AR - 16

ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABUS

COMPUTER SCIENCE AND ENGINEERING

for

B.TECH. FOUR YEAR DEGREE PROGRAMME

(Applicable for the batches admitted from 2016 - 2017)

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AUTONOMOUS)

Approved by AICTE,

Recognised under 2(f) 12(b) of UGC,

Permanently Affiliated to JNTU Kakinada.

K.Kotturu, Tekkali, Srikakulam – 532201, Andhra Pradesh.

Vision of the Institute

To evolve into a premier engineering institute in the country by continuously enhancing the range of our competencies, expanding the gamut of our activities and extending the frontiers of our operations.

Mission of the Institute

Synergizing knowledge, technology and human resource, we impart the best quality education in Technology and Management. In the process, we make education more objective so that the efficiency for employability increases on a continued basis..

Vision of the Department

To become a pioneer in providing high quality education and research in the area of computer science and engineering.

Mission of the Department:

M1: Enrich society and advance computer science and engineering by preparing graduates with the knowledge, ability, and skill to become innovators and leaders who are able to contribute for the aspirations of the country and society.

M2: Benefit humanity through research, creativity, problem solving, and application development.

M3: Share knowledge and expertise to benefit the country, the region, and beyond while inspiring people to engage in computing fields.

The **Programme Educational Objectives (PEOs)** for our Computer Science and Engineering program are to produce graduates who will:

PEO1.	Be employed as a practicing engineer in fields such as design, development, testing and research or undertake higher studies.
PEO2.	Engage in lifelong self-directed learning, a capacity that is vital for success in today's global and rapidly changing engineering environment.
PEO3.	Create new methods / processes to meet the society needs with their knowledge.
PEO4.	Conduct themselves as ethical and responsible professionals with good communication skills and demonstrate leadership skills

PROGRAM OUTCOMES (POs): Engineering Graduates will be able to:

1. **ENGINEERING KNOWLEDGE**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **PROBLEM ANALYSIS**: Identify, formulate, review research literature, and 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 (PSOs):

By the completion of Computer Science program the student will be able to:

PSO1. Apply mathematical foundations, algorithmic principles, and theoretical computer science in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.

PSO2. Demonstrate understanding of the principles and working of the hardware and software aspects of computer systems.

PSO3. Use knowledge in various domains to identify research gaps and hence to provide solution to new ideas and innovations

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Permanently Affiliated to JNTUK, Kakinada.

K.Kotturu, Tekkali, Srikakulam-532201, Andhra Pradesh

Academic Regulations 2016 for B. Tech.

(Effective for the students admitted into I year from the **Academic Year 2016-2017** and onwards)

1. Award of B.Tech. Degree

A student will be declared eligible for the award of the B. Tech. Degree if he/she fulfills the following academic regulations.

(a) Pursued a course of study for not less than four academic years and not more than

(b) Registered for **180** credits and he/she must secure total **180** credits.

2. Students, who fail to complete their Four years Course of study within **8** years or fail to acquire the 180 Credits for the award of the degree within **8** academic years from the year of their admission, shall forfeit their seat in B. Tech course and their admission shall stand cancelled.

3. Courses of study

The following courses of study are offered at present with specialization in the B.Tech. Course.

Sl. No.	Branch Code-Abbreviation	Branch
01	01-CE	Civil Engineering
02	02-EEE	Electrical and Electronics Engineering
03	03-ME	Mechanical Engineering
04	04-ECE	Electronics and Communication Engineering
05	05-CSE	Computer Science and Engineering
06	12-IT	Information Technology

And any other course as approved by the authorities of the University from time to time.

4. Credits (Semester system from I year onwards):

Sl. No	Course	Credits
1	**Theory Course**	**2/2.5/3/3.5/4.5**
2	**Open Electives**	**02**
3	**Laboratory Course**	**1.5**
4	**Advanced Laboratory Course**	**02**
5	**Self Study Course/Internship**	**01**
6	**Employability skills**	**1.5**
7	**Project**	**06**

5. Open Electives:

There is one open elective in each semester from 2-1 Semester to 4-1 semester. The student can choose one open elective of respective semester. The pattern of Midterm examinations and end examinations of these courses is similar to regular theory courses and the valuation is purely internal.

6. MOOCs:

Explore all possibilities to run at least one subject in every semester from 2-1 semester onwards as a Moocs.

7. Evaluation Methodology:

The performance of a student in each semester shall be evaluated subject – wise with a

Maximum of **100** marks for theory course and **75** marks for laboratory and other courses. The project work shall be evaluated for **200** marks.

7.1 Theory course:

For theory courses the distribution shall be **30** marks for internal midterm evaluation and **70** marks for the External End - Examinations.Out of 30 internal midterm marks **25** marks are allotted for descriptive exam and 5 marks for continuous assessment tests.

Process of conducting assessment test: The assessment test will be conducted for 5 marks. Teacher should give 5 questions after completion of **One and half** units to the students, from which the student has to answer any one of the questions suggested by the teacher in the classroom itself. Similarly there will be another two assessment tests after completion of **Three** units and **Four and half** units from prescribed syllabus. The average marks of these **THREE** tests will be considered for 5 marks for the continuous assessment tests finally.

(i) Pattern for Internal Midterm Examinations (25 marks):

For theory courses of each semester, there shall be **2** Midterm exams. Each descriptive exam is to be held for **25** marks with the duration of **120** minuets.

For final calculation of internal marks, weightage of 80% will be given to the student who performed well either in first Mid or second Mid and 20% weightage will be given to other Mid term examinations.

Mid paper contains descriptive type questions for forty marks and contain four questions. The student should answer 3 out of 4 questions. Each question carries 10 marks (3@10=30M).

The first Midterm examination to be conducted usually after 8 weeks of instruction or after completion of 50 percent syllabus, the second Midterm examination to be conducted usually at the end of instruction after completion of remaining 50 percent syllabus.

(ii) Pattern for External End Examinations (70 marks):

The question paper shall have descriptive type questions for70 marks. There shall be one question from each unit with internal choice. Each question carries 14 marks. Each course shall consist of five units of syllabus. The student should answer total 5 questions. (5x14M=70M)

7.2. Laboratory Course:

(i) **(a)** For practical subjects there shall be continuous evaluation during the semester for **25** internal marks and **50** semester end examination marks. Out of the **25** marks for internal: **10** marks for day to day work, **5** marks for record and **10** marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner from outside the college.

(b)For the benefit of the students, two advanced labs are introduced with some specialized areas in each B.Tech. Program.

(ii.) For the course having design and / or drawing, (such as Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation (15 marks for day–to–day work, and 15 marks for internal tests) and 70 marks for end examination.

For award of marks for internal tests. weightage of 80% will be given to the student who performed well either in first test or second test and 20% weightage will be given to other test.

7.3 Project Work:

Out of a total of 200 marks for the project work, **60** marks shall be for Project Internal Evaluation and **140** marks for the End Semester Examination. The End Semester Examination (Viva – Voce) shall be conducted by the committee. The committee consists of an external examiner, Head of the Department and Supervisor of the Project. The evaluation of project work shall be made at the end of the IV year. The Internal Evaluation shall be made on the basis of two seminars given by each student on the topic of his project which was evaluated by an internal committee.

7.4 Self Study Course:

Two Periods per week (which includes library, e-learning, Internet and presentation) are allotted for this course. Self Study shall be evaluated for 75 Marks.

Out of **75** Marks, **25** marks for day-to-day evaluation and **50** marks on the basis of end examination conducted by internal committee consisting of Head of the Department, Two Senior faculty Members of the department concerned. There shall be no external examination for self-study.

7.5 Audit Course:

Audit course is one among the compulsory courses and does not carry any credits. The audit courses will start from the II year I- semester onwards. The list of audit courses are shown below:

i) Professional Ethics and Morals
ii) Intellectual Property Rights & Patents

7.6 Employability Skills:

Employability skills shall be evaluated for **75** marks. **25** marks for day-to-day evaluation and **50** marks on the basis of end (internal) examination. There is no external examination for employability skills.

Three Periods per week are allotted for this course and evaluated in 4-1 semester.

7.7 Internship:

All the students shall undergo the internship period of **4** weeks and the students have an option of choosing their own industry which may be related to their respective branch. A self study report for the internship shall be submitted and evaluated during the IV year II-Semester and will be evaluated for a total of **75** marks consists of **25** marks for internal assessment and **50** marks for end examination.

Internal assessment for **25** marks shall be done by the internship supervisor. Semester end examination for **50** marks shall be conducted by committee consists of Head of the Department, internal supervisor and an external examiner.

8. Attendance Requirements:

(i.) A student shall be eligible to appear for End Semester examinations, if he/she acquires a minimum of **75%** of attendance in aggregate of all the subjects.

(ii.) Condonation of shortage of attendance in aggregate up to **10%** (**65%** and above and below 75%) in each semester with genuine reasons and shall be approved by a committee duly appointed by the college. The condonation approved otherwise it can be reviewed by the College academic committee.

(iii.) A Student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester. They may seek re-admission for that semester when offered next.

(iv.) Shortage of Attendance below **65%** in aggregate shall in NO case be condoned.

(v.) Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.

(vi.) A fee stipulated by the college shall be payable towards condonation of shortage of attendance.

9. Minimum Academic Requirements:

9.1 Conditions for pass and award of credits for a course:

a) A candidate shall be declared to have passed in individual course if he/she secures a minimum of 40% aggregate marks i.e 40 out of 100, 30 out of 75 (Internal & Semester end examination marks put together), subject to a minimum of 35% marks i.e 24 marks out of 70 and 17 out of 50 in semester end examination.

b) On passing a course of a programme, the student shall earn assigned credits in that Course.

9.2 Method of Awarding Letter Grades and Grade Points for a Course.

A letter grade and grade points will be awarded to a student in each course based on his/her performance as per the grading system given below.

Table: Grading System for B.Tech. Programme

Percentage	Grade Points	Letter Grade
95-100%	10	O
85-<95%	9	A+
75-<85%	8	A
65-<75%	7	B^+
55-<65%	6	B
45-<55%	5	C
40%-<45%	4	P
< 40%	0	F (Fail)

9.3. Calculation of Semester Grade Points Average (SGPA)* for semester

The performance of each student at the end of the each semester is indicated in terms of SGPA.

