E- transitions – Equivalence between NFA with and without E- transitions, NFA to DFA conversion, minimization FSM, Output machines- Moore and Mealy machine.

UNIT 2

Regular Languages : Regular Sets, Regular Expressions, identity Rules, Constructing Finite automata for a given regular expressions, Conversion of Finite automata to regular expressions, Pumping lemma of regular sets , closure properties of regular sets (proofs not required).

UNIT 3

Context Free Grammar: derivation trees, sentential forms, right most and left most derivations of strings, Ambiguity in Context free Grammars, Minimization of Context free grammars, CNF, GNF, Pumping Lemma for Context Free Languages. Enumeration of properties of CFL (proofs omitted).

UNIT 4

Push down Automata: definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFL and PDA (proofs not required), Introduction to DCFL and DPDA.

UNIT 5

Turing Machine: Definition, model, Design of TM, computable functions, recursively enumerable languages. Church's hypothesis, counter machine, types of Turing Machines (proofs not required)

UNIT 6

Computability Theory: Decidability of problems, Universal TM, Un decidable problems about Turing Machine – Post's Correspondence Problem - The classes P and NP.

Text Books:

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1. Formal Languages and Automata Theory by Basavaraj S. Anami, Karibasappa K.G, WILEY-INDIA
2. H.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2003.

References:

1. Theory of Computer Science, Automata languages and computation, 2/e, Mishra, Chandra Shekaran, PHI
2. H.R.Lewis and C.H.Papadimitriou, "Elements of The theory of Computation", Second Edition, Pearson Education/PHI, 2003
3. J.C.Martin, "Introduction to Languages and the Theory of Computation", Third Edition, TMH, 2003.

B. TECH 5th SEMESTER	L	T	P	C
	3	-	-	3
16MA5T01: Probability & Statistics				

Course Outcomes:

At the end of the course students are able to

1. Compute probabilities by modeling sample spaces and applying rules of permutation and combinations, additive and multiplicative laws and conditional probability. Construct the probability distribution of a random variable, based on a real-world situation, and use it to compute expectation and variance.
2. Construct the probability distribution of a random variable, based on a real-world situation, and use it to compute expectation and variance. Also compute probabilities based on practical situations using the binomial and normal distributions.
3. Use the normal distribution to test statistical hypothesis and to compute confidence intervals.
4. Use least squares approximation to find the best fit linear curve for a given set of data points.

Unit-I Probability: Sample spaces and events-probability-the axioms of probability-some elementary theorems-conditional probability-Bayes's theorem.

Unit-II Random variables & Distributions: Introduction-random variables and its classifications. Discrete random variable – moments and moment generating functions.

Discrete Probability Distributions: Binomial & Poisson distributions with moment generating functions.

Unit-III Continuous Probability Distributions: Continuous random variable, Normal and exponential distributions with moment generating functions.

Unit-IV Sampling Distributions: Population and samples – Sampling distribution of mean for large and small samples (with known and un-known's variance) – Sampling Distribution of Proportions - sampling distribution of Sums and differences of means – sampling distributions of variances – point and interval estimators for means and proportions.

Unit-V Tests of Hypothesis: Introduction – Type I and Type II errors – Maximum error – one tail, two tail tests – Tests concerning one mean and proportion, two means – proportions and their differences using Z-test, Student's t-test – F-test and Chi-square test.

Unit-VI Curve Fitting: Method of least squares – Fitting a straight line, second degree parabola – exponential curve – power curves.

Text Books:

1. Probability and Statistics by Mr. K. Murugesan and Mr.P.Gurusamy
2. Probability and Statistics for Engineers and scientists by R.E.Walpole and Raymond H. Myers.

References:

1. Probability and Statistics for Engineers by Miller & Freund's
2. Higher Engineering Mathematics by Dr. B. S. Grewal.

B. TECH 5th SEMESTER	L	T	P	C
	3	-	-	3
Elective-I: 16CS5E01: Software Project Management				

COURSE OUTCOMES:

At the end of the course students are able to

1. Manage the scope, cost, timing, and quality of the project, at all times focused on project success as defined by project stakeholders.
2. Align the project to the organization's strategic plans and business justification throughout its lifecycle.
3. Identify project goals, constraints, deliverables, performance criteria, control needs, and resource requirements in consultation with stakeholders.
4. Implement project management knowledge, processes, lifecycle and the embodied concepts, tools and techniques in order to achieve project success.
5. Demonstrate a strong working knowledge of ethics and professional responsibility.
6. Demonstrate effective organizational leadership and change skills for managing projects, project teams and stakeholders.

UNIT I

Conventional Software Management: The waterfall model, Conventional software management performance.

Evolution of Software Economics: Software Economics, Pragmatic software cost estimation.

UNIT II

Improving Software Economics: Reducing Software product size, Improving software processes, Improving team effectiveness, Improving automation, Achieving required quality, Peer inspections.

The old way and the new: The principles of conventional software engineering, Principles of modern software management, Transitioning to an iterative process.

Life cycle phases: Engineering and production stages, Inception, Elaboration, Construction, Transition phases.

UNIT III

Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, pragmatic artifacts.

Model based software architectures: A Management perspective, Technical perspective.

Work Flows of the process: Software process workflows, iteration workflows.

UNIT IV

Checkpoints of the Process: Major Mile Stones, Minor Milestones, Periodic status assessments. **Iterative**

Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, Evolution of Organizations.

UNIT V

Process Automation: Automation Building Blocks, The Project Environment.

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Project Control and Process instrumentation: The server core metrics, Management indicators, Quality indicators, life cycle expectations, Pragmatic software Metrics, Metrics automation.

UNIT VI

Tailoring the process: process discriminants, modern project profiles,next generation software economics.

TEXT BOOKS:

1. Software Project Management, Walker Royce, Pearson Education, 2005.

REFERENCE BOOKS:

1. Software Project Management, Bob Hughes & MikeCotterell, Tata Mc-Graw Hill, 2006.
2. Software Project Management, Joel Henry, Pearson Education.
3. Software Project Management in practice, Pankaj Jalote, Pearson Education.

B. TECH 5th SEMESTER	L	T	P	C
	3	-	-	3
Elective-I : 16CS5E02: Advanced Computer Architecture				

Course Outcomes:

At the end of the course students are able to

1. Identify various types of computer Architectures
2. Classify different instruction set architectures
3. Differentiate multiprocessor architecture from multi computers.
4. Analyze shared memory architectures and multithreading techniques
5. Explain parallel computer systems with ILP concepts.
6. Explain the several advanced optimization to achieve cache performance

UNIT-1

Parallel Computer Models: The state of computing-Multiprocessors and Multi computers- Multivector and SIMD Computers.

Program and Networks Properties: Conditions of Parallelism, Program Partitioning and Scheduling, Program Flow Mechanisms, System Interconnect Architectures.

UNIT-2

Processors and memory hierarchy: Design space of processors, Instruction set Architectures, Characteristics of typical CISC and RISC Architecture, Hierarchical Memory Technology, Inclusion, Coherence and Locality.

Cache memory organizations: cache addressing modes, direct mapping and Associative Caches, set-Associative and sector caches, cache performance issues

UNIT-3

Multiprocessors and Multicomputer: Multiprocessor System Interconnects ,Cache Coherence and Synchronization Mechanisms, Three Generations of Multicomputer, Message-Passing Mechanisms.

UNIT-4

Multivector and SIMD Computers: Vector Processing Principles, Multivector Multiprocessors, Compound Vector Processing, SIMD Computer Organizations, The Connection Machine CM-5.

UNIT-5

Scalable, Multithreaded, and Dataflow Architectures: Latency, Hiding Techniques, Principles of Multithreading, Fine-Grain Multicomputers, Scalable and Multithreaded Architectures, Dataflow and Hybrid Architectures.

UNIT6

Instruction Level Parallelism: Introduction, Basic Design Issues, Problem Definition, Model of a Typical Processor, Operand Forwarding, Reorder Buffer, Register Renaming-Tomasulo's Algorithm, Branch Prediction, Limitations in Exploiting Instruction Level Parallelism, Thread Level Parallelism.

TEXT BOOKS:

1. Advanced Computer Architecture- by Kai Hwang and Jotwani, Second Edition, McGraw-Hill Publications.

REFERENCES:

1. Computer Architecture and Parallel Processing by Hwang and Briggs
2. Computer Architecture A quantitative approach Third Edition John L.Hennessy and David A. Patterson, Morgan Kaufmann (An Imprint of Elsevier).

B. TECH 5th SEMESTER	L	T	P	C
	3	-	-	3
Elective-I : 16CS5E03: Computer Graphics				

Course Outcomes:

At the end of the course students are able to

1. Define the functions and operations of display hardware and associated devices.
2. Draw lines, circles, ellipses and polygon shapes in computer Graphics.
3. Describe 2D transformations.
4. Describe 3D transformations.
5. Explain visible surface detection methods.
6. Develop the simple graphics animation applications.

UNIT I : Introduction: Application of Computer Graphics, raster scan systems, random scan systems

Output primitives : Points and lines, line drawing algorithms(DDA and Bresenham's Line algorithms), mid-point circle algorithms.

Filled area primitives: Scan line polygon fill algorithm, inside and outside tests, boundary-fill algorithm.

UNIT II: 2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transformations.

2-D viewing: The viewing pipeline, window to view-port coordinate transformation, Cohen-Sutherland line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

UNIT III: 3-D object Representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curves and surfaces, B-Spline curves and surfaces.

UNIT IV: 3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations. 3D Viewing pipeline, clipping, projections (Parallel and Perspective).

UNIT V: Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSPtree methods, area sub-division and octree methods.

UNIT VI: Computer Animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.

TEXT BOOKS:

1. Computer Graphics C version, Donald Hearn, M.Pauline Baker, Pearson

REFERENCE BOOKS:

1. Computer Graphics Principles & practice, 2/e, Foley, VanDam, Feiner, Hughes, Pearson
2. Computer Graphics, Steven Harrington, TMH
3. Procedural elements for Computer Graphics, David F Rogers, 2/e, TMH.

B.TECH/CSE/2016 (CBCS)

B. TECH 5th SEMESTER	L	T	P	C
	3	-	-	3
Elective-I : 16CS5E04: Soft computing				

Outcomes: At the end of the course students are able to

1. Analyze and appreciate the applications which can use fuzzy logic.
2. Design inference systems.
3. Identify the difference between learning and programming and explore practical Applications of Neural Networks (NN).
4. Appreciate the importance of optimizations and its use in computer engineering fields and there domains.
5. Explain the efficiency of a hybrid system and how Neural Network and fuzzy logic can be hybridized to form a Neuro-fuzzy network
6. Analyze various applications of Genetic Algorithms.

UNIT I: Introduction to Soft Computing: Soft computing Constituents, Characteristics of Neuro Computing and Soft Computing, Difference between Hard Computing and Soft Computing, Concepts of Learning and Adaptation.

UNIT II: Neural Networks: Basics of Neural Networks: Introduction to Neural Networks, Biological Neural Networks, McCulloch Pitt model, **Supervised Learning algorithms:** Perceptron (Single Layer, Multi layer), Linear separability, Delta learning rule, Back Propagation algorithm, **Un-Supervised Learning algorithms:** Hebbian Learning, Winner take all, Self Organizing Maps, Learning Vector Quantization.

UNIT III: Fuzzy Set Theory : Classical Sets and Fuzzy Sets, Classical Relations and Fuzzy Relations, Properties of membership function, Fuzzy extension principle, Fuzzy Systems- fuzzification, defuzzification and fuzzy controllers.

UNIT IV: Hybrid systems: Introduction to Hybrid Systems, Adaptive Neuro Fuzzy Inference System (ANFIS).

UNIT V: Introduction to Optimization Techniques: Derivative based optimization- Steepest Descent, Newton method. 5.2 Derivative free optimization-Introduction to Evolutionary Concepts.

UNIT VI: Genetic Algorithms and its applications: Inheritance Operators, Cross over types, inversion and Deletion, Mutation Operator, Bit-wise Operators, Convergence of GA, Applications of GA.

Text Books:

1. Timothy J.Ross "Fuzzy Logic With Engineering Applications" Wiley.
2. S.N.Sivanandam, S.N.Deepa "Principles of Soft Computing" Second Edition, Wiley Publication.
3. S.Rajasekaran and G.A.Vijayalakshmi Pai "Neural Networks, Fuzzy Logic and Genetic Algorithms" PHI Learning.
4. J.-S.R.Jang "Neuro-Fuzzy and Soft Computing" PHI 2003.
5. Jacek.M.Zurada "Introduction to Artificial Neural Sytems" Jaico Publishing House.

Reference Books:

1. Satish Kumar "Neural Networks A Classroom Approach" Tata McGrawHill.
2. Zimmermann H.S "Fuzzy Set Theory and its Applications" Kluwer Academic Publishers.
3. Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.
4. Hagan, Demuth, Beale, "Neural Network Design" CENGAGE Learning, India Edition.

B. TECH 5th SEMESTER	L	T	P	C
	-	-	4	2
16CS5L01: Computer Networks Lab				

Course Outcomes:

At the end of this course, students are able to

1. Identify the different types of network devices and their functions within a network.
2. Design TCP iterative Client and Server application
3. Identify the basic protocols of computer networks, and how they can be used to assist in network design and implementation.
4. Design UDP Client Server
5. Configure a network using packet tracer software
6. Implement and build the skills of sub-netting and routing mechanisms.