The SGPA is calculated as below:

$$\text{SGPA} = \frac{\Sigma(\text{CR} \times \text{GP})}{\Sigma\text{CR}} \quad \text{(for all courses passed in semester)}$$

Where CR = Credits of a Course GP = Grade points awarded for a course

*SGPA is calculated for the candidates who passed all the courses in that semester.

9.4, Calculation of Cumulative Grade Points Average (CGPA) and Award of Division for Entire programme.

The CGPA is calculated as below:

$$\text{CGPA} = \frac{\Sigma(\text{CR} \times \text{GP})}{\Sigma\text{CR}} \quad \text{(For entire programme)}$$

Where CR = Credits of a course GP = Grade points awarded for a course

Table: Award of Divisions

CGPA	DIVISION
≥ 7.5	First Class with distinction
≥ 6.5 and < 7.5	First Class
≥ 5.5 and <6.5	Second Class
≥ 4.0 and <5.5	Pass Class
< 4.0	Fail

9.5 Supplementary Examinations:

Supplementary examinations will be conducted in every semester.

9.6 Conditions for Promotion:

(i.) A student will be promoted to second year, if he/she put up the minimum attendance requirement.

(ii.) A student shall be promoted from II to III year only if he fulfills the academic requirement of total **50%** credits (if number credits is in fraction, it will be rounded off to lower digit) from regular and supplementary examinations of I year and II year examinations, irrespective of whether the candidate takes the examination or not.

(iii.) A student shall be promoted from III year to IV year only if he fulfills the academic requirements of total **50%** credits (if number of credits is in fraction, it will be rounded off to lower digit) from regular and supplementary examinations of I Year, II Year and III Year examinations, irrespective of whether the candidate takes the examinations or not.

(iv.) A student shall register and put up minimum attendance in all **180** credits and earn all **180** credits, marks obtained in **180** credits shall be considered for the calculation of percentage of marks.

10. Course pattern:

(i.) The entire course of study is of four academic years and each year will have TWO Semesters (Total EIGHT Semesters).

(ii.) A student is eligible to appear for the end examination in a subject, but absent for it or failed in the end examinations may appear for that subject's **supplementary** examinations, when offered.

(iii.) When a student is detained due to lack of credits / shortage of attendance, he may be re-admitted when the semester is offered after fulfillment of academic regulations. Whereas the academic regulations hold good with the regulations he/she first admitted.

11. Minimum Instruction Days:

The minimum instruction days for each semester shall be **95** clear instruction days.

12. **There shall be no branch transfer after the completion of admission process**.

13. **General:**

(i.) Where the words "he" "him" "his", occur in the regulations, they include "she", "her", "hers".

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

(iii.) In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the principal is final.

(iv.) 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.

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT: TEKKALI

SRIKAKULAM-532201, Andhra Pradesh (India)

Academic Regulations 2016 (AR16) for B. Tech. (Lateral Entry Scheme)

(Effective for the students getting admitted into II year from the Academic Year 2017- 2018 and onwards)

1. **Award of B. Tech. Degree**

A student will be declared eligible for the award of the B. Tech. Degree if he/she fulfills the following academic regulations.

(a.) Pursued a course of study for not less than three academic years and not more than six academic years.
(b.) Registered for **131** credits and must secure **131** credits.

2. Students, who fail to complete their three year Course of study within six years or fail to acquire the **131** Credits for the award of the degree within **6** academic years from the year of their admission, shall forfeit their seat in B. Tech course and their admission shall stand cancelled.

3. **Promotion Rule:**

(a.) A lateral entry student will be promoted to II year to III year if he puts up the minimum required attendance in II year.

(b.) A student shall be promoted from III year to IV year only if he fulfills the academic requirements of total **50%** of credits (if number of credits is in fraction, it will be rounded off to lower digit) from the II Year and III Year examinations , whether the candidate takes the examinations or not.

4. Minimum Academic Requirements:

4.1 Conditions for pass and award of credits for a course:

a) A candidate shall be declared to have passed in individual course if he/she secures a minimum of 40% aggregate marks (Internal & Semester end examination marks put together), subject to a minimum of 35% marks in semester end examination.
b) On passing a course of a programme, the student shall earn assigned credits in that Course.

4.2 Method of Awarding Letter Grades and Grade Points for a Course.

A letter grade and grade points will be awarded to a student in each course based on his/her performance as per the grading system given below.

Table: Grading System for B.Tech. Programme

Percentage	Grade Points	Letter Grade
95-100%	10	O
85-<95%	9	A+
75-<85%	8	A
65-<75%	7	B^+
55-<65%	6	B
45-<55%	5	C
40%-<45%	4	P
< 40%	0	F (Fail)

4.3 Calculation of Semester Grade Points Average (SGPA)* for semester

The performance of each student at the end of the each semester is indicated in terms of SGPA. The SGPA is calculated as below:

$$\text{SGPA} = \frac{\Sigma(\text{CR} \times \text{GP})}{\Sigma\text{CR}} \quad \text{(for all courses passed in semester)}$$

Where CR = Credits of a Course GP = Grade points awarded for a course

*SGPA is calculated for the candidates who passed all the courses in that semester.

4.4 Calculation **of Cumulative Grade Points Average (CGPA) and Award of Division for Entire programme.**

The CGPA is calculated as below:

$$\text{CGPA} = \frac{\Sigma(\text{CR} \times \text{GP})}{\Sigma\text{CR}} \quad \text{(for entire programme)}$$

Where CR = Credits of a course GP = Grade points awarded for a course

Table: Award of Divisions

CGPA	DIVISION
≥ 7.5	First Class with distinction
≥ 6.5 and < 7.5	First Class
≥ 5.5 and < 6.5	Second Class
≥ 4.0 and <5.5	Pass Class
< 4.0	Fail

5. All other regulations as applicable for B. Tech. Four- year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme)

DISCIPLINARY ACTION FOR MALPRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	Punishment
1 (a)	If the student possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	If the student gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any student or students in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	If the student has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year.
3	If the student impersonates any other student in connection with the examination.	The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all semester end examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.

4	If the student smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all semester end examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
5	If the student uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6	If the student refuses to obey the orders of the Chief Superintendent/Assistant -Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7	If the student leaves the exam hall taking away answer script or intentionally tears off the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

8	If the student possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat.
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the college, expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and. a police case will be registered against them.
10	If the student comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the student has appeared including practical examinations and project work of that semester/year examinations.

ADITYA INSTITUTE OF TECHNOLOGY & MANAGEMENT, TEKKALI – 532201
(AUTONOMOUS)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
AR-16 REGULATIONS B.Tech COURSE STRUCTURE

I YEAR I SEMESTER								
S.No.	**CODE**	**COURSE**	**L**	**T**	**P**	**Credits**	**Internal**	**External**
1	16HS1001	English	3	0	0	3.0	30	70
2	16BS1001	Engineering Mathematics-I	3	1	0	3.5	30	70
3	16CS1001	Computer Programming	3	1	0	3.5	30	70
4	16EE1003	Electrical & Electronics Engineering	3	1	0	3.5	30	70
5	16ME1001	Engineering Drawing	3	0	0	3.0	30	70
6	16BS1003	Engineering Physics	3	1	0	3.5	30	70
7	16CS1101	Computer Programming Lab	0	0	3	1.5	25	50
8	16BS1101	Engineering Physics Lab	0	0	3	1.5	25	50
9	16HS1101	Basic English Communication Skills Lab	0	0	3	1.5	25	50
Total Periods			**18**	**4**	**9**	**24.5**	**255**	**570**

I YEAR II SEMESTER								
S.No.	**CODE**	**COURSE**	**L**	**T**	**P**	**Credits**	**Internal**	**External**
1	16HS1002	English Communication Practice	3	0	0	3.0	30	70
2	16BS1002	Engineering Mathematics-II	3	1	0	3.5	30	70
3	16HS1003	Environmental Studies	3	0	0	3.0	30	70
4	16CS1002	Data Structures	3	1	0	3.5	30	70
5	16ME1002	Engineering Mechanics	3	1	0	3.5	30	70
6	16BS1004	Engineering Chemistry	3	1	0	3.5	30	70
7	16CS1102	Data Structures Lab	0	0	3	1.5	25	50
8	16BS1102	Engineering Chemistry Lab	0	0	3	1.5	25	50
9	16CS1103	Information Technology Workshop Lab	0	0	3	1.5	25	50
Total Periods			**18**	**4**	**9**	**24.5**	**255**	**570**

II YEAR I SEMESTER								
S.No.	**CODE**	**COURSE**	**L**	**T**	**P**	**Credits**	**Internal**	**External**
1	16BS2005	Probability and Statistics	3	0	0	3.0	30	70
2	16CS2003	Mathematical Foundations of Computer Science	3	1	0	3.5	30	70
3	16EC2011	Digital Logic Design	3	1	0	3.5	30	70
4	16CS2004	Object Oriented Programming	3	1	0	3.5	30	70
5	16CS2005	Free Open Source Software	2	0	0	2.0	30	70
6	**xxxxxxxx**	**Open Elective – I**	2	0	0	2.0	30	70
7	16EC2106	Digital Logic Design Lab	0	0	3	1.5	25	50
8	16CS2104	Free Open Source Software (FOSS) Lab	0	0	3	1.5	25	50
9	16CS2105	OOPs Through C++ Lab	0	0	3	1.5	25	50
10	16HS2201	Professional Ethics & Morals	2	0	0	0.0	-	-
Total Periods			**18**	**3**	**9**	**22.0**	**255**	**570**

Open Elective - I	
16OE2011	Matrices and Applications
16OE2013	Introduction to MATLAB
16OE2014	Fundamentals of Material Science
16OE2015	Introduction of Electronic Measurements
16OE2017	IT Systems Management
16OE2019	Computer Aided Engineering Drawing

II YEAR II SEMESTER								
S.No	**CODE**	**COURSE**	**L**	**T**	**P**	**Credits**	**Internal**	**External**
1	16CS2006	Computer Organization and Architecture	3	0	0	3.0	30	70
2	16CS2007	Formal Languages & Automata Theory	3	1	0	3.5	30	70
3	16CS2008	Database Management Systems	3	1	0	3.5	30	70
4	16CS2009	Operating Systems	3	0	0	3.0	30	70
5	16CS2010	Principles of Programming Languages	2	1	0	2.5	30	70
6	**xxxxxxxx**	**Open Elective – II**	**2**	**0**	**0**	**2.0**	30	70
7	16CS2106	Operating Systems Lab	0	0	3	1.5	25	50
8	16CS2107	Database Management Systems Lab	0	0	3	1.5	25	50
9	16HS2102	Advanced English Communication Skills Lab	0	0	3	1.5	25	50
10	16CS2201	Self Study Course-1*	0	2	0	1.0	75	-
Total Periods			**16**	**5**	**9**	**23.0**	**330**	**570**

*2 Periods which includes library, e-learning, internet and presentation.

Open Elective - II	
16OE2023	Renewable Energy Sources
16OE2025	Principles of Communications
16OE2027	Introduction to PYTHON
16OE2029	Computational Number Theory
16OE202A	Remote Sensing
16OE202B	Linear Programming and its Applications

III YEAR I SEMESTER								
S.No	**CODE**	**COURSE**	**L**	**T**	**P**	**Credits**	**Internal**	**External**
1	16CS3011	UNIX Internals	3	0	0	3.0	30	70
2	16CS3012	Computer Networks	3	0	0	3.0	30	70
3	16CS3013	Software Engineering	3	1	0	3.5	30	70
4	16CS3014	Design and Analysis of Algorithms	3	1	0	3.5	30	70
5	16CS3015	Java Programming	2	1	0	2.5	30	70
6	**xxxxxxxx**	**Open Elective – III**	**2**	**0**	**0**	**2.0**	30	70
7	16CS3108	UNIX Internals Lab	0	0	3	1.5	25	50
8	16CS3109	Computer Networks Lab	0	0	3	1.5	25	50
9	16CS3110	Java Programming Lab	0	0	3	1.5	25	50
10	16CS2202	Self Study Course – 2*	0	2	0	1.0	75	-
Total Periods			**16**	**5**	**9**	**23.0**	**330**	**570**

Open Elective – III	
16OE3031	Fundamentals of Fuzzy Logic
16OE3033	Energy Audit Conservation and Management
16OE3035	Introduction to Signal Processing
16OE3037	Fundamentals of Computer Graphics
16OE3038	GPS & Survey Methods
16OE3039	Engineering Optimization Techniques

III YEAR II SEMESTER								
S.No.	**CODE**	**COURSE**	**L**	**T**	**P**	**Credits**	**Internal**	**External**
1	16CS3016	Web Technologies	3	1	0	3.5	30	70
2	16CS3017	Compiler Design	3	1	0	3.5	30	70
3	16CS3018	Software Testing and Project Management	3	1	0	3.5	30	70
4	16CS3019	Artificial Intelligence	2	1	0	2.5	30	70
5	**xxxxxx**	**Elective -I**	**3**	**0**	**0**	**3.0**	30	70
6	**xxxxxx**	**Open Elective -IV**	**2**	**0**	**0**	**2.0**	30	70
7	16CS3111	Web Technologies Lab	0	0	4	2.0	25	50
8	16CS3112	Compiler Design Lab	0	0	3	1.5	25	50
9	16CS3113	Software Testing & CASE Tools Lab	0	0	3	1.5	25	50
10	16HS3202	Intellectual Property Rights & Patents	2	0	0	0.0	-	-
Total Periods			**18**	**4**	**10**	**23.0**	**255**	**570**

Elective - I		**Open Elective - IV**	
16CS3020	Data Warehousing & Data Mining	16OE3041	Management Information Systems (MIS)
16CS3021	Cloud Computing	16OE3042	Natural Disaster Management
16CS3022	Distributed Databases	16OE3043	Special Machines
16CS3023	Social Networks and Semantic Web	16OE3044	Introduction to Automobile Engineering
		16OE3047	Soft Computing
		16OE3048	Sensors and Transducers

IV YEAR I SEMESTER								
S.No	**CODE**	**COURSE**	**L**	**T**	**P**	**Credits**	**Internal**	**External**
1	16CS4024	UML & Design Patterns	3	1	0	3.5	30	70
2	16CS4025	**Image Processing**	3	1	0	3.5	30	70
3	16CS4026	Data Analytics	3	1	0	3.5	30	70
4	16CS4027	Mobile Computing	2	0	0	2.0	30	70
5	**xxxxxx**	**Elective – II**	3	0	0	3.0	30	70
6	**xxxxxx**	**Open Elective – V**	2	0	0	2.0	30	70
7	16CS4114	UML & Design Patterns Lab	0	0	3	1.5	25	50
8	16CS4115	Mobile Application Development Lab	0	0	4	2.0	25	50
9	16CS4116	Data Analytics Lab using R Programming	0	0	3	1.5	25	50
10	16HS4203	Employability Skills	0	3	0	1.5	75	-
Total Periods			**16**	**6**	**10**	**24.0**	**330**	**570**

Elective - II		**Open Elective – V**	
16CS4028	Software Quality Management	16OE4051	Project Management
16CS4029	Advanced Computer Architecture	16OE4053	Power Quality Management
16CS4030	Neural Networks and Soft Computing	16OE4054	Fundamentals of Robotics
16CS4031	Cryptography & Cyber Security	16OE4058	Entrepreneurial Development
		16OE4059	Geographical Information Systems
		16OE405A	Introduction to Wireless Networks

IV YEAR II SEMESTER								
S.No	**CODE**	**COURSE**	**L**	**T**	**P**	**Credits**	**Internal**	**External**
1	16HS4005	Managerial Economics and Management Science	3	0	0	3.0	30	70
2	16CS4032	Human Computer Interaction	3	0	0	3.0	30	70
3	**xxxxxx**	**Elective - III**	3	0	0	3.0	30	70
4	16CS4203	Internship	0	0	0	1.0	25	50
5	16CS4204	Project Work	0	0	0	6.0	60	140
Total Periods			**9**	**0**	**0**	**16.0**	**175**	**400**

Elective - III	
16CS4033	**Software Product Design & Management**
16CS4034	Bio-Informatics
16CS4035	**Advanced Operating Systems**
16CS4036	Mobile Adhoc & Sensor Networks

English
(Common for All Branches)

Credits : 3.0 **External Marks: 70**
Course Code: 16HS1001 **Internal Marks: 30**

Course Objectives:

- To improve comprehension levels of the students while reading texts in English
- To enable students interpret data and present their perspective on it
- To help students learn the techniques of expanding their vocabulary
- To assist students use grammar effectively in both speech and writing
- To enable students to write formal letters and short essays

Course Outcomes:

1. Students will be able to read and comprehend seen and unseen passages and answer questions based on them.
2. Students will be able to interpret the content of a passage and state their perspective.
3. Students will be able to understand words and their meanings, and know prefixes, suffixes, analogies, synonyms, antonyms and one word substitutes.
4. Students will be able to use articles, quantifiers, gerunds, infinitives, present participles and tenses appropriately.
5. Students will be able to write sentences, paragraphs, formal letters, emails, short essays on any given topic.

Unit–I: Read and Proceed: Reading—Vocabulary—Grammar—Writing Sentences

Unit–II: Health: Reading—Vocabulary—Grammar—Types of Writing

Unit–III: Travel: Reading—Vocabulary—Grammar—Paragraph Writing

Unit–IV: Disaster Management: Reading—Vocabulary—Grammar—Writing Letters & Emails

Unit–V: Gender: Reading—Vocabulary—Grammar—Writing an Essay

Text book:

1. Rani, K. Neruda et al. *Step by Step*. Pearson: New Delhi, 2013.

Reference Books:

1. Maison, Margaret M. *Examine Your English*. Orient Longman: Hyderabad, 2003.
2. Taylor, Grant. *English Conversation Practice*. Tata McGraw-Hill: New Delhi, 2008.
3. Wood, Frederick T. *A Remedial English Grammar for Foreign Students*. Macmillan,1996.

Engineering Mathematics – I
(Common for All Branches)

Credits : 3.5 **External Marks : 70**
Course Code: 16BS1001 **Internal Marks: 30**

Course Objectives:

- To identify & solve the 1st order differential equations and apply in Engineering.
- To understand the process of solving a 2nd and higher order differential equation and solve it. Identify a 2nd and higher order differential equation & solve it in engineering topics.
- To understand the generalized mean value theorems & their use to find the series expansions of functions and in turn their application in finding the maxima and minima of two variable functions.
- To solve the multiple integrals and to develop the capacity of a student to understand the applications of multiple integrals.
- To Understand the mathematical and physical interpretation of Vector differential operator operating on a vector or scalar point function, the line, surface and volume integrals, vector integral theorems and their applications to find work done, area, and volume.

Course Outcomes:
On completion of this course, students should be able

- Solve the 1st order differential equations by identifying the suitable method.
- Identify and solve a 2nd and higher order differential equations and perform simple applications in Engineering.
- Estimate the maxima and minima of two variable functions under different constraints.
- Solve a multiple integral and apply to estimate the volume and surface area of the solids.
- Calculate grad, divergence, curl; a line, surface and volume integral. To find work done, area, and volume. Apply the vector integral theorems to evaluate multiple integrals.

Unit – I Linear Differential Equations of first order
Linear differential equations of first order and first degree – exact, linear and Bernoulli. Newton's Law of cooling, Law of natural growth and decay, orthogonal trajectories.

Unit-II Linear Differential Equations of Second and higher order
Linear differential equations of second and higher order with constant coefficients- Complete solution, Operator D, Rules for finding complementary function, Inverse operator D, Rules for finding particular integral 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, Cauchy's and Euler's equations.

Unit-III Partial Differentiation

Introduction-Total derivative - Chain rule - Generalized Mean Value theorem for One variable & two variable functions (without proof)-Taylors and Mc Laurent's series for two variables – Functional dependence – Jacobian. Maxima and Minima of functions of two variables with constraints and without constraints.

Unit-IV Multiple Integrals

Multiple integrals - double and triple integrals – change of variables in Double & Triple Integrals – Change of order of integration-Cartesian and Polar coordinates.

Unit-V Vector Calculus

Vector Differentiation: Gradient- Divergence- Curl - Laplacian and second order operators- Vector identities (without proof).

Vector Integration - 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- Work done, Force.