List of Programs:

1. Study of Networking Commands (Ping, Tracert, TELNET, nslookup, netstat, ARP, RARP) and Network Configuration Files.
2. Linux Network Configuration.
 - a. Configuring NIC's IP Address.
 - b. Determining IP Address and MAC Address using if-config command.
 - c. Changing IP Address using if-config.
 - d. Static IP Address and Configuration by Editing.
 - e. Determining IP Address using DHCP.
 - f. Configuring Hostname in /etc/hosts file.
3. Design TCP iterative Client and Server application to reverse the given input sentence.
4. Design a TCP concurrent Server to convert a given text into upper case using multiplexing system call "select".
5. Design UDP Client Server to transfer a file.
6. Study of different types of network cables and practically implement the cross wired cable and straight through cable using clamping tool
7. Study of network devices in detail
8. Study of network ip
9. Connect the computers in LAN network
10. Study of basic network command and network configuration commands using packet tracer
11. Configure a network topology using packet tracer software using two different networks

12. Configure a network using distance vector protocol
13. Configure a network topology link state vector routing protocol

B. TECH 5th SEMESTER	L	T	P	C
	-	-	4	2
16CS5L02: Advanced Java and Web Technologies Lab				

COURSE OUTCOMES:

1. Distinguish various static web pages and dynamic web pages using html,
- 2: Design web pages using JavaScript.
- 3: Link up files using xml storage.
- 4: Review on database connectivity.
5. Design web applications using servlets.
- 6: Design web application by JSP using oracle database connectivity.

LIST OF PROGRAMS

1. Create a web with all basic, formatting, images, and link tags.
2. Display nested list tags, forms and tables (nested also) in web pages.
3. Develop static web pages (using only HTML) of an online products store. The pages should resemble: **www.ajwt.com**. The website consists the following pages. Home, Registration, Login, Profile.
4. Redesign the catalog page using all CSS properties (like font-styles, background image etc.)
5. Practice on java script objects, control structures and events.
6. Validate the registration, user login, user profile and payment mode using JavaScript.
7. Create and save an XML document, which contains 10 student's information. Display the information by using html tables.
8. Install TOMCAT web server. Write a servlet code for User authentication of login form.
9. Write a servlet code for session tacking.
10. Install a database application and create tables for user details in the registration form and catalog page in the website Practice of JDBC Connectivity.
11. Write JSP code to insert the details of 3 or 4 users who register with the website by using registration form. Authenticate the user name and password from the database.

SIXTH SEMESTER

B. TECH 6th SEMESTER	L	T	P	C
	3	1	-	4
16CS6T01: Object oriented Analysis and Design				

COURSE OUTCOMES:

At the end of the course students are able to

1. Learn basic building blocks which helps to model the diagram.
2. Expose the importance of modeling and object-oriented systems analysis and design in solving complex problems.
3. Create common modeling techniques for all UML diagrams.
4. Describe Object Oriented Analysis and Design concepts and apply them to solve problems.
5. Prepare Object Oriented Analysis and Design documents for a given problem using Unified Modeling Language.
6. Perform Forward engineering for the all the UML diagrams.

UNIT I: Introduction to UML: Importance of modeling, principles of modeling, object oriented modeling, An Overview of the UML, A conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT II: Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams. **Advanced Structural Modeling:** Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

UNIT III: Class & Object Diagrams: Terms and concepts, common modeling techniques for Class & Object Diagrams.

UNIT IV: Basic Behavioral Modeling: Interactions, Interaction diagrams, Use cases, Use case Diagrams, Activity Diagrams.

Advanced Behavioral Modeling: Event s and signals, state machines, processes and Threads, time and space, state chart diagrams.

UNIT V: Architectural Modeling: Components, Deployment, Component diagrams and Deployment diagrams.

UNIT VI: Case Study: The Unified Library Management Application.

TEXT BOOKS:

1. The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.
2. UML 2 Toolkit, Hans - Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, WILEY - Dreamtech India Pvt.

REFERENCES:

Ref1: http://en.wikipedia.org/wiki/Software_development_process

Ref2: http://en.wikipedia.org/wiki/Rational_Unified_Process

Ref3: <http://www.uml-diagrams.org/profile-diagrams.html>

B.TECH/CSE/2016 (CBCS)

B. TECH 6th SEMESTER	L	T	P	C
	3	1	-	4
16CS6T02 : Design and Analysis of Algorithms				

Course Outcomes:

At the end of the course students are able to

1. Assess the correctness of algorithms using inductive proofs and invariants.
2. Analyze the asymptotic runtime complexity of algorithms for real world problems.
3. Identify the optimal solutions by using advanced design and analysis of algorithm techniques.
4. Describe the dynamic-programming paradigm and explain when an algorithmic design

Situation calls for it

5. Identify the search space and optimization problem techniques.
6. Distinguish the problems and its complexity as polynomial and NP problems.

UNIT-I

Introduction: Algorithm, Pseudo code for expressing algorithms, performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Probabilistic Analysis. Disjoint Sets - disjoint set operations, union and find algorithms, spanning trees, connected components and bi-connected components.

UNIT-II

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Stassen's matrix multiplication. Greedy method: General method, applications, Job sequencing with deadlines, 0/1 knapsack problem, Minimum cost spanning trees and Single source shortest path problem.

UNIT – III

Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem and Reliability design.

UNIT-IV

Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring and Hamiltonian cycles.

UNIT-V

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.

UNIT-VI

NP- Hard and NP- complete problems: NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, NP - Hard and NP Complete classes, Cook's theorem

TEXT BOOKS:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Universities Press.
2. The Algorithm Design Manual, 2nd edition, Steven S. Skiena, Springer.
3. Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd.

REFERENCE BOOKS:

1. Introduction to the Design and Analysis of Algorithms, AnanyLevitin, PEA
2. Design and Analysis of Algorithms, Parag Himanshu Dave, Himansu B Alachandra Dave, Pearson Education.
3. Introduction to Design and Analysis of Algorithms A strategic approach, R.C.T. Lee, S.S.Tseng, R.C.Chang and T.Tsai, McGraw Hill.
4. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
16CS6T03 : Compiler Design				

Course Outcomes:

At the end of the course students are able to

1. Understand about language processors and its phases.
2. Demonstrate about scanning of tokens.
3. Perform the syntax analysis by using parsing techniques
4. Perform Semantic analysis using attribute grammar
5. Compare different memory Management techniques in runtime environment
6. Ascertain optimization techniques for intermediate code forms and code generation

Syllabus:

UNIT 1

Overview of language processing: – preprocessors – compiler – assembler – Linkers & loaders, difference between compiler and interpreter- structure of a compiler –phases of a compiler. **Lexical Analysis:** - Role of Lexical Analysis – Input Buffering – Specification of Tokens – Recognition of Token – The Lexical Analyzer Generator Lex.

UNIT 2

Syntax Analysis: – Role of a parser – Context Free Grammar – Top Down Parsing – Recursive Descent Parsing — Non recursive Predictive Parsing- FIRST and FOLLOW – LL(1) Grammar – Error Recovery in Predictive Parsing.

UNIT 3

Bottom up Parsing: – Reductions – Handle Pruning - Shift Reduce Parsing - Introduction to simple LR – Why LR Parsers – Model of an LR Parsers — Construction of SLR Tables.
More powerful LR parsers: - Construction of CLR (1) - LALR Parsing tables.

UNIT 4

Runtime Environment: - Storage organization - Stack allocation – Static allocation - Heap management - Parameter passing mechanisms.
Intermediate code: - DAG - Three address code – Quadruples - Triples - Indirect Triples.

UNIT 5

Basic Blocks: – DAG representation of Block. Machine independent code optimization - Common sub expression elimination - Constant folding - Copy propagation -Dead code elimination - Strength reduction - Loop optimization.

UNIT6

Machine dependent code optimization: - Peephole optimization – Register allocation - Instruction scheduling - Inter Procedural Optimization - Garbage collection via reference counting.

Text Books

1. Compilers: Principles, Techniques and Tools: 2nd Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ulman; 2nd Edition, Pearson Education.
2. Modern Compiler Implementation in C- Andrew N. Appel, Cambridge University Press

References

1. lex & yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
 2. Modern Compiler Design- Dick Grune, Henry E. Bal, Cariel T. H. Jacobs, Wiley reamtech.
 3. Engineering a Compiler-Cooper & Linda, Elsevier.
 4. Compiler Construction, Louden, Thomson.
- Principles of compiler design, V. Raghavan, 2nd ed, TMH, 2011

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
Elective-II : 16CS6E01: Software Quality Management				

COURSE OUTCOMES:

At the end of the course students are able to

1. Explain what software quality management is.
2. Compare and contrast different ways to manage software quality in organizations.
3. Explain the roles of software metrics in software quality management.
4. Explain the roles of software risk management in software quality management.
5. Explain the roles of software change management in software quality management.
6. Adapt and adopt certain quality models (e.g. McCall's model and Boehm's model) to measure the quality of a software product.

UNIT I INTRODUCTION TO SOFTWARE QUALITY

Software Quality – Hierarchical models of Boehm and McCall – Quality measurement – Metrics measurement and analysis – Gilb's approach – GQM Model

UNIT II SOFTWARE QUALITY ASSURANCE

Quality tasks – SQA plan – Teams – Characteristics – Implementation – Documentation – Reviews and Audits

UNIT III QUALITY CONTROL AND RELIABILITY

Tools for Quality – Ishikawa's basic tools – CASE tools – Defect prevention and removal – Reliability models – Rayleigh model – Reliability growth models for quality assessment

UNIT IV QUALITY MANAGEMENT SYSTEM

Elements of QMS – Rayleigh model framework – Reliability Growth models for QMS – Complexity metrics and models – Customer satisfaction analysis.

UNIT V QUALITY STANDARDS

Need for standards – ISO 9000 Series – ISO 9000-3 for software development – CMM and CMMI – Six Sigma concepts.

UNIT VI CONFIGURATION MANAGEMENT

Need for configuration Management - Software product nomenclature - configuration management functions - Baselines - Responsibilities - Need for automated tools - plan – SCM support functions - The requirement phase Design control - The implementation phase - Test phase - SCM Tools - Configuration accounting and audit.

TEXT BOOKS

1. Allan C. Gillies, “Software Quality: Theory and Management”, Thomson Learning, 2003. (UI : Ch 1-4 ; UV : Ch 7-8)
2. Stephen H. Kan, “Metrics and Models in Software Quality Engineering”, Pearson Education (Singapore) Pte Ltd., 2002. (UI : Ch 3-4; UIII : Ch 5-8 ; UIV : Ch 9-11)
3. Watts S. Humphrey, Managing the software process, Addison Wesley, 1999.

REFERENCES

1. Norman E. Fenton and Shari Lawrence Pfleeger, “Software Metrics” Thomson, 2003
2. Mordechai Ben – Menachem and Garry S.Marlist, “Software Quality”, Thomson Asia Pte Ltd, 2003.
3. Mary Beth Chrissis, Mike Konrad and Sandy Shrum, “CMMI”, Pearson Education (Singapore) Pte Ltd, 2003.
4. ISO 9000-3 “Notes for the application of the ISO 9001 Standard to software development”.

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
Elective-II : 16CS6E02: Cloud Computing				

Course Outcomes:

At the end of the course students are able to

1. Define the fundamentals of Cloud Computing.
2. Explain the concept of virtualization and how this has enabled the development of Cloud Computing.
3. Demonstrate the Cloud Computing Architectures and types of services in cloud.
4. Defining the clouds for enterprise, Scaling, cloud security and disaster management.
5. Illustrate the knowledge on Aneka Cloud Application Platform
6. Identify the applications in cloud and some cloud computing commercial systems.

UNIT 1

Introduction to Cloud: Cloud Computing at a Glance: The Vision of Cloud Computing, Defining a Cloud, A Closer Look, Cloud Computing Reference Model, Characteristics and Benefits, Challenges Ahead, Historical Developments.

UNIT II

Virtualization: Introduction, Characteristics of Virtualized Environment, Taxonomy of Virtualization Techniques, Virtualization and Cloud computing, Pros and Cons of Virtualization, Technology Examples: VMware and Microsoft Hyper-V.

UNIT III

Cloud Computing Architecture: Introduction, Cloud Reference Model: Architecture, Infrastructure / Hardware as a Service, Platform as a Service, Software as a Service, Types of Clouds: Public Clouds, Private Clouds, Hybrid Clouds, Community Clouds, Economics of the Cloud, Open Challenges: Cloud Interoperability and Standards, Scalability and Fault Tolerance.

UNIT IV

Defining the Clouds for Enterprise: Storage as a service, Database as a service, Process as a service, Information as a service, Integration as a service and Testing as a service. Scaling a cloud infrastructure - B.TECH/CSE/2016 (CBCS)

Capacity Planning, Cloud Scale. **Disaster Recovery:** Disaster Recovery Planning, Disasters in the Cloud, Disaster Management

UNIT V

Aneka-Cloud Application Platform: Framework Overview, Anatomy of the Aneka Container: From the Ground Up- Platform Abstraction Layer, Fabric Services, Foundation Services, Application Services, Building Aneka Clouds: Infrastructure Organization, Logical Organization, Private Cloud Deployment Mode, Public Cloud Deployment Mode, Hybrid Cloud Deployment Mode, Cloud Programming and Management: Aneka SDK, Management Tools

UNIT VI

Cloud Applications: Scientific Applications – Health care, Biology and Geo science, Business and Consumer Applications- CRM and ERP, Social Networking, Media Applications and Multiplayer Online Gaming. **Cloud Platforms in Industry:** Amazon Web Services- Compute Services, Storage Services, Communication Services and Additional Services. Google AppEngine-Architecture and Core Concepts, Application Life-Cycle, cost model.

Text Books

1. “Mastering Cloud Computing” by Rajkumar Buyya, Christian Vecchiola, S.Thamarai Selvi from TMH 2013.
2. George Reese “Cloud Application Architectures”, First Edition, O’Reilly Media 2009.

References

1. “Cloud Computing and SOA Convergence in Your Enterprise” A Step-by-Step Guide by David S. Linthicum from Pearson 2010.
2. “Cloud Computing” 2nd Edition by Dr. Kumar Saurabh from Wiley India 2012.
3. “Cloud Computing” – web based Applications that change the way you work and collaborate Online – Micheal Miller.Pearson Education.

B. TECH 6 th SEMESTER	L	T	P	C
	3	-	-	3

Elective-II : 16CS6E03: Multimedia & Application Development

Course Outcomes:

At the end of the course students are able to

1. Describe differences in color and how it relates to color theory
2. Define the concepts of different Video signals, Audio signals and MIDI
3. Explain the features of Action Script2.0 programming
4. Describe the object oriented concepts of Action Script2.0.
5. Analyze the various data lossless and lossy compression techniques
6. Explain and apply the video compression techniques and multimedia communication across networks.

UNIT-I

Multimedia and hypermedia, World wide web, Overview of multimedia software tools, Graphics and image data representation graphics/image data types, file formats, Color science, Color models in images, Color models in video.

UNIT-II

Types of video signals, Analog video, Digital video, Digitization of sound, MIDI, Quantization and transmission of audio.

UNIT-II

Action Script I: Action Script Features, Object-Oriented ActionScript, Datatypes and Type Checking, Classes, Authoring an Action Script Class.

UNIT-IV

Action Script II : Inheritance, Authoring an Action Script 2.0 Subclass, Interfaces, Packages, Exceptions.

UNIT-V

Multimedia data compression : Lossless compression algorithm: Run-Length Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic Coding, Lossless Image Compression, Lossy compression algorithm: Quantization, Transform Coding, Wavelet-Based Coding, Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT).

UNIT-VI

Basic Video Compression Techniques: Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, **Multimedia Networks:** Basics of Multimedia Networks, Multimedia Network Communications and Applications Multimedia over IP, Media-on-Demand(MOD).

Text books:-

1. Fundamentals of Multimedia by Ze-Nian Li and Mark S.Drew PHI/Pearson Education.
2. Essentials ActionScript 2.0, Colin Mook, SPD O, REILLY.

Reference books:-

1. Digital multimedia, Nigel Chapman and Jenny Chapman, Wiley-Dreamtech.
2. Macromedia Flash MX Professional 2004 Unleashed, Pearson.
3. Multimedia and communication technology, Steve Heath, Elsevier(Focal press).
4. Multimedia Applications, Steinmetz, Nahrstedt, Springer.
5. Multimedia basics by Weixel Thomson.

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
Elective-II : 16CS6E04: Wireless Networks				

COURSE OUTCOMES:

At the end of the course students are able to

1. Interpret basic terms and characteristics of wireless access networks
2. Compare various wireless access technologies
3. Analyze measurements of wireless access network parameter
4. Assess security issues in wireless networks
5. Explain modulation technique for wireless transmission
6. Analyze wireless networking and various access mechanism, new standards

Unit 1:

Necessity for wireless terminals connectivity and networking. Wireless networking advantages and disadvantages, Overview of wireless access technologies. Narrowband and broadband networks, fixed and nomadic networks. Wireless local loop (WLL), Public Switched Telephone Network (PSTN) interfaces.

Unit 2: Fixed wireless access (FWA) networks, frequency bands for different networks. Criteria for frequency bands allocation, Network topologies, hotspot networks. Communication links: point-to-point (PTP), point to-multipoint (PMP), multipoint-to-multipoint (MTM).

Unit 3: Standards for most frequently used wireless access networks: WPAN (802.15, Bluetooth, DECT, IrDA), UWB (Ultra-Wideband), WLAN (802.11, Wi-Fi, HIPERLAN, IrDA), WMAN (802.16, WiMAX, HIPERMAN, HIPERACCESS), WWAN (802.20), Other technologies for broadband wireless access, Local Multipoint Distribution Service (LMDS), Multichannel Multipoint Distribution Service (MMDS). Ad Hoc networks, Network services. Services types based on carrier frequency and bandwidth.

Unit 4: Wireless access networks planning, design and installation. Services provision, legislative and technical aspects, Technical and economical factors for network planning: expenses, coverage, link capacity, network complexity and carrier-to-interference ratio (C/I). Base station or access point allocation. Base station and access point equipment. Terminal mobility issues regarding wireless access to Internet. Wireless networking security issues.

Unit 5: Example of laptop or handheld PC wireless connection in real environment. PC wireless interface equipment. Wireless access network exploitation and management, software requirements, link quality control. Business model, wireless network services market, market research and marketing, service providers, wireless data application service providers(WDASP) and their role on public telecommunication services market, billing systems.

Unit 6: Recent trends in wireless networking and various access mechanism, new standards of wireless communication.

References:

1. M. P. Clark, Wireless Access Networks: Fixed Wireless Access and WLL networks -- Design and Operation, John Wiley & Sons, Chichester
2. D. H. Morais, Fixed Broadband Wireless Communications: Principles and Practical Applications, Prentice Hall, Upper Saddle River
3. R. Pandya, Introduction to WLLs: Application and Deployment for Fixed and Broadband Services, IEEE Press, Piscataway

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
Open Elective-I :				

LIST OF OPEN ELECTIVES

S.No.	Course Code	Name of the Course	Offering Dept.
1	16CEXO01	Green Buildings & Infrastructure	CIVIL
2	16CEXO02	Disaster Management	
3	16EEXO01	Electrical Safety Management	EEE
4	16EEXO02	Non-Conventional Energy Sources	
5	16MEXO01	Composite Materials	MECH
6	16MEXO02	Operation Research	
7	16ECXO01	Nanotechnology and its Applications	ECE
8	16ECXO02	Global Positioning and Navigation Satellite Systems	
9	16CSXO01	Data Base Management Systems	CSE
10	16CSXO02	Big Data Analytics	
11	16ITXO01	Software Project Management	IT
12	16ITXO02	Internet of Things (IOT)	
13	16BMXO01	Managing Innovations and Entrepreneurship	MBA
14	16BMXO02	Industrial Sociology & Psychology	

Note: The student has to choose one Open Elective subject in Sem VI and Sem VIII from the above list other than offered by Parent department, which was not studied in earlier semesters.

B. TECH 6th SEMESTER	L	T	P	C
	-	-	4	2
16CS6L01: Unified Modeling Language Lab				

COURSE OUTCOMES:

At the end of the course students are able to

1. Model various UML diagrams.
2. Perform a System Analyst role and identify the functionality of each UML model in developing object-oriented software.
3. Explain the importance of systems analysis and design in solving computer based problems.
4. Develop software architecture for a mini project problem.
5. Classify dynamic and static aspects of various case studies.
6. Transform model to code and code to model through round trip engineering.

List of Programs:

- 1) To Model UML diagrams of ATM APPLICATION.
- 2) To Model UML diagrams of LIBRARY MANAGEMENT SYSTEM.
- 3) To Model UML diagrams of ONLINE BOOK SHOP.
- 4) To Model UML diagrams of RAILWAY RESERVATION SYSTEM.
- 5) To Model UML diagrams of BANKING SYSTEM.
- 6) To Model UML diagrams of CREDIT CARD PROCESSING.
- 7) To Model UML diagrams of PAYTM APPLICATION.

B. TECH 6 th SEMESTER	L	T	P	C
	-	-	4	2

16CS6L02: Compiler Design Lab

Course Outcomes:

At the end of the course students are able to

1. Design Lexical analyzer for given language using C and LEX tools.
2. Design and convert BNF rules into YACC form to generate various parsers.
3. Design Predictive parser for the given language
4. Generate machine code from the intermediate code forms
5. Implement Symbol table
6. Design machine code from the abstract syntax tree

Syllabus:

1. Design a Lexical analyzer for the given language. The lexical analyzer should ignore redundant spaces, tabs and new lines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value.
2. Implement the lexical analyzer using JLex, flex or lex or other lexical analyzer generating stools.
3. Design Predictive parser for the given language.
4. Design LALR bottom up parser for the given language.
5. Convert the BNF rules into Yacc form and write code to generate abstract syntax tree.
6. Write program to generate machine code from the abstract syntax tree generated by the parser.
7. Implementation of Symbol Table.
8. Generation of Code for a given Intermediate Code.

Text Books

1. Compilers: Principles, Techniques and Tools: 2nd Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ulman; 2nd Edition, Pearson Education.
2. Modern Compiler Implementation in C- Andrew N. Appel, Cambridge University Press.

Reference Books

1. lex & yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
2. Modern Compiler Design- Dick Grune, Henry E. Bal, Cariel T. H. Jacobs, Wiley dreamtech.
3. Engineering a Compiler-Cooper & Linda, Elsevier.
4. Compiler Construction, Loudon, Thomson.
5. Principles of compiler design, V. Raghavan, 2nd ed, TMH, 2011.

B. TECH 6 th SEMESTER	L	T	P	C
	-	-	4	2
16BS6L01: Soft Skills & Aptitude Lab				

- Total Number of Laboratory Sessions: 10
- Total Number of Modules: 4

List of Modules:

- **Module-I:** Communicative Grammar and Language Skills

i) Grammar: a) Parts of Speech

- b) Articles and useful prepositions
- c) Sentence and its types
- d) Verb forms and Tenses
- e) Question Tags
- f) Do-Forms and Wh-questions
- g) Common mistakes at proficiency

ii) Language Skills

- a) Listening activity with a CD on Parts of Speech
- b) Listening activity with a CD on Articles and Prepositions
- c) Listening activity through CD on sentence and its types
- d) Listening activity with a CD on Verb forms and Tenses
- e) Reading activity on Question Tags
- f) Reading activity on Do-Forms and Wh-questions
- g) Writing activity (Resume)
- h) Writing activity (E-mail)
- i) Writing activity (Guided Composition)
- j) Writing activity (Guided Composition)

- **Module-II:** Communication Skills

- a) JAM/J2M on a given topic
- b) Introduce yourself (Strengths and weaknesses)
- c) Conversations
- d) Body Language
- e) Presentations
- f) Group Discussion
- g) Interview Skills

- **Module-III: Vocabulary**
 - a) 20 useful vocabulary for an engineering resume
 - b) Commonly confused words
 - c) One-word Substitutes
 - d) Useful phrases or expressions for a Telephonic Interview
 - e) Useful phrases or expressions for introduction and conclusion at a speech, interview, presentation, seminar, conference, GD etc.
 - f) GRE words
 - g) Useful phrases for an interview

- **Module-IV: Soft Skills**
 - a) Positive Attitude- Courtesy and etiquette
 - b) Motivation
 - c) Adaptability
 - d) Goal Setting
 - e) Leadership Qualities
 - f) Team Work
 - g) Problem Solving
 - h) Time and Stress Management
 - i) Negotiation and conflict resolution
 - j) Interpersonal Skills

- **Method/Approach to be Adopted:** Communicative, implicit, incidental and activity based method to create enthusiasm among the students.

Division of Syllabus for each Laboratory Session

Lab-I: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Parts of Speech

Language Skills Topic: Listening activity with a CD on Parts of Speech

Activity follows

Part-II: Communication Skills

Topic: JAM/J2M on a given topic

Part –III: Vocabulary

Topic: 20 useful vocabulary for an engineering resume

Part-IV: Soft Skills

Topic: Positive Attitude- Courtesy and etiquette

Lab-II: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Articles and useful prepositions

Language Skills Topic: Listening activity with a CD on Articles and Prepositions

Follow-up Activity: Articles and Prepositions

For E.g., Picture Description on Articles and Prepositions

Part-II: Communication Skills

Topic: Introduce yourself (Strengths and weaknesses)

Activity: Role Play/Simulation

Part –III: Vocabulary

Topic: Commonly confused words

Part-IV: Soft Skills

Topic: Motivation

Lab-III: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Sentence and its types

Language Skills Topic: Listening activity through CD on sentence and its types

Follow-up Activity: Sentence and its types

Part-II: Communication Skills

Topic: Conversations

For E.g., Greetings and Introducing, Making Requests etc.

Activity: Role Play/Simulation

Part –III: Vocabulary

Topic: One-word Substitutes

Part-IV: Soft Skills

Topic: Adaptability

Lab-IV: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Verb forms and Tenses

Language Skills Topic: Listening activity with a CD on Verb forms and Tenses

Follow-up Activity: Story Narration

Part-II: Communication Skills

Topic: Conversations

Part –III: Vocabulary

Topic: Useful phrases or expressions for a Telephonic Interview

Part-IV: Soft Skills

Topic: Goal Setting

Lab-V: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Question Tags

Language Skills Topic: Reading activity with a CD on Question Tags

Follow-up Activity: Question Tags

Part-II: Communication Skills

Topic: Body Language

Part –III: Vocabulary

Topic: Useful phrases or expressions for introduction and conclusion at a speech, interview, presentation, seminar, conference, GD etc.