Text Books:

1. Higher Engineering Mathematics, 42nd edition, 2012 - B. S. Grewal, Khanna Publishers, New Delhi.
2. Engineering Mathematics, Volume-I, II 11th editions respt., 2012, Dr. T.K.V.Iyengar & others, S. Chand Publishers.

Reference Books:

1. Engineering Mathematics, 4th edition, 2009 - B. V. Ramana, Tata McGraw Hill, New Delhi.
2. A Text Book of Engineering Mathematics – I & II, 2nd edition, 2011, U. M. Swamy & others – Excel Books, New Delhi.
3. Advanced Engineering Mathematics, 8th edition, 2009, Erwin Kreyszig- Shree Maitrey Printech Pvt.Ltd, Noida.

Computer Programming
(Common for All Branches)

Credits : 3.5 **External Marks: 70**
Course Code: 16CS1001 **Internal Marks: 30**

Course Objectives:

- To impart adequate knowledge on the need of programming languages and problem solving techniques.
- To develop programming skills using the fundamentals and basis of C language.
- To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.
- To teach the issues in the file organization and the usage of file systems.
- To impart the knowledge about pointers this is the backbone of effective memory handling.
- To study the advantages of user defined data type this provides flexibility for application development.

Course Outcomes:
At the end of this course the student will be able to

1. Understand the fundamentals of C programming.
2. Choose the loops and decision making statements to solve the problem.
3. Implement different operations on arrays and solve problems using functions.
4. Understand pointers, structures and unions.
5. Implement file operations in C programming for a given application.

Unit-I:
Computer Languages: Machine, Assembly and High-level, algorithm, flowchart, Program Development Steps.
Introduction to C: Character set, **Tokens:** Identifiers, keywords, data types, constants, variables, **Operators:** Arithmetic, relational, logical, assignment, bitwise, conditional and special (increment, decrement, comma)
Basic I/O statements, structure of a program, simple programs

Unit-II:
Control Structures: Decision Making: if, if-else, nested if, switch **Iteration:** while, for, do-while, nested loops **Branching:** Break, continue, goto

Unit-III:
Arrays: Definition, Types: 1D, Multi Dimensional arrays, declaration, initialization, accessing elements, Matrix operations
Functions: Definition, user defined function declaration, types of user defined functions, parameter passing, recursion, library functions, storage classes, passing arrays to function, string manipulations, preprocessor

Unit-IV:

Pointers: Definition, initialization, operations on pointers, functions and pointers, arrays and pointers, pointers to pointers, dynamic memory allocation

Structures: Definition, declaration, initialization, accessing members, array of structures, arrays within structure, functions and structures, pointers to structures, nested structures, unions

Unit-V:

File Handling: Types, operations on files, modes, file I/O functions, Random Access Functions.

Text Books:

1. E. Balagurusamy. 2011. C Programming. Tata Mc Graw Hills, New Delhi, India.
2. Yashwant Kantikar. 2012. Let Us C, 8th Ed.. PBP Publications.

Reference Books:

1. Dr. N.B Venkateswarlu. 2009. C and Data Structures: A snap shot Oriented Treatise Using Live Engineering Examples. S. Chand & Co., New Delhi.
2. B. W Kernighan, Dennis M. Ritchie . The C – Programming Language. PHI.

Electrical & Electronics Engineering

Credits : 3.5 **External Marks: 70**
Course Code: 16EE1003 **Internal Marks: 30**

Course Objectives:
The course is designed with the objective to provide students:

- To introduce electric circuits and its analysis
- To have knowledge on DC machines.
- To understand the performance of Transformers and Induction motors.
- To understand the operation of alternators and measuring instruments.
- To educate about the different types of semiconductor devices.

Course Outcomes:
Students are expected to:

1. Ability to analyze electrical circuits for both DC and AC
2. Ability to generalize A.C machines.
3. Identify and Discuss different types of dc generators
4. Classify different types of measuring instruments.
5. To outline semiconductor devices.

Unit-I
BASIC ELECTRICAL COMPONENTS
Basic definitions, Types of elements, Ohm's Law, symbols, R, Land C and their V-I relationships, Resistive networks, Inductive networks, Capacitive networks, Series & Parallel circuits, Kirchhoff‟s Laws, Star-delta and delta-star transformations, simple problems.

Unit-II
DC MACHINES:
Generator-Principle of Operation, construction, EMF equation, Classification; O.C.C, internal and external characteristics of shunt generator. Motor-principle of operation, Torque equation, Speed Control Methods, Testing of DC motors, Operation of 3 point starter.

Unit-III
TRANSFORMERS:
Operation of a Single Phase Transformer, EMF equation, Equivalent Circuit, losses, Regulation and Efficiency of a single phase transformer, O.C and S.C Tests.

THREE PHASE INDUCTION MOTOR:
Principle of Operation of 3-Φ induction motor, power and torque equations, Torque-Speed Characteristics of 3- Φ induction Motor.

Unit-IV
Alternators
Principle of operation of alternator, emf equation, regulation by synchronous impedance method

MEASURING INSTRUMENTS:
Types of instruments, principle operation of permanent magnet Moving Coil and Moving Iron instruments advantages, disadvantages

Unit-V
SEMICONDUCTOR DEVICES:
P-N junction diode- V-I characteristics, applications, rectifiers-half wave, full wave (simple problems) P-N-P,N-P-N transistor, common base, common emitter configuration.
Text Books:

1. M.S Naidu and S. Kamakshaiah, Introduction to Electrical Engineering ,TMH Publ.
2. Dr.K.B.Madhu Sahu, Basic Electrical Engineering

Reference Books:

1. Dr. K. Padmanabhan, Electronic components ,Laxmi publications, New Delhi.
2. S.Salivhanan, N.Suresh Kumar, A.Vallavaraj ,Electronic Devices and circuits ,Tata McGraw-Hill Education Private Limited, New Delhi second edition .
3. V.K.Mehta, Principles of Electrical and Electronics Engineering, S.Chand& Co.

Engineering Drawing
(Common for All Branches)

Credits : 3.0 **External Marks: 70**
Course Code: 16ME1001 **Internal Marks: 30**

Course Objectives:

- Able to develop drawing skills and representation of I angle and III angle projection, isometric Projection, Isometric drawing.

Course Outcomes:

1. Construct polygons, ellipse and scales (plain, diagonal, vernier).
2. Draw orthographic projection of points and straight lines in any quadrant, and determine its true length and true inclination.
3. Draw projections of plane surfaces inclined to either one or both reference planes.
4. Draw projections of simple solids inclined to one reference plane.
5. Convert orthographic views into isometric projections and vice-versa.

Unit-I

Lines, Lettering and Dimensioning: Introduction to Drawing instruments and their uses, Types of lines, Lettering ,Elements of dimensioning and systems of dimensioning.

Construction of scales: Plain Scale, Diagonal & Vernier Scales.

Geometric Constructions and Engineering Curves: Construction of Polygons, Construction of Conic sections–parabola, ellipse and hyperbola using General Method, construction of ellipse using oblong and concentric circles methods. Construction of cycloid & involute.

Unit-II

Orthographic Projections: First and Third Angle Projections:

Projections of Points. Projections of Straight Lines inclined to one reference plane only.

Unit-III

Projections of Planes: Perpendicular planes & planes inclined to one reference plane and both reference planes.

Unit-IV

Projections of Solids: Classification of solids. Projections of Prism, Cylinder, Pyramid, & Cone inclined to one reference plane only.

Unit-V

Conversion of Orthographic Projections to Isometric Projections: Conversion of Orthographic Views to Isometric views

Conversion of Isometric Projection to Orthographic Projections: Conversion of Isometric view to Orthographic views

TEXT BOOKS:

1. Engineering Drawing, N. D. Bhatt, V. M. Panchal, Charotar Pub.
2. Engineering Drawing, K. L .Narayana, P.Kanniah, Scitech Pub.

REFERENCE BOOKS:

1. Engineering Drawing and Graphics, 2nd ed., K. Venugopal, New Age International Pub.
2. Fundamentals of Engineering Drawing, 11th ed., Luzadder, J. Warren, D.M. Jon, Prentice Hall India Pub.

Engineering Physics
(Common for All Branches)

Credits : 3.5 **External Marks: 70**
Course Code: 16BS1003 **Internal Marks: 30**

Course Description:

This course encompass Fundamental Concepts of Physics that include Wave Optics

- Lasers & Fiber Optics
- Preliminary Quantum Mechanics
- Magnetic Materials
- Dielectric Materials that are inevitable for any Engineering student so that these prerequisites aid the student to readily understand Day to Day Engineering Problems with Pragmatic Approach.

SCOPE: This course is offered for all First Year B.Tech. Students either in SEM-I or SEM-II.

- Student is exposed to Wave Optics such as Interference and Diffraction that will enable him to appreciate Electromagnetic Wave Propagation in Communications and also in Stress Analysis.
- Lasers and Fiber Optics will help the students to understand the Fabrication of Engineering Materials apart from Optical Communication Technology
- Further, the students will be elucidated with significance of Quantum Theory that will give an Insight on Physical Properties and Theories of Solids
- In addition, the familiarity with Magnetic Materials and Dielectric Materials will through light on Engineering Applications.

Course Objectives:

- To realize the principles of optics in designing optical devices
- To comprehend the Principles of Lasers and Fiber Optics
- To define the shortcoming of classical physics and describe the need for modifications to classical theory
- To possess an insight on Magnetic Properties pertaining to Material Fabrication
- To estimate the response of E-Field on Dielectric Materials to control the device performance

Course Outcomes:

Will be able to

1. Apply the principles of optics in designing optical devices
2. Outline the Principles of Lasers and Fiber Optics
3. Resolve the discrepancies in classical estimates through quantum principles
4. Interpret the knowledge of Magnetic Properties in Material Fabrication
5. Explain the response of E-Field on Dielectric Materials to control the device performance

Unit- I : WAVE OPTICS

Interference - Introduction, Principle of Superposition of Waves, Interference in Plane Parallel Film due to Reflected Light, Newton's Rings under Reflected Light - Determination of Wavelength of Monochromatic Source of Light, Applications of Interference-Testing of Flatness of Surfaces, Anti Reflecting Coatings

Diffraction - Introduction, Differences between Interference and Diffraction, Fraunhofer Diffraction due to Single Slit – Intensity Distribution

Unit-II : LASERS & FIBER OPTICS

Lasers - Introduction, Characteristics of Lasers- Coherence, Directionality, Monochromacity and High Intensity, Principle of Laser – Absorption, Spontaneous and Stimulated Emission, Einstein Coefficients (Qualitative), Population Inversion, Optical Resonator and Lasing Action, Ruby Laser [Three Level System], Helium-Neon Laser [Four Level System], Applications of Lasers in Industry, Scientific and Medical Fields.

Fiber Optics - Introduction, Optical Fiber Construction, Principle of Optical Fiber – Total Internal Reflection, Conditions for Light to Propagate - Numerical Aperture and Acceptance Angle, Differences between Step Index Fibers and Graded Index Fibers, Differences between Single Mode Fibers and Multimode Fibers, Appications of Optical Fibers in Communication

Unit-III : PRELIMINARY QUANTUM MECHANICS

Introduction, Waves and Particles, Wave Particle Duality and De-Broglie Hypothesis, Heisenberg's Uncertainty Principle – Applications (a) Non Existence of Electrons in Nucleus (b) Existence of Protons and Neutrons in Nucleus (c) Radiation of Light from an excited atom, Time independent Schrödinger wave equation, Physical Significance of Wave Function, Particle in One Dimensional Potential Box, Comparison of Maxwell Boltzmann, Bose Einstein and Fermi Dirac Statistics (Qualitative Treatment only)

Unit-IV : Magnetic Properties

Introduction, Basic Terms, Relation between B, H & I, Origin of Magnetic Moment – Bohr Magnetron, Classification of Magnetic Materials – Dia, Para and Ferro, Domain Theory of Ferromagnetism – Hysteresis, , Soft and Hard Magnetic Materials, Applications- Ferrites and Eddy Current Losses Transformer Cores, Concept of Magnetostriction

Unit-V : DIELECTRIC MATERIALS

Introduction, Basic Terms – Relation between D, E & P, Electronic Polarizability, Ionic Polarizability, Orienational Polarizability (both Qualitative and Quantitative), Total Polarizability, Frequency Dependence of Polarizability, Dielectric Loss and Dielectric Breakdown, Applications of Dielectrics – Solid Insulating Materials, Liquid Insulating Materials, Dielectric Heating, Concept of Ferro Electricity - Spontaneous Polarization in Barium Titanate Crystal, Concept of Piezoelectricity.

Text Books:

1. A Textbook of Engineering Physics**,** M N Avadhanulu & P G Kshirsagar, S.Chand Publishers

Reference Books:

1. University Physics by Young and Freedman
2. Fundamentals of Physics by Resnick, Halliday and Walker
3. Concepts of Modern Physics by Arthur Beiser, McGraw-Hill Pubishers
4. Solid State Physics by S. O. Pillai, New Age International Pubishers
5. Engineering Physics, Volume-I&II, P.K.Palani Swamy, Scitech Publications Hyderabad
6. Engineering Physics Volume I&II Dr.K.Vijaykumar, S.Chand Publishing Company, New Delhi
7. Engineering Physics Dr. S. Mani Naidu, Pearson Publications Chennai

Computer Programming Lab
(Common for All Branches)

Credits : 1.5 **External Marks: 50**
Course Code: 16CS1101 **Internal Marks: 25**

Course Objectives:

- To gain experience about structured programming
- To help students to understand the implementation of C language
- To understand various features in C

Course Outcomes:
At the end of the course students will be able to

1. Solve the given problem using the syntactical structures of C language
2. Develop , execute and document computerized solution for various problems using the features of C language
3. Design programs involving decision structures and loops.
4. Implement modularity and code reusability concepts using functions.
5. To read and write C program that uses pointers, structures and files

List of Experiments

Ex 1: Write the C programs calculate the following
a) Area of triangle when sides are given.
b) Sum of first n numbers.
c) Interchanging values of two variables.

Ex 2: Write the C programs to perform the following
a) Read lower case character and convert into upper case.
b) Find maximum of 3 values using conditional operator.
c) Calculate area and perimeter of circle.

Ex 3: Write C programs for the following using decision making statements
a) Check the given number is even / odd.
b) Find the Largest among 3 values.
c) Calculate the grades of a student.

Ex 4:
a) Arithmetical operations using switch-case.
b) Read a number and display in reverse.
c) Check for Armstrong number property

Ex 5:
a) Check for strong number property
b) Generate Fibonacci series.
c) Generate Prime numbers between two numbers.

Ex 6: Implement the following using arrays

a) Largest and smallest from a list of elements.
b) Find the position of given element from a list.
c) Arrange the elements in order.

Ex 7: Implement the following using arrays

a) Matrix addition.
b) Matrix Multiplication.
c) Transpose of given matrix

Ex 8: Calculate ${}^{n}C_{r}$ value using functions.
Write functions to perform

a) String copy
b) String concatenation
c) String comparison

Ex 9:

a) Factorial using recursion and non recursion.
b) GCD using recursion and non recursion.

Ex 10:

a) Find the sum and average of list of elements using DMA Functions
b) Implementation of call by reference

Ex 11:

a) Implementation of array of structure.
b) Demonstration of Union.

Ex 12:

a) Copy the contents of one file into another.
b) Count the number of characters, words and lines in a file.

Text Books:

1. E. Balaguruswamy, "C Programming", Tata Mc Graw Hills
2. Yashwant Kantikar "Let Us C",

Reference Books:

1. Dr. N.B Venkateswarlu, "C and Data Structures: A snap shot Oriented Treatise Using Live Engineering Examples", S. Chand & Co, New Delhi.
2. B. W Kernighan, Dennis M. Ritchie, "The C – Programming Language", PHI.

Engineering Physics Lab
(Common for All Branches)

Credits : 1.5 **External Marks: 50**
Course Code: 16BS1101 **Internal Marks: 25**

Course Description
This Laboratory course is intended to apply the Scientific Method to expedite experiments that include

- Wave Fundamentals
- Physical/Wave Optics
- Modern Physics
- Solid State Devices
- Electromagnetic Induction

So that student can verify theoretical ideas and concepts covered in lecture through host of Analytical Techniques, Statistical Analysis and Graphical Analysis

Scope
This course is offered for all First Year B.Tech students either in SEM-I or SEM-II.

- Student will get acquainted with Determination of Rigidity Modulus and Acceleration due to Gravity using Torsional Pendulum and Compound Pendulum respectively.
- The learner is expected to understand Wave Phenomena such as Laws of Stretched Strings apart from Electromagnetic Phenomena such as Variation of Magnetic Field along the Axis of Circular Coil.
- Student will be familiar with Optical Equipment such as Traveling Microscope and Spectrometer to understand the phenomena of Interference and Diffraction that will enable him to appreciate the Precision Measurements.
- The Modern Physics Experiments include introduction to Cutting Edge Technology such as Lasers and Fiber Optics in addition to the Solid State Devices such as Thermistor and Energy Band Gap of a typical Diode

Course Objectives:

- To Interpret the results of mechanical parameters such as modulus of elasticity and acceleration due to gravity through simple oscillatory experiments using torsional pendulum or physical pendulum
- To use classic experimental techniques to understand the Phenomenon of resonance with equipment such as sonometer, Melde's apparatus and volume resonator to measure desired properties
- To operate optical systems and design Instrumentation with precision measurements to estimate error for targeted accuracy
- To attain ability to use Techniques and Skills associated with Modern Engineering Tools such as Lasers and Fiber Optics
- To characterize magnetic, dielectric and semiconducting material devices

Course Outcomes:

Will be able to

1. infer the results of mechanical parameters such as modulus of elasticity and acceleration due to gravity through simple oscillatory experiments using torsional pendulum or physical pendulum
2. apply classic experimental techniques to comprehend the Phenomenon of resonance with equipment such as sonometer, Melde's apparatus and volume resonator to measure desired properties
3. demonstrate the ability to measure properties of optical systems and design instrumentation with precision measurements to estimate error for targeted accuracy
4. illustrate techniques and skills associated with Modern Engineering Tools such as Lasers and Fiber Optics
5. evaluate characteristics of magnetic, dielectric and semiconducting material devices

List Of Experiments (Any Ten Experiments have to be completed)

1. Precision Measurements and Instruments
2. Error Analysis and Graph Drawing
3. Determination of Rigidity Modulus of the Material of Wire using Torsional Pendulum
4. Verification of Laws of Transverse vibrations in Stretched Strings using Sonometer
5. Wedge method – Determination of Thickness of Thin Object
6. Determination of Numerical Aperture and Bending Loss of an Optical Fiber
7. Determination of Acceleration due to Gravity (g) using Compound Pendulum
8. Determination of Energy Band Gap using the given Semiconductor Diode
9. Newton's Rings – Determination of the Radius of Curvature of given Plano Convex Lens
10. Slit Width Determination with Single Slit Diffraction Pattern using LASER
11. Study of Characteristics of Thermistor
12. Determination of Wavelength of Monochromatic Source using LASER Diffraction
13. Determination of the Frequency of the given Tuning Fork using Volume Resonator
14. Study of the variation of Magnetic Field along the axis of a Circular Coil using Stewart and Gee's Method.
15. Diffraction Grating: Normal Incidence – Determination of Wavelength of Monochromatic Source

Manual / Record Book

1. Prof. M. Rama Rao, Manual cum Record for Engineering Physics Lab, Acme Learning.
2. Dr.Y. Aparna and Dr. K. Venkateswara Rao , Lab Manual of Engineering Physics (VGS books links,Vijayawada)

Basic English Communication Skills Lab
(Common for All Branches)

Credits : 1.5 **External Marks: 50**
Course Code: 16HS1101 **Internal Marks: 25**

Course Objectives:

- To get students pronounce words correctly and speak with proper intonation
- To help students understand people speaking with different accents
- To enable students to describe objects and events effectively
- To help students approach a book with effective reading techniques
- To help students comprehend and interpret data provided in graphs, tables etc.

Course Outcomes:

1. Students will be able to pronounce words accurately based on the knowledge of speech sounds and use appropriate intonation patterns in speech.
2. Students will be able to comprehend audio and video clips of different accents.
3. Students will be able to describe / discuss / explain a given situation / context well.
4. Students will be able to read and recall what they have read.
5. Students will be able to understand and interpret information provided in graphs, tables etc.