Part-IV: Soft Skills

Topic: Leadership Qualities

Lab-VI: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Do-Forms and Wh-questions

Language Skills Topic: Reading activity without a CD on Do-Forms and Wh-questions

Follow-up Activity: on Do-Forms and Wh-questions

Part-II: Communication Skills

Topic: Presentations

Part –III: Vocabulary

Topic: GRE words

Part-IV: Soft Skills

Topic: Team Work

Lab-VII: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Common mistakes at proficiency

Language Skills Topic: Writing (Resume)

Part-II: Communication Skills

Topic: Group Discussion

Part –III: Vocabulary

Topic: GRE Words

Part-IV: Soft Skills

Topic: Problem Solving

Lab-VIII: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Common mistakes at proficiency

Language Skills Topic: Writing (E-mail)

Part-II: Communication Skills

Topic: Group Discussion

Part –III: Vocabulary

Topic: GRE words

Part-IV: Soft Skills

Topic: Time and Stress Management

Lab-IX: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Common mistakes at proficiency

Language Skills Topic: Writing (Guided Composition)

Part-II: Communication Skills

Topic: Group Discussion

Part –III: Vocabulary

Topic: Common mistakes at proficiency

Part-IV: Soft Skills

Topic: Negotiation and conflict resolution

Lab-X: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Common mistakes at proficiency

Language Skills Topic: Writing (Guided Composition)

Part-II: Communication Skills

Topic: Interview Skills

Part –III: Vocabulary

Topic: Common mistakes at proficiency

Part-IV: Soft Skills

Topic: Interpersonal Skills

APTITUDE LAB FOR VI SEM (40 HOURS)

TOPICS

APTITUDE

- PERCENTAGES (3)
- RATIO AND PROPORTIONS (3)
- AVERAGES (2)
- TIME AND WORK (2)
- PIPES AND CISTERNS (1)
- PROFIT AND LOSS (3)
- LCM & HCF (3)
- SIMPLE INTEREST (2)
- COMPOUND INTEREST (3)
- TIME AND DISTANCE (2)
- TRAINS ,BOATS & STREAMS (2)

REASONING

- BLOOD RELATIONS (2)
- DIRECTIONS (2)
- SYLLOGISM (2)
- CODING AND DECODING (2)
- ANOLOGY (2)
- CLASSIFICATION (2)
- SERIES (2)

SEVENTH SEMESTER

B. TECH 7th SEMESTER	L	T	P	C
	3	1	-	4
16CS7T01: Distributed Systems				

COURSE OUTCOMES:

At the end of the course students are able to

1. Define the concept of distributed systems and various distributed models.
2. Analyze inter-process communication mechanisms used in distributed systems.
3. Describe the knowledge on RPC and RMI.
4. Explain the process of Synchronization and Replication.
5. Define distributed file systems and name services.
6. Explain distributed transactions and concurrency control.

UNIT-I

Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges.

System Models: Introduction, Physical Models, Architectural Models and Fundamental Models.

UNIT-II

Inter Process Communication (IPC): Introduction, the API for the Internet Protocols, External Data Representation and Marshalling, Client-Server Communication, Group Communication, and Case Study: IPC in UNIX.

UNIT-III

Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects - Object Model, Distributed Object Model, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVARMI.

UNIT-IV

Synchronization and Replication:

Introduction - Clocks, events and process states - Synchronizing physical clocks- Logical time and logical clocks - Global states – Coordination and Agreement – Introduction - Distributed mutual exclusion – Elections.

Replication:

Introduction, System model and the role of group communication, fault tolerant services and Transactions with replicated data.

UNIT-V

Distributed File Systems: Introduction, File Service Architecture, Case Study 1: Sun Network File System, Case Study 2: The Andrew File System.

Name Services: Introduction, Name Services and the Domain Name System, Directory Services, Case Study of the Global Name Services.

UNIT-VI

Transactions and Concurrency Control: Introduction, Transactions, Nested Transactions, Locks, Optimistic Concurrency Control, Timestamp Ordering, Comparison of Methods for Concurrency Control.

Distributed Transactions: Introduction, Flat and Nested Distributed Transactions, Atomic Commit Protocols, Concurrency Control in Distributed Transactions, Distributed Deadlocks, Transaction Recovery.

TEXT BOOK

1. Distributed Systems, Concepts and Design, George Coulouris, J Dollimore and Tim Kindberg, Pearson Education, 41st Edition. 2009.

REFERENCE BOOKS

1. Distributed Systems, Principles and Paradigms, Andrew S. Tanenbaum, Maarten Van Steen, 2nd Edition, PHI.

2. Distributed Systems, An Algorithm Approach, Sukumar Ghosh, Chapman & Hall/CRC, Taylor & Francis Group, 2007.

B. TECH 7th SEMESTER	L	T	P	C
	3	1	-	4
16CS7T02: Cryptography and Network Security				

COURSE OUT COMES:

At the end of the course students are able to

1. Illustrate the different type of Security attacks
2. Analyze and compare Security Mechanisms and Services
3. Demonstrate mathematical foundations required for Cryptographic Algorithms
4. Distinguish different modern Encryption Algorithms
5. Define the basic Knowledge in different Authentication Mechanisms
6. Justify latest techniques used in different Security aspects (Ex. Network Security and Web Security etc.)

UNIT-I: Introduction: Security Attacks, Security Services, Security Mechanisms, Model for Network Security

Basics of Cryptography: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques

UNIT-II: Secret Key Cryptography: Data Encryption Standards (DES), Strength of DES, Block Cipher Design Principles and Modes of Operations, Triple DES, Blowfish, AES

UNIT-III: Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermats and Euler's Theorem, The Chinese Remainder Theorem, Discrete Logarithms

UNIT-IV: Public Key Cryptography: Principles of Public Key Cryptosystems, RSA Algorithm, Diffie-Hellman Key Exchange, Introduction to Elliptic Curve Cryptography

UNIT-V: Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Secure Hash Algorithm, Message Authentication Codes: Message Authentication Requirements and Functions, HMAC, Digital Signatures, Digital Signature Schemes, Digital Signature Standards

UNIT-VI: IP Security: Overview, Architecture, Authentication Header, Encapsulating Security Payload

Web Security: Web Security Considerations, Secure Socket Layer. Transport Layer Security

System Security: Intruders, Intrusion Detection, Password Management, Malicious Software-Types Viruses, Virus Counter measurements, Worms, Firewalls-Characteristics, Types of Firewalls

Text Books:

1. Cryptography and Network Security: Principles and Practice, 5th Edition, William Stallings, Pearson Education, 2011.
2. Network Security and Cryptography, Bernard Menezes, Cengage Learning, 2011.
3. Cryptography and Network, 2nd Edition Behrouz A. Fourouzan and Debdeep Mukhopadhyay. McGraw-Hill, 2010

Reference Books:

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech Press)
2. Principles of Information Security, Whitman, Thomson
3. Introduction to Cryptography, Buchmann, Springer

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B. TECH 7th SEMESTER	L	T	P	C
	3	-	-	3
16CS7T03: Data Warehousing and Data Mining				

Course Outcomes:

At the end of the course students are able to

1. Define why there is a need for data warehouse in addition to traditional operational database systems.
2. Identify components in typical data warehouse architectures.
3. Design a data warehouse and understand the process required to construct one.
4. Solve real data mining problems by using the right tools to find interesting patterns
5. Illustrate the data mining functionalities in detail with examples.
6. Examine the types of the data to be mined and apply preprocessing methods on raw data.

UNIT –I:

Introduction: What Motivated Data Mining? Why Is It Important, Data Mining—On What Kind of Data, Data Mining Functionalities—What Kinds of Patterns Can Be Mined? Are All of the Patterns Interesting? Classification of Data Mining Systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System, Major Issues in Data Mining. **(Han & Kamber)**

UNIT –II:

Data Pre-processing: Why Pre-process the Data? Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation. **(Han & Kamber)**

UNIT –III:

Data Warehouse and OLAP Technology: An Overview: What Is a Data Warehouse? A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining. **(Han & Kamber)**

UNIT –IV:

Classification : Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.

Model Over fitting: Due to presence of noise, due to lack of representation samples, evaluating the performance of classifier: holdout method, random sub sampling, cross-validation, bootstrap. **(Tan & Vipin)**

UNIT –V

Association Analysis: Basic Concepts and Algorithms : Introduction, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm. **(Tan & Vipin)**

UNIT –VI

Cluster Analysis: Basic Concepts and Algorithms : What Is Cluster Analysis? Different Types of B.TECH/CSE/2016 (CBCS)

Clustering, Different Types of Clusters, K-means, The Basic K-means Algorithm, K-means: Additional Issues, Bisecting K-means, K-means and Different Types of Clusters, Strengths and Weaknesses, K-means as an Optimization Problem, Agglomerative Hierarchical Clustering, Basic Agglomerative Hierarchical Clustering Algorithm, Specific Techniques, DBSCAN, Traditional Density: Center-Based Approach, The DBSCAN Algorithm, Strengths and Weaknesses. **(Tan & Vipin)**

Text Books :

1. Introduction to Data Mining : Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

Reference Books :

1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
2. Data Mining : Introductory and Advanced topics : Dunham, Pearson.
3. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.
4. Data Mining Techniques, Arun K Pujari, Universities Press.

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	3	-	-	3
Elective-III : 16CS7E01: Image Processing				

Course Outcomes: At the end of the course students are able to

At the end of this course, students will be able to

1. Describe and explain basic principles of digital image processing;
2. Define different techniques for image enhancement, video and image recovery
3. Identify the techniques for image and video segmentation
4. Analyze the techniques for image and video compression and object recognition
5. Explain information on color image processing
6. Illustrate with processing of images, recognition of the pattern and their applications

Syllabus Contents:

UNIT-I

Digital Image and Video Fundamentals

Digital image and video fundamentals and formats, 2-D and 3-D sampling and aliasing, 2-D/3-D filtering, image decimation/interpolation, video sampling and interpolation, Basic image processing operations, Image Transforms Need for image transforms, DFT, DCT, Walsh, Hadamard transform, Haar transform, Wavelet transform

UNIT-II

Image and Video Enhancement and Restoration

Histogram, Point processing, filtering, image restoration, algorithms for 2-D motion estimation, change detection, motion-compensated filtering, frame rate conversion, deinterlacing, video resolution enhancement, Image and Video restoration (recovery).

UNIT-III

Image and Video Segmentation

Discontinuity based segmentation- Line detection, edge detection, thresholding, Region based segmentation, Scene Change Detection, Spatiotemporal Change Detection, Motion Segmentation, Simultaneous Motion Estimation and Segmentation Semantic Video Object Segmentation, Morphological image processing.

UNIT-IV

Colour image Processing

Colour fundamentals, Colour models, Conversion of colour models, Pseudo colour image processing, Full colour processing

UNIT-V

Image and Video Compression

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Lossless image compression including entropy coding, lossy image compression, video compression techniques, and international standards for image and video compression (JPEG, JPEG 2000, MPEG-2/4, H.264, SVC), Video Quality Assessment

UNIT-VI

Object recognition

Image Feature representation and description-boundary representation, boundary descriptors, regional descriptors, feature selection techniques, introduction to classification, supervised and unsupervised learning, Template matching, Bayes classifier

References:

1. Ed. Al Bovik ,”Handbook of Image and Video Processing”, 2nd Edition, Academic Press, 2000.
2. J. W. Woods, “Multidimensional Signal, Image and Video Processing and Coding”, 2nd Edition, Academic Press, 2011.
3. Rafael C. Gonzalez and Richard E. Woods,” Digital Image Processing”, 3rd Edition, Prentice Hall, 2008.
4. A. M. Tekalp, “Digital Video Processing”, 2nd Edition, Prentice Hall, 2015.
5. S. Shridhar, “Digital Image Processing”, 2nd Edition, Oxford University Press, 2016.

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	3	-	-	3
Elective-III : 16CS7E02: Cyber Security				

Course Outcomes:

At the end of the course students are able to

1. Define the broad set of technical, social & political aspects of Cyber Security
2. Explain the vulnerabilities and threats posed by criminals, terrorist and nation states to national infrastructure
3. Demonstrate the nature of secure software development, operating systems and data base design
4. Recognized the role security management plays in cyber security defense
5. Explain the security management methods to maintain security protection
6. Define the legal and social issues at play in developing solutions.

UNIT-I

Introduction to Cybercrime: Introduction, Cybercrime and Information security, who are cybercriminals, Classifications of Cybercrimes, Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes. Cyber offenses: How criminals Plan Them: Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

UNIT-II

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies an Measures in Mobile Computing Era, Laptops.

UNIT - III

Cybercrimes and Cyber security: the Legal Perspectives
Introduction. Cyber Crime and Legal Landscape around the world, Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario In India, Digital signatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment
Cyber law, Technology and Students: Indian Scenario.

UNIT - IV

Understanding Computer Forensics: Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Chain of Custody concept, Network
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Forensics, Approaching a computer, Forensics Investigation, Challenges in Computer Forensics, Special Tools and Techniques Forensics Auditing

UNIT - V

Cyber Security: Organizational Implications: Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications.

UNIT -VI:

Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

TEXT BOOK:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, Wiley INDIA.
2. Introduction to Cyber Security , Chwan-Hwa(john) Wu,J.David Irwin.CRC Press T&F Group

REFERENCE BOOK:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press

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	3	-	-	3

Elective-III : 16CS7E03: Internet of Things

Course Outcome:

At the end of the course students are able to

1. Explain Arduino IDE tool and Arduino Programming concept.
2. Illustrate concept hardware configuration with Firmata protocols.
3. Explain the knowledge Arduino pin configuration.
4. Differentiate various sensors configuration and workflows.
5. Define architecture of IoT.
6. Explain the knowledge in cloud based web application.

UNIT-I (Introduction to Arduino)

Introduction to Arduino, history of Arduino, variants, Uno board block diagram, installation of Arduino, Arduino IDE, Arduino programming, functions and statements.

UNIT-II (Configuration)

Connecting Arduino board, Introducing the Firmata Protocol, uploading a Firmata sketch to the Arduino board, testing the Firmata protocol.

UNIT-III (Components)

List of components, software flow design, hardware flow design, hardware prototyping software, designing the hardware prototype, Arduino sketch default functions and custom function, setting Arduino board, pin configuration, working with pins.

UNIT-IV (Prototype)

Potentiometer-continuous observation from an analog input connection, Buzzer-generating sound alarm pattern, DC motor-controlling motor speed using PWM, LED- controlling LED brightness using PWM, Servomotor-moving the motor to a certain angle.

UNIT-V (Networking and cloud)

Arduino and computer networking, Networking fundamentals, Obtaining the IP address, Networking extensions for Arduino with libraries and class, architecture of IoT web applications, IoT cloud platforms, develop cloud-based IoT applications.

UNIT-VI (Case study: Home Automation)

IoT project design methodology, Project overview, UX flow, List of required components, project development stages.

Textbooks:

1. Python programming for Arduino by Pratik desai, Packt Publishing.
2. Internet of Things with Arduino Cookbook by Marco Schwartz.
3. Introduction to Arduino by Alan G. Smith.

References

1. Beginning Arduino by Michael McRoberts, 2e.
2. Getting Started with Arduino Massimo Banzi Second Edition.

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	3	-	-	3
Elective-III : 16CS7E04: Artificial intelligence				

At the end of the course students are able to

Course Outcomes:

At the end of this course, students will be able to

- Understand the concept of Artificial Intelligence, search techniques and knowledge representation issues
- Understanding reasoning and fuzzy logic for artificial intelligence
- Understanding game playing and natural language processing

Unit 1

What is AI (Artificial Intelligence)? : The AI Problems, The Underlying Assumption, What are AI Techniques, The Level Of The Model, Criteria For Success, Some General References, One Final Word Problems, State Space Search & Heuristic Search Techniques: Defining The Problems As A State Space Search, Production Systems, Production Characteristics, Production System Characteristics, And Issues In The Design Of Search Programs, Additional Problems. GenerateAnd-Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, MeansEnds Analysis.

Unit 2

Knowledge Representation Issues: Representations And Mappings, Approaches To Knowledge Representation. Using Predicate Logic: Representation Simple Facts In Logic, Representing Instance And Isa Relationships, Computable Functions And Predicates, Resolution. Representing Knowledge Using Rules: Procedural Versus Declarative Knowledge, Logic Programming, Forward Versus Backward Reasoning.

Unit 3

Symbolic Reasoning Under Uncertainty: Introduction To Non-monotonic Reasoning, Logics For Non-monotonic Reasoning. Statistical Reasoning: Probability And Bays' Theorem, CertaintyFactors And Rule-Base Systems, Bayesian Networks, DempsterShafer Theory

Unit 4

Fuzzy Logic. Weak Slot-and-Filler Structures: Semantic Nets, Frames. Strong Slot-and-Filler Structures: Conceptual Dependency, Scripts, CYC

Unit 5

Game Playing: Overview, And Example Domain: Overview, MiniMax, Alpha-Beta Cut-off, Refinements, Iterative deepening, The Blocks World, Components Of A Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems, Other Planning Techniques. Understanding: What is understanding? What makes it hard? As constraint satisfaction

Unit 6

Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Semantic Analysis, Discourse And Pragmatic Processing, Spell Checking Connectionist Models: Introduction: Hopfield Network,

Learning In Neural Network, Application Of Neural Networks, Recurrent Networks, Distributed Representations, Connectionist AI And Symbolic AI.

References:

- Elaine Rich and Kevin Knight “Artificial Intelligence”, 2nd Edition, Tata Mcgraw-Hill, 2005.
- Stuart Russel and Peter Norvig, “Artificial Intelligence: A Modern Approach”, 3rd Edition, Prentice Hall, 2009.

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	-	-	4	2
16CS7L01: Distributed Systems Lab				

COURSE OUTCOMES:

At the end of the course students are able to

1. Implement the distributed client server applications.
2. Configure and implement the Server Socket programs in distributed environment.
3. Implement the RMI based server client applications.
4. Implement the CORBA based server client applications
5. Implement the Publish/Subscribe Paradigm using Web Services
6. Design and test BPEL module that composes Arithmetic Service

Syllabus

- 1) Implement concurrent echo client-server application.
- 2) Implement concurrent day-time client-server application.
- 3) Configure following options on server socket and tests them: SO_KEEPALIVE, SO_LINGER, SO_SNDBUF, SO_RCVBUF, TCP_NODELAY.
- 4) Incrementing a counter in shared memory
- 5) Create CORBA based server-client application
- 6) Design XML Schema and XML instance document
- 7) WSDL based: Implement Arithmetic Service that implements add, and subtract operations /
Java based: Implement TrigonometricService that implements sin, and cos operations
- 8) Implementing Publish/Subscribe Paradigm using Web Services, ESB and JMS
- 9) Monitor SOAP request and response packets. Analyze parts of it and compare them with the operations (java functions) headers.
- 10) Design and test BPEL module that composes Arithmetic Service and Trigonometric Service
- 11) Test open source ESB using web service.

B. TECH 7 th SEMESTER	L	T	P	C
	-	-	4	2
16CS7L02: Data Warehousing and Data Mining Lab				

The objective of the lab exercises is to use data mining techniques to identify customer segments and to extract knowledge from various datasets using WEKA tool or R-programming.

Course outcomes:

At the end of the course students are able to

1. Synthesize the data mining fundamental concepts and techniques from multiple perspectives.
2. Develop skills and apply data mining tools for solving practical problems
3. Demonstrate the Advance relevant programming skills.
4. Develop research skills by reading the data mining literature.
5. Demonstration of classification rule process.
6. Demonstration of clustering rule process

List of Programs:

1. Demonstration of pre-processing on dataset student.arff
2. Demonstration of pre-processing on dataset labor.arff.
3. Demonstration of Association rule process on dataset contactlenses.arff using Aprior algorithm.
4. Demonstration of Association rule process on dataset weather.arff using Aprior algorithm.
5. Demonstration of classification rule process on dataset student.arff using Id3 algorithm.
6. Demonstration of classification rule process on dataset employee.arff using Id3 algorithm.
7. Demonstration of classification rule process on dataset labour.arff using Id3 algorithm.
8. Demonstration of clustering rule process on dataset iris.arff using simple K-Means.
9. Demonstration of clustering rule process on dataset student.arff using simple K-Means.

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B. TECH 7th SEMESTER	-	-	4	2
Skill Based Laboratory Elective : 16CS7LE1: R-Programming Lab				

Course Outcomes: At the end of the course students are able to

- 1 Install and use R for simple programming tasks.
2. Extend the functionality of R by add -on packages
3. Extract data from files and other sources and perform various data manipulation tasks on them.
4. Code statistical functions in R.
5. Develop R Graphics and Tables to visualize results of various statistical operations on data.
6. Apply the knowledge of R gained to data Analytics for real life applications

Lab Experiments:

- 1 Introduction R Nuts and Bolts (I)
- 2 Getting Data In and Out of R
- 3 Control Structures and Functions
- 4 Loop Functions
- 5 Data Manipulation (dplyr, reshape2 packages)
- 6 String Operations (stringr package)
- 7 Packaging, Debugging and Object Oriented Programming
- 8 Data Visualization (ggplot2 package)
- 9 Clustering
- 10 Regressions and Classification
- 11 Data Analytics Case Study

B. TECH 7th SEMESTER	L	T	P	C
	-	-	4	2
Skill Based Laboratory Elective : 16CS7LE2: Cloud Computing Technologies Lab				

Course Outcomes:

At the end of the course students are able to

1. Develop the systems, protocols and mechanisms to support cloud computing
2. Develop applications for cloud computing
3. Develop the hardware necessary for cloud computing
4. Design a novel cloud computing application
5. Implement a novel cloud computing application
6. Develop Items Servlet using Goggle App Engine

List of Programs:

1. Study on cloud Google App engine and its installations.
2. Write a program to display “Hello World” using Goggle App Engine.
3. Write a program to receive “Greetings” using Goggle App Engine.
4. Write a program to Handling Email Servlet using Goggle App Engine.
5. Write a program to confirm Friend Servlet using Goggle App Engine.
6. Write a program to Handling URL Servlet using Goggle App Engine.
7. Write a program to create and read employee data in cloud using Goggle App Engine.
8. Write a program to delete and update employee data in cloud using Goggle App Engine.
9. Write a program to display customer Servlet using Goggle App Engine.
10. Write a program to display Items Servlet using Goggle App Engine.

B. TECH 7th SEMESTER	L	T	P	C
	-	-	4	2
Skill Based Laboratory Elective : 16CS7LE3: Python Lab				

Course Outcomes:

At the end of the course students are able to

- 1 Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python
- 2 Express different Decision Making statements and Functions
- 3 Interpret Object oriented programming in Python
- 4 develop and summarize different File handling operations
- 5 Explain how to design GUI Applications in Python and evaluate different database Operations
6. Design and develop -Client Server network applications using Python

Lab Experiments:

Exercise 1:

Python Basics

Python Scripting, Working with Data, Program Structure, Running Python Scripts, Variables, Assignment, Keywords, Input- Output, Indentation.

Exercise 2:

Data Types, Operators and Expressions

Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while, break, continue, pass

Exercise 3:

Data Structures

Lists-Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.

Exercise 4:

Functions, Modules

Functions - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables.

Modules: Creating modules, import statement, from. Import statement, name spacing, Classes and Objects

Exercise 5:

Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Datahiding,

Exercise 6:

Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions

Exercise 7:

Python Database Integration

Exercise 8:

Python CGI & GUI Programming

Exercise 9:

Project Case Study

B. TECH 7 th SEMESTER	L	T	P	C
	-	-	4	2
Skill Based Laboratory Elective : 16CS7LE4: DotNet Technology Lab				

Course Outcomes:

At the end of the course students are able to

1. Create, Compile and Run object-oriented C# programs using Visual Studio.
2. Write C# language syntax, constructs and semantics.
3. Develop reusable .NET components using C# with the help of classes and interfaces.
4. Develop ASP.NET server controls in web applications.
5. Design web applications using ASP.NET
6. Create database driven web applications with ASP.NET and ADO.NET

LAB EXPERIMENTS

1. Installation of Visual Studio IDE and running the sample program.
2. Write a console application that obtains four integer values from the user and displays the product of four values.
3. Write an application that includes the logic from Exercise 2, obtains two numbers from the user, and displays them, but rejects any input where both numbers are greater than 10 and asks for two new numbers.
4. Write programs using conditional statements and loops:
 - i. Generate Fibonacci series.
 - ii. Test for prime numbers.
 - iii. Generate prime numbers.
 - iv. Reverse a number and find sum of digits of a number.
 - v. Generate various patterns (triangles, diamond) with numbers.
5. Write an application that receives the following information from a set of students:

Student Id:

Student Name:

Course Name:

Date of Birth:

The application should also display the information of all the students once the data is entered. Implement this using an Array of Structures.

6. Write a program using function overloading to swap two integer numbers and swap two float numbers.
7. Define a class 'salary' which will contain member variable Basic, TA, DA, HRA. Write a program using Constructor with default values for DA and HRA and calculate the salary of employee.
8. Write a program to implement inheritance concept and multiple inheritance using interface and class.
9. Write a program to accept a number from the user and throw an exception if the number is not an even number.
10. Create an application that allows the user to enter a number in the textbox. Check whether the number in the textbox is palindrome or not. Print the message accordingly in the label control named 'Result' when the user clicks on the button 'check'.
11. Create an application which will ask the user to input his name and a message, display the two items concatenated in a label, and change the format of the label using radio buttons and check boxes for selection, the user can make the label text bold, underlined or italic and change its color. Include buttons to display the message in the label, clear the text boxes and label and exit.
12. Create an application with "How is the book Programming in C# by Balaguruswamy?" Give the user 3 choices: i) Good ii) Satisfactory iii) Bad.

Provide a VOTE button. After user votes, present the result in percentage using labels next to the choices.

13. Set the font-Arial, font style-bond, font size-18px of different controls (i.e., Label, textbox, button) using CSS.
14. Create the application that accepts name, password, age, email id, and user id. All the information entry is compulsory. Password should be reconfirmed. Age should be within 21 to 30. Email id should be valid. User id should have at least a capital letter and digit as well as length should be between 7 and 20 characters.
15. Create a Web application to display all the EmpName and DeptId of the employee from the database using SQL source control and bind it to GridView. Database fields are (DeptId, DeptName, EmpName, Salary).
16. Create a Login Module which adds Username and Password in the database. Username in the database should be a primary key.

Text Books

1. Programming in C#: A Primer, Balaguruswamy, McGraw-Hill.
2. Mastering Visual C# .NET, Jason Price and Mike Gunderloy, Publisher: Wiley
3. ASP .NET Programming with C# & SQL Server, 1st Edition by Don Gosselin.

EIGHT SEMESTER

B. TECH 8th SEMESTER	L	T	P	C
	3	-	-	3
Elective –IV: 16CS8E01: Machine Learning				

Course outcomes:

At the end of the course students are able to

1. Define basic concepts of machine learning.
2. Evaluate and compare the performance or, other qualities of regression and logistic regression.
3. Describe concepts of artificial intelligence.
4. Design a supervised or unsupervised learning system.
5. Define the knowledge about SVM.
6. Demonstrate Instance based learning algorithms.

Syllabus

UNIT I: Introduction

Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning. Concept learning and the general to specific ordering – Introduction, a concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias.

UNIT II: Linear Regression & Logistic Regression

Predicting numeric values: regression – Finding the best fit lines with linear regression, locally weighted linear regression, Shrinking Coefficients, The bias / Variance tradeoff. Logistic Regression: Classification with logistic regression and the sigmoid function, using optimization to find the best regression coefficients.

UNIT III: Artificial Neural Networks

Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition, Advanced topics in artificial neural networks.

UNIT IV: Evaluation Hypotheses

Motivation, Estimation hypothesis accuracy, Basics of sampling theory, a general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms.