Course Syllabus

Unit I: Received Pronunciation—Speech sounds of English—Intonation
Unit II: Comprehension of Audio and Video Clips of different Accents
Unit III: Greetings—Self-introduction—Introducing others—Story telling—Narrating an incident / event / person / picture
Unit–IV: Reading: SQ3R Technique (Survey-Question-Read-Recite/Recall-Review)
Unit V: Interpreting data of graphs, tables etc. orally and in writing

Course Material:

Text book:

Rani, K. Nirupa et al. *Speak Well*. Orient Blackswan: Hyderabad, 2012.

Reference Books:

1. Prasad, M. Hari et al. *Strengthen Your Steps*. Maruthi: Hyderabad, 2010.
2. Prasad, M. Hari et al. *Strengthen Your Communication Skills*. Maruthi: Hyd, 2014.
3. Ashraf, M. Rizvi. *Effective Technical Communication*. Tata McGraw-Hill, 2005

English Communication Practice
(Common for All Branches)

Credits : 3 **External Marks: 70**
Course Code: 16HS1002 **Internal Marks: 30**

Course Objectives:

- To assist students use grammar effectively in both speech and writing
- To improve communication skills of students by making them participate in different language activities
- To help students acquire the study skills of 'Note taking' and 'Note making'
- To assist students to use reading techniques learnt in English for other Course s
- To enable students to summarize, paraphrase and review a piece of writing

Course Outcomes:

1. Students will be able to use grammar appropriately in speech and writing.
2. Students will be able to describe, discuss, explain and interpret a given situation / context effectively.
3. Students will be able to read texts and listen to lectures and make notes on them.
4. Students will be able to apply reading techniques in their other Course s.
5. Students will be able to summarize, paraphrase and review a piece of writing efficiently.

Course Syllabus

Unit–I: Grammar: Regular & Irregular Verbs—Tenses—Voice—Reported Speech—Auxiliaries and Modals—*If* Conditionals— Degrees of Comparison— Simple, Compound, Complex Sentences— Question Tag—Correction of Sentences
Unit –II: Situational Dialogues—Acceptance and Rejection of Invitation—Debate—JAM—Public Speaking
Unit–III: Study Skills: Note taking and Note making
Unit-IV: Intensive and Extensive reading—Skimming and Scanning
Unit–V: Summarising / Paraphrasing / Reviewing an article orally and in writing

Course Material:

Text Book :
Rani, K. Nirupa et al. *Speak Well*. Orient Blackswan: Hyderabad, 2012.

Reference Books :
1. Wood, Frederick T. *A Remedial English Grammar for Foreign Students*. Macmillan.
2. Heaton, John Brian et al. *Longman Dictionary of Common Errors*. Longman .
3. Taylor, Grant. *English Conversation Practice*. Tata McGraw-Hill: New Delhi, 2008.
4. Ashraf, M. Rizvi. *Effective Technical Communication*. Tata McGraw-Hill, 2005.

Engineering Mathematics – II
(Common for All Branches)

Credits : 3.5 **External Marks: 70**
Course Code: 16BS1002 **Internal Marks: 30**

Course Objectives:

- To solve the algebraic and transcendental equations, using different numerical method. Estimate the best curve for a given data.
- To estimate the value of derivatives, evaluate the definite integrals using different numerical methods and calculate the numerical solution of an ordinary differential equation i.e IVP .
- To explain Laplace transform of continuous functions using Laplace transform formulae & properties, apply Laplace transform to solve an I.V.P &B.V.P
- Perform the Fourier series and half range series expansion of different functions in different intervals.
- Interpret the methods of solving a linear and non-linear 1st order partial differential equation and evaluate wave equations & heat equations using method of separation of variables.

Course Outcomes:

On completion of this course, students should be able

1. Solve the algebraic and transcendental equations by identifying suitable numerical methods, estimate a linear and non-linear curve to the given data by the method of least squares, calculate the value of dependent variable for a particular x by deducing the unknown function y = f(x) for an evenly or unevenly spaced points.
2. Estimate the value of derivatives, evaluate the definite integrals using different numerical methods and evaluate an IVP.
3. Deduce Laplace transform of different continuous functions using different properties and solve an I.V.P & B.V.P applying Laplace transform.
4. Deduce the Fourier series and half range series expansions of different functions for different intervals.
5. Solve a linear and non-linear 1st order partial differential equation and using method of separation of variables evaluate a wave equation & heat equation

Unit – I Numerical solutions of Equations and Interpolation

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

Interpolation**:** Introduction – Finite differences- Forward Differences – Backward differences – Central differences – Symbolic relations and separation of symbols-Differences of a polynomial – Newton's formulae for interpolation – Interpolation with unevenly spaced points – Lagrange's Interpolation formula.

Unit-II

Numerical Differentiation, Integration and solution of Ordinary Differential equations

Numerical Differentiation and Integration: Numerical Differentiation using finite differences – Trapezoidal rule – Simpson's 1/3 Rule –Simpson's 3/8 Rule.

Solution of Ordinary Differential equations - Solution by Taylor's series – Picard's Method of successive Approximations – Euler's and Modified Euler's Method – Runge – Kutta Methods – Predictor – Corrector Methods – Milne's Method.

Unit-III Laplace and Inverse Laplace transforms

Laplace transforms of standard functions – Shifting Theorems, Transforms of derivatives and integrals – Unit step function – Dirac's delta function – Inverse Laplace transforms – Convolution theorem. Solution of ordinary differential equations using Laplace transforms.

Unit-IV Fourier series

Determination of Fourier coefficients (without proof) – Fourier series – even and odd functions – Fourier series in an arbitrary interval– Half-range sine and cosine series.

Unit-V Partial Differential equations

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and non-linear (standard type) equations. Solution of linear Partial differential equations with constant coefficients – Method of Separation of Variables- One dimensional Wave and Heat equations.

Text Books:

1. Higher Engineering Mathematics, 42nd edition, 2012 - B. S. Grewal, Khanna Publishers, New Delhi.
2. Ravindranath, V. and Vijayalaxmi, A., 2nd edition, 2012, A Text Book on Mathematical Methods, Himalaya Publishing House, Bombay.

Reference Books:

1. Mathematical Methods, 6th edition, 2011, Dr. T. K.V.Iyengar & others S. Chand Publications.
2. Engineering Mathematics, 4th edition, 2009 - B. V. Ramana, Tata McGraw Hill, New Delhi.
3. Engineering Mathematics Volume-II, 6th edition, 2012, T.K.V Iyengar, &others, S.Chand Co. New Delhi.

Environmental Studies
(Common for All Branches)

Credits : 3 **External Marks: 70**
Course Code: 16HS1003 **Internal Marks: 30**

Course Objectives:

- Memorize the overall knowledge of the environment; differentiate the resources, reserves, importance and conservation.
- Identify the significance, arrangement, causes of annihilation of ecosystems and biodiversity; recognize the importance of their protection and preservation.
- Discriminate various causes, effects of a range of environmental pollutions and describe the appropriate control methods.
- Identify the sustainable development; evaluate the different environmental management issues and environmental legal issues.
- Describe the variations in population growth, recognizes the human health problems and evaluate the environmental assets.

Course Outcomes:

1. Recognize the general issues of environment and know how to conserve the environment, speaks well again on various resources, present status and their better usage.
2. Explain the interdependency of life in the ecosystem, demonstrate the structural and functional setup, classify and appraise the importance of diversity on the earth and differentiate the conservation methods.
3. Examine the various types of pollutants and their impacts along with their control methods; review the different types of solid wastes, impacts and their ecofriendly disposal methods.
4. Translate the concept of sustainable development by green technologies, experiment on the environmental management systems for clean, green, safe and healthy environment through clean development mechanisms.
5. Evaluate the changing trends of population curves among different nations, discuss how to limit the current population size, collect and compile the information to document the environmental assets.

Unit – I

Multidisciplinary nature of Environmental Studies: Definition of Environment – Scope, Importance and multidisciplinary nature of the course - Need for Public Awareness

Natural Resources:

Forest Resources - Use and over exploitation - deforestation – consequences – solutions - case studies

Water Resources - Use and over utilization - dams - benefits and problems on Tribes and Environment

Mineral Resources - Use and exploitation - Tribal and environmental effects of extracting and using mineral resources - case studies

Food Resources – Food security concept - changes caused by agriculture and overgrazing - effects of modern agriculture – fertilizer - pesticide problems - water logging - salinity – concept of sustainable agricultural methods - case studies
Energy Resources - Non-renewable energy resources – coal – crude oil - natural gas - use of renewable and alternate energy sources - case studies
Land resources – Reasons for land degradation - Human induced landslides - soil erosion and desertification

Unit – II
Ecosystems: Definition – Structure of ecosystem: producers - consumers – decomposers. Functions of ecosystem: Food chains - food webs - ecological pyramids - Energy flow - Nutrient cycles (Carbon cycle and Nitrogen cycle). Ecological succession, Types - characteristic features of the following ecosystems: Forest ecosystem - Grassland ecosystem - Desert ecosystem - Aquatic ecosystems (lakes and oceans)
Biodiversity and its conservation: Definition of Biodiversity – genetic, species and ecosystem diversities - Values of biodiversity - Bio-geographical classification of India - India as a mega-diversity nation – Hotspots of biodiversity (India) - Endangered and endemic species of India – Threats to biodiversity - Conservation of biodiversity

Unit – III
Environmental Pollution: Definition – causes - effects - control measures of Air pollution - Water pollution - Marine pollution - Noise pollution - Nuclear hazards
Solid waste Management: Causes - effects - disposal methods of urban waste - biomedical wastes - case studies
Disaster management: floods – earthquakes - cyclones

Unit – IV

Social Issues and the Environment: Concept of Unsustainable and Sustainable development – Urbanization and Urban problems related to energy - Water conservation: Rain water harvesting - Watershed management - Resettlement and rehabilitation of people - case studies. Global environmental challenges: climate change - global warming – acid rains - ozone layer depletion - World summits on environment: Stockholm conference – Rio-earth summit – Kyoto protocol – EIA - definition – significance - scope – stages of EIA – Concept of Bioremediation – Concept of Carbon Sequestration – Environment (Protection) Act - Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act - Wildlife (Protection) Act - Forest (Conservation) Act