UNIT V: Support vector machines & Dimensionality Reduction techniques

Separating data with the maximum margin, finding the maximum margin, efficient optimization with SMO algorithm, speeding up optimization with full platt SMO, Using Kernels for more Complex data. Dimensionality Reduction techniques: Principal Component analysis, Example.

UNIT VI: Instance-Based Learning

Introduction, k -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.

Genetic Algorithms: Representing Hypotheses, Genetic Operators, Fitness Function and Selection, Illustrative Example.

TEXT BOOKS

1. Machine Learning, Tom M. Mitchell, MGH
2. Machine Learning in Action, Peter Harington, 2012, Cengage.`

REFERENCE BOOKS

1. Introduction to Machine Learning, Ethem Alpaydin, PHI, 2004

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Elective –IV: 16CS8E02: Web Services & SOA				

Course Outcomes:

At the end of the course students are able to

1. Creation of SOA compliant web service using various technologies.
2. Classify various service oriented analysis techniques
3. Analyze basic concepts of SOA and it differs with other architectures.
4. Illustrate various web services architectures.
5. Predict advanced concepts of service composition, Orchestration and Choreography.
6. Associate various open standards available for developing SOA compliant web services.

UNIT-1

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

UNIT-2

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.

UNIT-3

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.

UNIT-4

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).

UNIT-5

Web Services Interoperability Technologies (WSIT) - SOA support in .NET – Common Language Runtime - ASP.NET web forms – ASP.NET web services – Web Services Enhancements (WSE).

UNIT-6

WS-BPEL basics – WS-Coordination overview - WS-Choreography, WS-Policy, WS-Security.

TEXT BOOKS:

1. Thomas Erl, “Service-Oriented Architecture: Concepts, Technology, and Design”, Pearson Education, 2005.

REFERENCES:

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1. Thomas Erl, "SOA Principles of Service Design "(The Prentice Hall Service-Oriented Computing Series from Thomas Erl), 2005.
2. Newcomer, Lomow, "Understanding SOA with Web Services", Pearson Education, 2005.
3. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services, An Architect's Guide", Pearson Education, 2005.
4. Dan Woods and Thomas Mattern, "Enterprise SOA Designing IT for Business Innovation" O'REILLY, First Edition, 2006.

B. TECH 8th SEMESTER	L	T	P	C
	3	-	-	3
Elective –IV 16CS8E03: Information Retrieval Systems				

Course Outcomes:

At the end of this course student is able to:

1. Describe the basic information storage and retrieval concepts
2. Apply various data structures to store and represent information
3. Analyze effective information retrieval system using automatic indexing and clustering techniques
4. Choose clustering techniques for different data base systems
5. Choose searching techniques for different data base systems
6. Describe various information visualization technologies and Explain different types of search algorithms

UNIT 1

Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital Libraries and Data Warehouses, **Information Retrieval System Capabilities:** Search, Browse, Miscellaneous

UNIT 2

Data Structures: Introduction, Stemming Algorithms, Inverted File Structure, N-Gram data Structure, PAT data structure, Signature file structure, Hypertext data structure.

UNIT 3

Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural language, Concept indexing, Hypertext linkages.

UNIT 4

Document and Term Clustering: Introduction, Thesaurus Generation, Item Clustering, Hierarchy of clusters

UNIT 5

User Search Technique Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, Weighted searches of Boolean systems, Searching the internet and Hypertext

UNIT 6

Information Visualization Introduction, Cognition and Perception, Information Visualization Technologies

Text Search Algorithms: Introduction, Software Text Search Algorithms, Hardware Text Search Systems

Text Books:

1. Kowalski, Gerald, Mark T May bury: Information Retrieval Systems Theory and Implementation, Kluwer B.TECH/CSE/2016 (CBCS)

Academy Press,1997

References:

1. Modern Information Retrieval by Yates, Pearson Education
2. Information Storage and Retrieval by Robert Korfhage - John Wiley and Sons

B. TECH 8th SEMESTER	L	T	P	C
	3	-	-	3
Elective –IV: 16CS8E04: Big Data Analytics				

Course Outcomes: At the end of the course students are able to

1. Distinguish efficient big data solutions for various application areas using appropriately selected algorithms and data structures.
2. Analyze methods and algorithms, to compare and real-world problems.
3. Explain trade-offs in big data processing technique.
4. Explain the Big Data Fundamentals, including the evolution and the characteristics of Big Data
5. Solve non-relational databases, the techniques for storing and processing large volumes of structured and unstructured data.
6. Apply the novel architectures and platforms introduced for big data.

UNIT-I

Introduction to Big Data Analytics:

Definition of Big data, Big data characteristics and considerations, Unstructured data fueling big data analytics, Analyst perspective data repositories, Key roles of the New Data Eco system, applications.

UNIT-II

Data Analytics Life Cycle:

Data analytics life cycle, Roles of Successful Analytics project

UNIT-III

Working with Big Data using R:

How to use R Graphical user interface, How to get data into R, Data types used in R, and the basic operations, generic functions, Data analytic methods in R

UNIT-IV

Advanced Analytics Theory and methods:

Categorization: K-means clustering, association rules, Regression: Linear & Logistic Classification: Nave Bayesian, Decision trees, time series analysis, text analysis.

UNIT-V

Advanced Analytics _Technology and tools

Mapreduce and Hadoop, HDFS, Using R with Hadoop

UNIT-VI

Hadoop Ecosystem:

Using Query Languages HIVE and PIG for data analytics, HBASE, Mahout-machine learning algorithms using Hadoop mapreduce HDFS

Text Books:

- 1 Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data by EMC Education Services- Wiley
- 2 Big Data Analytics with R, by Simon Walkowiak

Reference:

- 1 R For data science-Dan Toomey
- 2 Big Data Analyticswith R and Hadoop-Vignesh Prajapati

B. TECH 8th SEMESTER	L	T	P	C
	3	-	-	3
Open Elective-II :				

LIST OF OPEN ELECTIVES

S.No.	Course Code	Name of the Course	Offering Dept.
1	16CEXO01	Green Buildings and Infrastructure	CIVIL
2	16CEXO02	Disaster Management	
3	16EEXO01	Electrical Safety Management	EEE
4	16EEXO02	Non-Conventional Energy Sources	
5	16MEXO01	Composite Materials	MECH
6	16MEXO02	Introduction to Operation Research	
7	16ECXO01	Introduction to Nanotechnology and its Applications	ECE
8	16ECXO02	Introduction to Global Positioning and Navigation Satellite Systems	
9	16CSXO01	Introduction to Data Base Management Systems	CSE
10	16CSXO02	Introduction to Big Data Analytics	
11	16ITXO01	Introduction to Software Project Management	IT
12	16ITXO02	Introduction to Internet of Things (IoT)	
13	16BMXO01	Innovations and Entrepreneurship	MBA
14	16BMXO02	Industrial Sociology & Psychology	

Note: The student has to choose one Open Elective subject in Sem VI and Sem VIII from the above list other than offered by parent Department, which was not studied in earlier semesters.

B. TECH 6th/ 8th SEMESTER	L	T	P	C
	3	-	-	3
16CEX001: GREEN BUILDINGS AND INFRASTRUCTURE				

COURSE OUTCOMES: Students are able to

1. Recognize existing energy codes, green building codes and green rating systems.
2. Compare cost and performance of building materials with recycled components.
3. List out construction materials and methods that more easily allow for salvage and re-use of building materials.
4. List out available renewable energy resources.
5. Develop the techniques and benefits of building performance testing, monitoring and metering.
6. Identify techniques for weatherization and sustainable remodeling of existing structures.

Unit – I

Green Buildings: Definition of Green Buildings, typical features of green buildings, benefits of Green Buildings- Sustainable site selection and planning of buildings to maximize comfort, day lighting, ventilation, planning for storm water drainage.

Unit - II

Environmentally friendly building materials and technologies: Natural Materials like bamboo, timber, rammed earth, stabilized mud blocks, hollow blocks, lime & lime-pozzolana cements, materials from agro and industrial waste, Ferro-cement and Ferro-concrete.

Unit - III

Energy and resource conservation: Need for energy conservation, various forms of energy used in buildings, embodied energy of materials, energy used in transportation and construction processes- water conservation systems in buildings-water harvesting in buildings.

Unit - IV

Use of renewable energy resources: Wind and Solar Energy Harvesting, potential of solar energy in India and world, construction and operation of various solar appliances, success case studies of fully solar energy based buildings in India.

Unit – V

Climate Design: Local climatic conditions-temperature, humidity, wind speed and direction-impact of climate change on built environment - comforts: the desirable conditions - Principles of thermal design - means of thermal -light and lighting-building acoustics- energy efficient lighting, Ventilation and air quality requirement, various techniques for passive cooling, case studies for passive cooling and thermal comfort.

Unit - VI

Green Building Rating Systems: Introduction to Leadership in Energy and Environment Design (LEED), Green Rating systems for Integrated Habitat Assessment - Modular wastewater treatment systems for built environment.

TEXT BOOKS:

1. "Alternative building materials and technologies" by K.S. Jagadish, B.V. Venkatarama Reddy and K.S. Nanjunda Rao, New age international publishers, New Delhi.
2. "Non-Conventional Energy Resources" by G. D. Rai, Khanna Publishers.

REFERENCES:

1. Kibert, C. (2005) Sustainable Construction: Green Building Design and Delivery (Hoboken, NJ: John Wiley & Sons).
2. McDonough, W. and M. Braungart (2002) Cradle to Cradle: Remaking the Way We Make Things (New York: Farrar, Straus and Giroux).

B. TECH 6th / 8th SEMESTER	L	T	P	C
	3	-	-	3
16CEX002: DISASTER MANAGEMENT				

COURSE OUTCOMES: Students are able to

1. Identify the tools of integrating disaster management principles in disaster mitigation process.
2. Distinguish between the different approaches needed to manage pre and post- disaster activities.
3. Explain the process of risk management.
4. Recognize the ‘relief system’, ‘disaster victim’ and relate them.
5. Evaluate the planning strategies useful in risk mitigation processes.
6. Explain about public awareness and economic incentive possibilities.

UNIT-I

Natural Hazards and Disaster management: Introduction of DM – Inter Disciplinary -nature of the subject- Disaster Management cycle- Five priorities for action. Case study methods of the following: floods, draughts - Earthquakes- global warming, cyclones & Tsunamis- Post Tsunami hazards along the Indian coast - landslides.

UNIT-II

Man Made Disaster and their management along with case study methods of the following: Fire hazards - transport hazard dynamics -Solid waste management- post disaster – bio terrorism -threat in mega cities, rail and air craft’s accidents, and Emerging infectious diseases & Aids and their management.

UNIT-III

Risk and Vulnerability: Building codes and land use planning - social vulnerability - environmental vulnerability - Macroeconomic management and sustainable development, climate change risk rendition - financial management of disaster - related losses.

UNIT-IV

Role of Technology in Disaster managements: Disaster management for infra structures, taxonomy of infrastructure - treatment plants and process facilities-electrical substations- roads and bridges- mitigation programme for earth quakes -flowchart, geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training transformable indigenous knowledge in disaster reduction.

UNIT-V

Education and Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery - Community based disaster management and social capital-Designing resilience- building community capacity for action.

UNIT-VI

Multi-sectional Issues: Impact of disaster on poverty and deprivation-Climate change adaptation and human health -Exposure , health hazards and environmental risk-Forest management and disaster risk reduction.-Institutional capacity in disaster management -The Red cross and red crescent movement.-Corporate sector and disaster risk reduction-A community focused approach.

TEXTBOOKS:

1. 'Disaster Management - Global Challenges and Local Solutions' by Rajib shah & R. Krishnamurthy (2009), Universities press.
2. 'Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. 'Disaster Management - Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

REFERENCE BOOKS:

1. 'Disaster Management' edited by H K Gupta (2003), Universities press.
2. "Disaster Management and Mitigation" by Prof. R.B. Singh (2016), World Focus

B. TECH 6th/ 8th SEMESTER	L	T	P	C
	3	-	-	3
16EEXO01: ELECTRICAL SAFETY MANAGEMENT				

COURSE OUTCOMES: Students are able to

1. Explain the objectives and precautions of Electrical safety, effects of shocks and their prevention.
2. Summarize the safety aspects during installation of plant and equipment.
3. Describe the electrical safety in residential, commercial and agricultural installations.
4. Describe the various Electrical safety in hazardous areas, Equipment earthing and system neutral earthing.
5. State the electrical systems safety management and IE rules.

UNIT-I

Introduction to Electrical Safety, Shocks and their Prevention: Terms and definitions- objectives of safety and security measures- Hazards associated with electric current, and voltage who is exposed, principles of electrical safety- Approaches to prevent Accidents- scope of subject electrical safety. Primary and secondary electrical shocks -possibilities of getting electrical shock and its severity- medical analysis of electric shocks and its effects - shocks due to flash/ Spark over's - prevention and safety precautions against contact shocks - flash shocks, burns, residential buildings and shops.

UNIT-II

Safety during Installation of Plant and Equipment: Introduction, preliminary preparations, preconditions during installation electrical plant and equipment, safety aspects. Field quality and safety during erection, personal protective equipment installation of a large oil immersed power transformer, installation of outdoor switchyard equipment, safety during installation of electrical rotating machines, drying out and insulation resistance measurement of rotating machines.

UNIT-III

Electrical Safety In Residential, Commercial And Agricultural Installations Wiring and fitting – Domestic appliances – shock from wet wall and water taps – fan firing shock – multi-storied building – Temporary installations – Agricultural pump installation – Do's and Don'ts for safety in the use of domestic electrical appliances.

UNIT-IV

Electrical Safety In Hazardous Areas : Hazardous zones – class 0,1 and 2 – spark, flashovers and corona discharge and functional requirements – Specifications of electrical plants, equipments for hazardous locations Classification of equipment provided for various hazardous gases and vapours – classification of equipment/enclosure for hazardous locations.

UNIT-V

Equipment Earthing and System Neutral Earthing : Introduction description of earth system between system grounding and Equipment Grounding, Equipment Earthing, Functional Requirement of earthing system, neutral grounding(System Grounding), Types of Grounding, Methods of Earthing Generators Neutrals.

UNIT-VI

Safety Management of Electrical Systems: Principles of Safety Management, Management Safety Policy, Safety organization, safety auditing, Motivation to managers, supervisors, employees towards safety.

TEXT BOOKS:

1. S. Rao, Prof. H.L. Saluja, "Electrical safety, fire safety Engineering and safety management", Khanna Publishers. New Delhi, 1988.(units-I to V)

REFERENCE BOOK:

1. Pradeep Chaturvedi, "Energy management policy, planning and utilization", Concept Publishing company, New Delhi, 1997.

B. TECH 6th / 8th SEMESTER	L	T	P	C
	3	-	-	3
16EEXO02: NON CONVENTIONAL ENERGY SOURCES				

COURSE OUTCOMES: Students are able to

- Analyze solar radiation data, extraterrestrial radiation, radiation on earth's surface.
- Design solar thermal collections.
- Design solar photo voltaic systems.
- Develop maximum power point techniques in solar PV and wind.
- Explain wind energy conversion systems, Betz coefficient , tip speed ratio.
- Explain basic principle and working of hydro, tidal, biomass ,fuel cell and geothermal systems.

UNIT-I

Fundamentals of Energy Systems : Energy conservation principle – Energy scenario (world and India) – Solar radiation: Outside earth's atmosphere – Earth surface – Analysis of solar radiation data – Geometry – Radiation on tilted surfaces – Numerical problems.

UNIT-II

Solar Thermal Systems: Liquid flat plate collections: Performance analysis – Transmissivity – Absorptivity – Product collector efficiency factor – Collector heat removal factor – Numerical problems – Introduction to solar air heaters – Concentrating collectors and solar pond.

UNIT-III

Solar Photovoltaic Systems : Balance of systems – IV characteristics – System design: Storage sizing, PV system sizing, Maximum power point techniques: Perturb and observe (P&O) technique – Hill climbing technique.

UNIT-IV

Wind Energy: Wind patterns – Types of turbines – Kinetic energy of wind – Betz coefficient – Tip-speed ratio – efficiency – Power output of wind turbine – Selection of generator(synchronous, induction) – Maximum power point tracking.

UNIT-V

Hydro and Tidal power systems: Basic working principle – Classification of hydro systems: large, small, micro – Measurement of head and flow – Energy equation – Types of turbines – Numerical problems. Tidal power – Basics – Kinetic energy equation – Numerical problems – Wave power – Basics – Kinetic energy equation.

UNIT-VI

Biomass, fuel cells and geothermal systems: Biomass Energy: Fuel classification – Pyrolysis – Direct combustion of heat – Different digesters and sizing.

- **Fuel cell:** classification – Efficiency – VI characteristics.
- **Geothermal:** classification – Dry rock and aquifer – Energy analysis.

Text Books

- Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition.
- Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis.
- Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford.

Reference Books

- Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal, World scientific, Singapore.
- Renewable Energy Technologies /Ramesh & Kumar /Narosa.
- Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI.

B. TECH 6 th / 8 th SEMESTER	L	T	P	C
	3	-	-	3
16MEXO01:COMPOSITE MATERIALS				

COURSE OUTCOMES: Student are able to

CO1: Summarize the basic terminology and advantages of composite materials. [K2]

CO2: Classify and **Analyze** various types of laminates. [K2, K4]

CO3: Analyze the mechanical behavior of composite material as well as summarize various manufacturing methods of Laminated Fiber Reinforced Composite Material. [K4]

CO4: Analyze the micromechanical behavior of composite material. [K4]

CO5: Analyze the macromechanical behavior of composite material. [K4]

CO6: Explain various applications of Composite material in detail. [K2]

UNIT – I

INTRODUCTION TO COMPOSITE MATERIALS:

Definitions: Composite material, Fiber, Matrix. Types of fibers and Raw Fiber Properties, Types of Matrix, Prepegs, Fillers and other Additives. Advantages of Composite Materials and Structures – Strength and Stiffness advantages, Cost advantages, Weight advantages, Applications

UNIT – II

ANALYSIS OF LAMINATED COMPOSITES:

Laminates, Basic Assumptions, Strain-Displacement Relationship, Stress-Strain Relationships, Equilibrium Equations, Laminate Stiffness, Determination of Lamina Stresses and Strains, Types of Laminate Configuration, Balanced Laminate, Anti-symmetric Laminate, Examples

UNIT – III

BASICS OF COMPOSITE MATERIALS:

Mechanical Behavior of Composite Materials - Lamina, Laminate: The basic building block of a composite material.

Manufacturing of Laminated Fiber-Reinforced Composite Materials

UNIT – IV

MICRO MECHANICAL ANALYSIS OF COMPOSITE STRENGTH AND STIFFNESS:

Properties of typical composite materials, Volume and Weight Fractions, Longitudinal Strength and Stiffness. Transverse Modulus, In-plane shear Modulus, Poisson's ratio.

UNIT – V

ELASTIC PROPERTIES OF UNIDIRECTIONAL LAMINA:

Stress-strain relationships. Engineering Constants. Stress strain relations of a Thin Lamina. Examples

UNIT – VI

APPLICATIONS OF COMPOSITE MATERIALS:

Use of Composite materials in present world – Aeronautical Applications, Space applications, Automotive applications and commercial applications.

TEXT BOOKS:

1. Mechanics of Composite Materials - R M Jones / Taylor & Francis
2. Mechanics of Composite Materials and Structures - Madhujit Mukhopadhyay / Universities Press

B. TECH 6th/ 8th SEMESTER	L	T	P	C
	3	-	-	3
16MEX002: OPERATION RESEARCH				

COURSE OUTCOMES: Students are able to

CO1: Apply linear programming techniques to solve industrial optimization problems.[K3]

CO2: solve transportation and assignment problems using operation research techniques. [K3]

CO3: Solve sequencing problems using operation research techniques. [K3]

CO4: Solve replacement problems for optimization. [K3]

CO5: Analyze game theory and apply them for optimization. [K4]

CO6: Analyze queuing theory and apply it for optimization and also analyze inventory models for various industrial problems. [K4]

UNIT—I

LINEAR PROGRAMMING: Linear programming problem formulation – Graphical solution – simplex method-artificial variables techniques -two–phase method, Big-M method – Duality principle.

UNIT – II

TRANSPORTATION PROBLEM: Formulation – optimal solution, unbalanced transportation problem – Degeneracy

***ASSIGNMENT PROBLEM-** Formulation – optimal solution - variants of assignment problem- traveling salesman problem.*

UNIT – III

SEQUENCING PROBLEM: Introduction – Optimal Solution for processing n jobs through two machines - processing n jobs through three machines - processing n jobs through m machines - processing two jobs through m machines

UNIT – IV

***REPLACEMENT:** Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement.*

UNIT – V

THEORY OF GAMES: Introduction – minimax (maxmin) – criterion and optimal strategy –solution of games with saddle points – rectangular games without saddle points – 2 x 2 games– dominance principle – m x 2 & 2 x n games -graphical method.

UNIT – VI

WAITING LINES: Introduction- Single channel-Poisson arrivals-Exponential service times-with infinite population model (M/M/1:FIFO/ ∞/∞)

INVENTORY : Introduction – single item – deterministic models – purchase inventory models with one price break and multiple price breaks – shortages are not allowed .

TEXT BOOKS:

1. Operations Research / S.D.Sharma, Ramnath co, Meerut
2. Operations Research, P.K.Gupta, D.S.Hira, S.Chand

REFERENCE BOOKS:

1. Operations Research /A.M.Natarajan,P.Balasubramani, A. Tamilarasi/PearsonEducation.
2. Operations Research / R.Pannerselvam,PHI Publications.

B. TECH 6th/8th SEMESTER	L	T	P	C
	3	-	-	3
16ECXO01 : INTRODUCTION TO NANO TECHNOLOGY AND ITS APPLICATIONS				

COURSE OUTCOMES: Students are able to

- CO1.** Define Nano materials and Nano Technology with properties
- CO2.** Explain Synthesis as Fabrication methods of Nano Technology
- CO3.** Demonstrate Characterization techniques of Nano Materials
- CO4.** Analyze carbon Nano technology and application of Nano technology.

UNIT-I : INTRODUCTION: History of nano science, definition of nano meter, nano materials, nano technology. Classification of nano materials. Crystal symmetries, crystal directions, crystal planes. Band structure. **(T1)**

UNIT-II : PROPERTIES OF MATERIALS: Mechanical properties, electrical properties, dielectric properties, thermal properties, magnetic properties, opto electronic properties. Effect of size reduction on properties, electronic structure of nano materials. **.(T1)**

UNIT-III : SYNTHESIS & FABRICATION METHODS: Synthesis of bulk polycrystalline samples, growth of single crystals. Synthesis techniques for preparation of nano particle – Bottom Up Approach – sol gel synthesis, hydro thermal growth, thin film growth, PVD and CVD; Top Down Approach – Ball milling, micro fabrication, lithography. **.(T1)**

UNIT-IV : CHARACTERIZATION TECHNIQUES: X-Ray diffraction and Scherrer method, scanning electron microscopy, transmission electron microscopy, scanning probe microscopy, atomic force microscopy, piezoresponse microscopy, X-ray photoelectron spectroscopy, XANES and XAFS, angle resolved photoemission spectroscopy, diffuse reflectance spectra, photoluminescence spectra, Raman spectroscopy. **.(T2)**

UNIT-V : CARBON NANO TECHNOLOGY: Characterization of carbon allotropes, synthesis of diamond – nucleation of diamond, growth and morphology. Applications of nanocrystalline diamond films, graphene, applications of carbon nanotubes, carbon nanotubes for nanoelectronics devices. **.(T2)**

UNIT-VI : NANO TECHNOLOGY APPLICATIONS: Applications in material science, biology and medicine, surface science, energy and environment. Applications of nano structured thin films, applications of quantum dots. **.(T2)**

TEXT BOOKS

1. Nano science and nano technology by M.S RamachandraRao, Shubra Singh, Wiley publishers. **(Unit-I,II,III)**

2. Fundamentals of nanoelectronics by George W Hanson Pearson publications, India 2008 **(Unit-IV,V,VI)**

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REFERENCE BOOKS

- 1.Introduction to Nano Technology by Charles P. Poole, Jr., Frank J.Owens, Wiley publishers.
- 2.Principles of Nanotechnology by Phani Kumar, Scitech.

B. TECH 6th/ 8th SEMESTER	L	T	P	C
	3	-	-	3
16ECX002 : GLOBAL POSITIONING AND NAVIGATION SATELLITE SYSTEMS				

COURSE OUTCOMES: Students are able to

CO1: Describe the principles of GNSS based positioning methods, the main components in a satellite navigation system and their functions.

CO2: Estimate and represent the GPS coordinate frames & GPS orbits..

CO3: Analyze the influence of different error sources on the positioning precision.

CO4: Describe examples of the role of GNSS, or GNSS based products and services, in sustainable development.

UNIT - I

Overview of GPS: Basic concept, system architecture, space segment, user segment, services of GPS, applications of GPS.

UNIT - II

GPS Signals: Signal structure, anti spoofing (AS), selective availability, Difference between GPS and GALILEO satellite construction.

UNIT - III

GPS coordinate frames, Time references: Geodetic and Geo centric coordinate systems, ECEF coordinate world geodetic 1984 (WGS 84), GPS time.

UNIT - IV

GPS orbits and satellite position determination: GPS orbital parameters, description of receiver independent exchange format (RINEX) – Observation data and navigation message data parameters, GPS position determination.

UNIT - V

GPS Errors: GPS error sources – clock error, ionospheric error, tropospheric error, multipath, ionospheric error estimation using dual frequency GPS receiver.

UNIT - VI

GPS Aided Geo-Augmented Navigation (GAGAN) architecture, Indian Regional Navigation Satellite System. GNSS augmentation, Wide Area Augmentation System (WAAS), applications

TEXT BOOKS :

1. G S RAO, Global Navigation Satellite Systems, McGraw-Hill publications, New Delhi, 2010 (**Unit-I,III,IV,V,VI**)

2. B. Hoffman – Wellenhof, H. Liehtenegger and J. Collins, ‘GPS – Theory and Practice’, Springer – Wien, New York (2001). **(Unit-I,II,IV)**

REFERENCE BOOKS :

1. James Ba – Yen Tsui, ‘Fundamentals of GPS receivers – A software Approach’, John Wiley & Sons,2001.

B. TECH 6th / 8th SEMESTER	L	T	P	C
	3	1	-	4
16CSX001: DATABASE MANAGEMENT SYSTEMS				

COURSE OUTCOMES: Student are able to

1. Identify the different issues involved in the design and implementation of a database system
2. Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data.
3. Predict different concurrency control techniques while implementing real time applications
4. Solve real time database issues through SQL concepts
5. Organize the data from unstructured to structured using different normal forms
6. Justify various kinds of secondary storage devices to store data

UNIT-I

History of DBMS, File Systems vs DBMS, Advantages of DBMS, Describing and Storing Data in DBMS, Transaction Management, Structure of a DBMS, people who work with Databases, Database Design and ER Diagrams, Entities, Attributes and Entity Sets, Relationships and Relationship sets

UNIT-II

Additional Features of ER Models, Conceptual Design with ER Models, Conceptual Design for Large Enterprise. Relational Model- Introduction to Relational Model, Integrity constraints over relations, Enforcing Integrity constraints, Logical Database Design, Views.