Unit – V
Human Population and the Environment: Population growth patterns - variation among nations - Population problems - control -Environment and human health - Role of information Technology in Environment and human health
Field work: Visit to local area to document environmental assets - River/ forest/ grassland/ hill/ mountain Visit to local polluted sites Urban/ Rural/ industrial/ Agricultural
Study of common plants/ insects/ birds - Study of simple ecosystems ponds/ rivers/ hill slopes

Text Books:

1. Shashi Chawla. 2015, *A Text book of Environmental Studies*, Revised edition, TMH, New Delhi
2. Bharucha, E. 2005, *Text book of Environmental Studies*, First edition, Universities Press (India) Pvt. Ltd., Hyderabad
3. Suresh K. Dhameja. 2006-07, *Environmental Studies*, Third revised edition, S.K. Kataria & Sons (P) Ltd., New Delhi
4. Benny Joseph. 2015, *Environmental Studies*, Revised edition, TMH, New Delhi

Reference Books:

1. Odum, E.P, *Fundamentals of Ecology*, Third edition, W.B. Saunders & Co (P) Ltd., Philadelphia.
2. P. D. Sharma , *Ecology and Environment*, Revised edition, Rastogi Publications (P) Ltd
3. Cunningham, W.P., Cunningham, M.A., *Principles of Environmental Science*, TMH, New Delhi
4. Peavy, Rowe and Tchobanoglous, *Environmental Engineering*, Mc Graw – Hill International edition
5. Graedel, T.E., Allenby, B.R., *Industrial Ecology and Sustainable Engineering*, Pearson Publications.

Data Structures
(Common to CSE& IT Branches)

Credits : 3.5 **External Marks: 70**
Course Code: 16CS1002 **Internal Marks: 30**

Course Objectives:

- Demonstrate familiarity with major algorithms and data structures.
- Write recursive methods.
- Demonstrate understanding of various searching & sorting algorithms.
- Choose the appropriate data structure and algorithm design method for a specified application.
- Understand and demonstrate of the abstract properties of various data structures such as stacks, queues, lists, trees and graphs
- Understand and apply fundamental algorithmic problems including Tree traversals, Graph traversals.

Course Outcomes:

Upon completion of the Course, students will be able to:

1. Design appropriate algorithms for various data processing problems.
2. Implement various searching and sorting techniques.
3. Apply data structures like stacks and queues to solve various computing problems.
4. Devise programs using linear data structures.
5. Develop and apply various non-linear data structures like trees and graphs to solve various computing problems.

Unit–I: INTRODUCTION:

Preliminaries of algorithm, algorithm analysis and complexity, Introduction to recursion, design methodology and implementation of recursive algorithms, linear and binary recursion, examples, definition of data structure, operations, type of data structures: Linear, Non-Linear.

Unit – II: SEARCHING & SORTING:

Searching: Basic concepts, Linear and Binary search.
Sorting: Basic concepts, Selection Sort, Insertion Sort, Bubble Sort, Quick Sort, Merge Sort, Comparison of various Sorting techniques.

Unit – III: LINEAR DATA STRUCTURES-I:

Stacks: Concepts, Array representation of stack, Operations and implementation, Applications of stack, Evaluation of arithmetic expression, Conversion of expression from infix to postfix.
Queues: Concepts, Array representation of Queue, Operations and implementation, Applications of Queue.

Unit – IV: LINEAR DATA STRUCTURES-II:

Linked-Lists: Singly linked lists, doubly linked lists, circular linked lists, Operations and applications, Merits and Demerits of Linked Lists, Representing stacks and queues using linked lists.

Unit – V: NON-LINEAR DATA STRUCTURES:

Trees: Basic concepts, terminology, Binary Tree, representation, traversals (In-Order, Pre-Order, Post-Order); Binary Search Tree operations: insertion, deletion.

Graphs: Basic Concepts, representation: Adjacency Matrix and Adjacency List, Graph traversals: BFS and DFS.

Text Books:

1. Debasis Samanta , 2012, "Classic Data Structures", Second Edition, PHI, New Delhi, India.
2. B.A. Forouzan and R.F. Gilberg, 2011, "Computer science, A structured programming approach using C", Third edition, Thomson, New Delhi, India.

References Books:

1. Dr. N.B Venkateswarlu, Dr. E. V. Prasad, 2010, "C and Data Structures", S Chand, New Delhi, India.
2. A.M. Tanenbaum, Y. Langsam, and M. Augenstein, 2009, "Data Structures Using C", PHI, New Delhi, India.

Engineering Mechanics
(Common to CSE, IT, EEE, ECE & Civil branches)

Credits : 3.5 **External Marks : 70**
Course Code: 16ME1002 **Internal Marks: 30**

Course Objectives:

- To provide knowledge on system of forces, free body diagram.
- To provide knowledge on friction between two mating surfaces.
- To provide knowledge on centre of gravity and moment of inertia for different sections.

Course Outcomes:

1. Know the system of forces and calculate the resultant of different force system.
2. Draw the free body diagram and understand the concept of moment and couple.
3. Know the friction between two mating surfaces and calculate cetroid of plane areas.
4. Determine area and mass moment of inertia for different sections.
5. Determine the kinematic relations of particles & rigid bodies.

Unit I

SYSTEMS OF FORCES: Introduction – parallelogram law – Forces and components - Resultant of coplanar concurrent forces – component forces - vector notation – moment of force – principle of moments – couples - Resultant of planar force systems.

Unit II

EQUILIBRIUM OF FORCE SYSTEMS: Equilibrium – free body diagrams – Equations of equilibrium – equilibrium of planar systems – graphical methods and analytical methods for equilibrium of planar systems – Moment of a Force and its applications, Varignon's theorem

Unit III

FRICTION: Introduction, limiting friction – types of friction and friction laws – application of friction - Inclined plane, friction of screw and nuts – screw jack.
CENTROIDS AND CENTRE OF GRAVITY: Centre of gravity – centroids of area and lines – determination of centroids by integration – centroids of composite figures – theorems of Pappus.

Unit IV

AREA MOMENT OF INERTIA : Moment of inertia – polar moment of Inertia – Radius of gyration - Transfer theorem for moment of Inertia – Moment of inertia of composite areas – product of inertia – Transfer formula for product of Inertia.
MASS MOMENT OF INERTIA : Moment of inertia of masses –Radius of gyration – Transfer formula for mass moment of inertia – Mass moment of Inertia by Integration**.**

Unit V

KINEMATICS : Rectilinear motion-curvilinear motion – Rectangular components of curvilinear motion - Normal and Tangential components of acceleration, Radial and transverse components - Kinematics of rigid bodies - angular motion – fixed axis rotation – Definition and analysis of plane motion.

KINETICS: Kinetics of rigid bodies – equation of planes motion – fixed axis rotation – rolling bodies (simple examples) - general plane motion (Simple examples).

Text Books:

1. I.B. Prasad: Applied Mechanics, Khanna Publishers, 19th Edition, 2009.
2. Ferdinand L. Singer: Engineering Mechanics, Harper Collins Publishers India, 3rd Edition, 2008.
3. A.K. Tayal: Engineering Mechanics, Umesh Publishers, 13th Edition, 2008.

References Books :

1. Irving. H. Shames: Engineering Mechanics, PHI Publishers, 4th Edition, 2008.
2. Timoshenko & Young: Engineering Mechanics, MGH Publishers, 4th Edition, 2010.
3. K.L. Kumar, Engineering Mechanics, TMH Publishers, 3rd Edition, 2009.
4. Engineering Mechanics by S. Timoshenko and D.H.Young, McGraw-Hill.
5. Engg. Mechanics / S.S. Bhavikati & J.G. Rajasekharappa.

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Engineering Chemistry
(Common for All Branches)

Credits : 3.5 **External Marks: 70**
Course Code: 16BS1004 **Internal Marks: 30**

Course Objectives:

- To become familiar in moulding methods of preparation of different types of plastic materials.
- To understand the determination of hardness of water sample by EDTA method.
- To understand the methods of prevention of corrosion of metal.
- To become familiar about different lubrication techniques.
- To understand about constructing the PV cell.

Course Outcomes:

1. Student will **differentiate** different moulding techniques of plastic materials.
2. Students can able to **determine** total hardness of water by EDTA method.
3. Students can able to **design** the metallic materials to prevent corrosion.
4. Student will **apply** suitable lubrication mechanisms for various machinery parts.
5. Students will **demonstrate** the working of PV cell.

Unit-I :

POLYMER SCIENCE & INORGANIC ENGINEERING MATERIALS

Introduction – Definitions of Polymer, Polymerization – Functionality – Degree of polymerization - Types of polymerizations (addition and condensation polymerizations). Plastics – Definition - Thermoplastics, Thermosetting Plastics – Compounding of Plastics – Moulding of plastics into Articles (Compression, injection, transfer and extrusion moulding methods). **Cements**: Classification of cements - Manufacture of Portland cement - Chemical constitution of Portland cement - Setting and Hardening of Portland Cement.

Unit-II :

WATER TECHNOLOGY

Hardness of Water – Temporary and Permanent Hardness - Units and Inter Conversions of Units - Problems on Temporary and Permanent Hardness - Estimation of Hardness by EDTA Methods - Treatment of Water for Domestic Purposes - Sedimentation – Coagulation – Filtration - Disinfection – Sterilization – Chlorination - Break Point chlorination – Ozonisation - **Industrial Water Treatments:** Desalination – Electro Dialysis - Reverse Osmosis - Lime-Soda Process - Zeolite Process - Ion-Exchange Process.

Unit-III :

CORROSION AND ITS CONTROL

Definition, Causes and Effects of Corrosion - Theories of Corrosion (Chemical and Electro Chemical Corrosion) - Mechanism of Electro Chemical Corrosion (Oxygen Absorption Type and Hydrogen Evolution Type) - Types of Corrosion (Galvanic Corrosion, Differential Aeration Corrosion, Water Line Corrosion, Pitting Corrosion and Stress corrosion) - Galvanic Series – Factors Effecting Rate of Corrosion (Nature of Metal and Nature of Environment). Proper Designing - Modifying the Environment - Cathodic Protection (Sacrificial Anodic and Impressed Current).