UNIT-III

Relational Algebra-Selection and projection, Set Operators, Renaming, joins, divisions. Form of Basic SQL Query, Nested Queries, Correlated Nested Queries, Set Comparison Operators, Aggregate Operators, Logical Connectivity Operators, Joins and Types, introduction to Triggers.

UNIT-IV

Introduction to Schema Refinement, functional Dependencies, Normal forms-1NF, 2NF,3NF, BCNF, Properties of decompositions, Multivalued Dependencies, Fourth Normal Form and Fifth Normal Form, Transaction Management-ACID properties, Transaction and schedules, concurrent execution of transactions.

UNIT –V

Lock based Concurrency Control-Strict 2PL, Dead Locks. Concurrency Control without Locking, Crash Recovery-Introduction to ARIES, LOG, Write a Head Log Protocol, Check Point, Recovery from a System Crash.

UNIT-VI

Data on External Storage, File Organization and indexing, Index Data Structures, Comparison of File Organizations, Tree structured indexing-Indexed Sequential Access Method, B+ trees.

Text Books:

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2. Database Management Systems- Raghurama Krishnan, Johannes Gehrke, Tata McGraw-Hill., 3rd Edition.

Reference Books:

3. Database System Concepts, Silberschatz, Korth, McGraw hill, 5th edition.
4. Database Management Systems, Elmasri Navathe-5th Edition.

B. TECH 6th / 8th SEMESTER	L	T	P	C
	3	-	-	3
16CSX002: BIG DATA ANALYTICS				

Course Outcomes: Students are able to

1. Distinguish efficient big data solutions for various application areas using appropriately selected algorithms and data structures.
2. Analyze methods and algorithms, to compare and real-world problems.
3. Explain trade-offs in big data processing technique.
4. Explain the Big Data Fundamentals, including the evolution and the characteristics of Big Data
5. Solve non-relational databases, the techniques for storing and processing large volumes of structured and unstructured data.
6. Apply the novel architectures and platforms introduced for Big data.

UNIT-I

Introduction to Big Data Analytics:

Definition of Big data, Big data characteristics and considerations, Unstructured data fueling big data analytics, Analyst perspective data repositories, Key roles of the New Data Eco system, applications.

UNIT-II

Data Analytics Life Cycle: Data analytics life cycle, Roles of Successful Analytics project

UNIT-III

Working with Big Data using R: How to use R Graphical user interface, How to get data into R, Data types used in R, and the basic operations, generic functions, Data analytic methods in R

UNIT-IV

Advanced Analytics Theory and methods: Categorization: K-means clustering, association rules, Regression: Linear & Logistic Classification: Nave Bayesian, Decision trees, time series analysis, text analysis.

UNIT-V

Advanced Analytics _Technology and tools: Mapreduce and Hadoop, HDFS, Using R with Hadoop

UNIT-VI

Hadoop Ecosystem: Using Query Languages HIVE and PIG for data analytics, HBASE, Mahout-machine learning algorithms using Hadoop mapreduce HDFS

Text Books:

- 1 Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data by EMC Education Services- Wiley
- 2 Big Data Analytics with R, by Simon Walkowiak

Reference:

- 1 R For data science-Dan Toomey
- 2 Big Data Analyticswith R and Hadoop-Vignesh Prajapati

B. TECH 6 th & 8 th SEMESTER	L	T	P	C
	3	-	-	3

16ITXO01: SOFTWARE PROJECT MANAGEMENT

COURSE OUTCOMES: Students are able to

1. Explain the basic concepts of Software Engineering and Process framework.
2. Define the various software process models and its requirements.
3. Outline software project management principles based on conventional software project Management.
4. Distinguish different Software Management life cycle phases
5. Define the artifacts and knowledge on Model Based Software Architecture.
6. Illustrate various software workflows and checkpoints of the process.

UNIT-I

Introduction to Software Engineering: The evolving role of software, Software Characteristics, Changing Nature of Software, Software myths.

A Generic view of Process: Software engineering- A layered technology, a Process framework, The Capability Maturity Model Integration (CMMI), Process assessment, Product and Process.

UNIT-II

Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

Software Requirements: User requirements, System requirements, Functional and non-functional requirements, the Software Requirements Document (SRS).

UNIT-III

Conventional Software Management and Economics: Conventional software Management performance, Software Economics.

Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

UNIT-IV

The old way and the new: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases.

UNIT-V

Artifacts of the process: The artifacts sets, Management artifacts, Engineering artifacts, programmatic artifacts.

Model based software architectures: A Management perspective and technical perspective.

UNIT-VI

Work Flows of the process: Software process workflows, Iteration workflows.

Checkpoints of the process: Major mile stones, Minor Milestones, Periodic status assessments.

Text Books:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.
2. Software Project Management, Walker Royce: Pearson Education, 2005.

Reference Books:

1. Software Engineering- Somerville, 9th edition, Pearson education.
2. Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw-Hill Edition.
3. Software Project Management, Joel Henry, Pearson Education.

B. TECH 6th / 8th SEMESTER	L	T	P	C
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16ITXO02: INTERNET OF THINGS				

COURSE OUTCOMES: Students are able to

1. Define the fundamentals of IoT.
2. Illustrate the IoT design methodology.
3. Explain the Microcontroller and various IoT Platforms.
4. Construct the IoT using Raspberry Pi
5. Explain the basics of IoT sensors and communications.
6. Analyze applications of IoT in real time scenario.

UNIT-I

Fundamentals of IoT: Introduction-Characteristics-Physical design - Protocols – Logical design – Enabling technologies – IoT Levels – Domain Specific IoTs – IoT vs. M2M.

UNIT-II

IoT Design Methodology: IoT systems management – IoT Design Methodology – Specifications Integration and Application Development.

UNIT-III

8051 Microcontroller: Introduction to Microcontrollers, The 8051 Instruction Set, AT89S8253 Microcontroller, Assembly Language, Examples, Development systems.

IoT Platform: IoT Platform overview, Overview of IoT supported Hardware platforms such as: Raspberry pi, ARM Cortex Processors, Arduino and Intel Galileo boards.

UNIT-IV

Building IoT With Raspberry PI: Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services.

UNIT-V

Programming The Microcontroller For IoT Basics of Sensors & Actuators: Basics of Sensors and actuators – examples and working principles of sensors and actuators – Cloud computing and IoT – RASPBERRY PI /Equivalent Microcontroller platform – Setting up the board - Programming for IOT– Reading from Sensors;

Communication: Connecting microcontroller with mobile devices – communication through Bluetooth and USB – connection with the internet using wifi / Ethernet.

UNIT-VI

B.TECH/CSE/2016 (CBCS)

Case Studies and Advanced Topics: Various Real time applications of IoT- Connecting IoT to cloud – Cloud Storage for IoT – Data Analytics for IoT – Software & Management Tools for IoT

Text Books:

1. ArshdeepBahga, Vijay Madiseti, “Internet of Things – A hands-on approach”, Universities Press, 2015.
2. Charalampos Doukas “Building Internet of Things With the Arduino”, CreateSpace Independent Publishing Platform, 2012.
3. Milan Verle, “Architecture and Programming of 8051 Microcontrollers” 1st Edition mikro
4. Dieter Uckelmann et.al, “Architecting the Internet of Things”, Springer, 2011
5. Matt Richardson & Shawn Wallace, “Getting Started with Raspberry Pi” O'Reilly (SPD), 2014.

Reference Books:

1. Luigi Atzor et.al, “The Internet of Things: A survey“, Journal on Networks, Elsevier Publications, October, 2010
2. Web Link 1: <http://postscapes.com/>(Accessed on 16 February 2016).
3. Web Link 2: <http://www.theinternetofthings.eu/what-is-the-internet-of-things>(Accessed on 16 February 2016).

B. TECH 6th / 8th SEMESTER	L	T	P	C
	3	-	-	3
16BMXO01: INNOVATION AND ENTREPRENEURSHIP				

COURSE OUTCOMES: Students are able to

CO1: Comprehend the concept and levels of Innovation. [K2]

CO2: Discriminate the Micro & Macro perspectives & Innovation. [K4]

CO3: Appraise the creative Intelligence abilities. [K4]

CO4: Define and explain the basic concepts of Entrepreneurship & social responsibilities of an entrepreneur [K1 & K2]

CO5: Estimates the importance of training for Entrepreneurs, Use feedback and Performance of trainees. [K2 & K3]

CO6: Discover the Challenges and Sickness in MSMEs. [K2]

UNIT-I Innovation Management: Concept of Innovation –Levels of Innovation –Incremental Vs Radical Innovation –Inbound and Outbound Ideation –Open and Other Innovative Ideation Methods- Systems approach to innovation- Innovation in the context of emerging economies-leadership and innovation.

UNIT-II Creative Intelligence: Creative Intelligence Abilities – A Model Of Creative Intelligence – Convergent Thinking Ability – Traits Congenial To Creativity – Creative Personality And Forms Of Creativity.

UNIT-III Entrepreneurship: Entrepreneurship characteristics –classification Of Entrepreneurship – Incorporation of Business - Role of Entrepreneurship in economic development – startups.

UNIT-IV Idea generation and opportunity assessment: Ideas in entrepreneurship – sources of new ideas- Techniques for generating ideas- Opportunity recognition – Steps in tapping opportunities

UNIT-V Project Formulation and Appraisal: Preparation of Detailed project Report (DPR) – content-Guidelines for Report preparation – project Appraisal techniques-economic- steps Analysis; Financial analysis; Market analysis; Technical feasibility.

UNIT-VI Institutions promoting small Business Enterprises: Central level Institutions; NABARD, SIDBI, NIC, KVIC, SIDIO, NSIC - State level Institutions- DICs – SFC- SSIDC- other financial

B.TECH/CSE/2016 (CBCS)

assistance, Government policy and taxation benefits- government policy for SSIs – tax incentives and concessions- Non –tax concessions- Rehabilitation investment and Allowances

REFERENCES:

1. Vasanth Desai, “Entrepreneurship’ Himalaya Publishing House, New Delhi, 2012
2. Arya Kumar: “Entrepreneurship”, Pearson, Publishing House, New Delhi, 2012.
3. VSP Rao, Kuratko: “Entrepreneurship’, Cengage Learning, New Delhi,
4. Pradip N Khandwalla, Lifelong Creativity, An Unending Quest, Tata McGraw Hill, 2004.
5. Vinnie Jauhari, Sudanshu Bhushan, Innovation Management, Oxford Higher Education, 2014
6. Innovation Management, C. S. G. Krishnamacharyulu, R. Lalitha, Himalaya Publishing House, 2010.
7. A.Dale Timpe, Creativity, Jaico Publishing House, 2003.

B. TECH 6th / 8th SEMESTER	L	T	P	C
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16BMXO02: INDUSTRIAL SOCIOLOGY AND PSYCHOLOGY				

COURSE OUTCOMES: Students are able to

- CO1:** Demonstrate an appreciation on different areas of Industrial Psychology and Sociology that have contributed to organizational effectiveness.(K3)
- CO2:** Identify critical factors that affect behavior of individual and groups in an organization.(K2)
- CO3:** Analyze the importance of organizational design and culture prevailing in an organization.(K4)
- CO4:** Interpret the role and importance of Leadership and Motivation towards achieving objectives of individuals and groups in work environment.(K3)
- CO5:** Appraise the concept of change in the dynamic business organization (K5)

UNIT I: Industrial Sociology : Nature and Scope of Industrial Sociology-Development of Industrial Sociology, Factors of social change – the technological factors, the cultural factors, effects of technology on major social institutions, social status system, social relations in industry.

UNIT II: Group Dynamics: Work Teams & Groups, Group Behavior, Group formation & development, Decision Making by Individuals , Groups Decision making process, individual influences, group decision process, Group dynamics

UNIT III: Organizational Conflicts: Concept - Causes and Consequences of Conflict-Conflict handling techniques-Emotional Intelligence - Inter Group Behavior and Collaboration.

UNIT IV Industrial Psychology : Nature and Meaning of Industrial Psychology, Role of Industrial Psychology, Organizational Attitude, Motivation at work-Theories of Motivation (Theory X and Y, McClelland's Theory, Maslow's Need Theory, Herzberg's Two Factor Theory) Cultural Differences in Motivation

UNIT V: Organizational Design and Leadership : Organizational Design & Structure- Key organizational design process, Structural differentiations, factors influencing design of organizations, Leadership, Leadership vs. Management, Leadership Theories, Emerging issues in Leadership

UNIT VI: Organizational Culture: Functions of organizational culture, Organizational Socialization, Assessing Cultural Values and Fit, Cross Cultural issues, Managing Change Forces for change in Organization, Resistance to change and change management.

Books Recommended:

1. Gisbert Pascal, Fundamentals of Industrial sociology, Tata McGraw Hill Publishing Co., New Delhi, 1972.
2. Schneider Engno V., Industrial Sociology 2nd Edition, McGraw Hill Publishing Co., New Delhi,

B.TECH/CSE/2016 (CBCS)

3. Stephen Robin, Organizational Behavior, Prentice Hall, India
4. Nelson, Quick and Khandelwal, ORGB : An innovative approach to learning and teaching Organizational Behaviour. A South Asian Perspective, Cengage Learning, 2012
5. Luthans, Fred, Organizational Behavior, McGraw Hill 2008
6. Udai Pareek, Understanding Organizational Behavior, Oxford University Press