Unit-IV :

FUEL TECHNOLOGY & LUBRICANTS

Classification of Crude Oil-Fractional Distillation of Petroleum- Manufacturing Of Synthetic Petrol (Fischer-Tropschs & Bergius Process) - Knocking –Anti Knocking Agents-Octane & Cetane Number - **Lubricants:** Definition and functions of lubricants – classification of lubricants with examples - mechanism of lubrication – Thick film, Thin film and Extreme pressure lubrication - properties of lubricants - Viscosity, flash and fire points, cloud and pour points, aniline points, neutralization number and mechanical strength.

Unit-V:

ENERGY SOURCES

Chemical sources of energy: Single electrode potential - Faraday Laws – electro chemical series - Nernst Equation – reference electrodes – calomel electrode – NHE (or) SHE - **Renewable energy Source (Solar Energy):** Green house concept – harnessing of solar energy – photo voltaic cells – concentrated power plants – parabolic trough – solar dish - solar tower.

Text Books:

1. "Engineering Chemistry", P.C.Jain and Monica Jain, DhanpatRai Publications, Co., New Delhi 15th Edition.
2. "A Text Book of Engineering Chemistry", S.S. Dara, S.S.Umare, S.Chand& Co., Ltd., 12th Edition.

Reference Books :

1. "A Text Book of Engineering Chemistry" by Dr.SUnita Rattan, S.K. Kataria& Sons (2012).
2. "A Text Book of Engineering Chemistry", by S. Nagarajan, R. Gopalan, D.Venkatappayya, 3rd edition, Vikas Publishing House.
3. "Engineering Chemistry" by Wiley India Editorial Team, Wiley Publishers (2011).

Data Structures Lab
(Common to CSE, IT Branches)

Credits : 1.5 **External Marks: 50**
Course Code: 16CS1102 **Internal Marks: 25**

Course Objectives:

- To develop skills to design and analyze simple linear and non linear data structures
- To strengthen the ability to identify and apply the suitable data structure for the given real world problem
- To gain knowledge in practical applications of data structures

Course Outcomes:

Upon completion of the Course, students will be able to:

1. Develop programs as recursive solutions for basic routine problems.
2. Demonstrate different strategies to solve the most common searching and sorting problems.
3. Design programs that use data structures such as arrays, linked lists, stacks, queues, and solve applications like Infix-to-Postfix conversion.
4. Develop programs for implementing various operations on binary trees and binary search trees.
5. Solve traversal problems on graphs using BFS, DFS.

List of Programs:

1. (a) Write C programs to generate a Fibonacci series using recursive function.
   (b) Write C programs to find the GCD of given numbers using recursive function.
   (c) Write C programs to find the factorial of given number using recursive function.
2. (a)Write a C program to perform linear search for a key value in a given list.
   (b)Write a C program to perform Binary search for a key value in a given list.
3. (a) Write C programs that implement Selection Sort to sort a given list of integers.
   (b) Write C programs that implement Bubble Sort to sort a given list of integers.
   (c) Write C programs that implement Insertion Sort to sort a given list of integers.
4. (a) Write C programs that implement Quick Sort to sort a given list of integers.
   (b) Write C programs that implement Merge Sort to sort a given list of integers.
5. (a) Write a C program that implement stack operations using arrays.
   (b)Write a C program that implement queue operations using arrays.
6. Write a c program to perform infix to postfix conversion of a given expression.
7. (a)Write a C program to implement various operations on a single linked list.
   (b)Write a C program to implement various operations on a double linked list.
8. Write a C program that implement stack operations using linked lists.
9. Write a C program that implement queue operations using linked lists.
10. Write a C program to implement Binary tree traversals.
11. Write a C program to implement the operations on a Binary Search Tree.
12. (a)Write a program in C to implement Breadth First search
    (b)Write a program in C to implement Depth first search

Text Books:

1. Debasis Samanta, 2012, “Classic Data Structures”, Second Edition, PHI, New Delhi, India.
2. B.A. Forouzan and R.F. Gilberg, 2011, “Computer science, A structured programming approach using C”, Third edition, Thomson, New Delhi, India.

Reference Books:

1. Dr. N.B Venkateswarlu, Dr. E. V. Prasad, 2010, “C and Data Structures”, S Chand, New Delhi, India.
2. A.M. Tanenbaum, Y. Langsam, and M. Augenstein, 2009, “Data Structures Using C”, PHI, New Delhi, India.

Engineering Chemistry Laboratory
(Common for All Branches)

Credits : 1.5 **External Marks: 50**
Course Code: 16BS1102 **Internal Marks: 25**

Course Objectives:

- To understand the determination of D.O. and Turbidity of water samples.
- To become familiar with the determination of viscosity, flash point and acid value of oil.
- To learn concepts of pH and conductometric titrations.
- To understand the determination of hardness of water by EDTA method.
- To become familiar about all the instruments in the chemistry Laboratory.

.**Course Outcomes:**

1. Students are able to determine D.O. and Turbidity of water samples.
2. Students can explain the importance of viscosity, Flash point and Acid value of a lubricant.
3. Students will determine the amount of acid or base by pH metric and conductometric titrations.
4. Students are able to determine the hardness of various water samples.
5. Students can able to operate all the instruments in the chemistry Laboratory analysis.

List Of Experiments: (Any Twelve experiments have to be completed)

1. Determination of Dissolved Oxygen present in the given water smaple by Modern Winkler's method.
2. Nephelometric determination of Turbidity present in the given water sample.
3. Determination of Kinematic Viscosity of a given oil sample by using Viscometer.
4. Determination of Flash and Fire points of given Oil Samples.
5. Determination of acid number of given lubricating oil.
6. Determination of Strength of a strong acid by pH metric Method.
7. Conductometric determination of Strength of an Acid using strong base.
8. Conductometric determination of mixture of acids using strong base.
9. Determination of Total Hardness of water sample by using EDTA Method.
10. Colorimetric determination of Iron (III).
11. Potentiometric determination of Mohr's salt using $K_2Cr_2O_7$.
12. Potentiometric determination of strong acid using strong base.
13. Determination of manganese dioxide in manganese ore (pyrolusite).
14. Estimation of Viscosity of an Organic Solvent by using Ostwald Viscometer.
15. Preparation and calculation of the yield of Phenol-Formaldehyde Resin (Bakelite).

Text Books:

1) "Practical Engineering Chemistry" by K.Mukkanti, etal. B.S.Publications, Hyderabad (2011).
2) "Lab Manual on Engineering Chemistry" by Sudharani, Dhanpat Rai Publications, Co., New Delhi. (Latest Edition).

Reference Books:

1) "Engineering Chemistry Lab Manual" by Shuchi Tiwari (2010), SCITECH Publications.
2) "Vogel's Text Book of Quantitative Chemical Analysis", 6th Edition by G.J.Jeffery, J.Bassett, J.Mendham, R.C. Denney, Longman Scientific & Technical Publications, New York.
3) "A Text Book of Engineering Chemistry" by R.N.Goyal and H. Goel, Ane Books (P) Ltd.(2009).
4) "A Text Book on experiments and calculations Engineering" by S.S. Dara, S.Chand & Company Ltd. (2003).
5) "Instrumental methods of Chemical Analysis", Gurudeep R, Chatwal Sham, K. Anand, Latest Edition (2015), Himalaya Publications.

Information Technology Workshop Lab
(Common for All Branches)

Credits : 1.5 **External Marks: 50**
Course Code: 16CS1103 **Internal Marks: 25**

Course Objectives:

- PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers.
- All the DOS commands would be covered for maintains of the Operating system.
- Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered.
- Productivity tools module would enable the students in crafting professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools.

Course Outcomes:

1. Students gain knowledge on computer system such as system Unit, input devices, and output devices connected to the computer.
2. Students gain knowledge to understand the booting process that includes switching on the system, and familiar with all the commands of an operating system.
3. Students gain knowledge to understand the working of the internet that include the use of protocols, domains, IP addresses, URLs, web browsers and search engines etc.
4. Students get familiarize with parts of Word window, To create and save a document, To set page settings, create headers and footers, To use various formatting features such as bold face, italicize, underline, subscript, superscript, line spacing, etc.
5. Students get familiarize with parts of Excel window, to create and save a workbook with single and/or multiple worksheets, to apply operations on range of cells using built-in formulae, etc.
6. Students get familiarize with parts of PowerPoint win, to create and save a new presentation, apply design templates to a presentation, to insert, edit and delete a slide , etc.

<u>PC Hardware</u>

Task 1: Identification of the peripherals of a computer.
To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions.

Task 2: (Optional) : A practice on disassemble the components of a PC and assembling them to working condition.

Task 3 : Installation of WINDOW XP operating system in PC.

Task 4: Introduction to all internal and external DOS commands

Task 5 : Installation of LINUX operating system in PC.

Internet & World Wide Web

Task 6: S**urfing the Web using Web Browsers and Search engine:** How to access the websites and email. Students customize their web browsers using bookmarks, search toolbars and pop up blockers. And Students should know what search engines are and how to use the search engines.
A few topics would be given to the students for which they need to search on Google.

MS – Word
Word Orientation : Describe Importance of MS- Word

Task 7 :Using word to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word.

Task 8: Creating project abstract for using MS-WORD: Abstract Features to be covered:- Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check , Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

Task 9 : Creating a Newsletter : Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs

Task 10 : Creating a Feedback form - Features to be covered- Forms, Text Fields, Inserting objects, Mail Merge in Word.

MS-Excel
Excel Orientation : The mentor needs to tell the importance of MS/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel –Accessing, overview of toolbars, saving excel files, Using help and resources

Task 11 : Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 12 : Creating Performance Analysis - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting.

Task 13: Calculating GPA - Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function,

Task 14: Creating Cricket Score Card - Features to be covered:-Pivot Tables, Interactive Buttons, Importing Data, Data Protection, Data Validation

MS-Power Point

Task 15 : Students will be working on basic power point utilities and tools which help them create basic power point presentation.
Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in Powerpoint.

Task 16 : Concentrating on the in and out of Microsoft power point, Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides.

Text Books:

1. Vikas Gupta ,"Comdex Information Technology course tool kit" , WILEY Dreamtech
2. Cheryl A Schmidt ,"The Complete Computer upgrade and repair book", 3rd edition, WILEY Dreamtech
3."Introduction to Information Technology", ITL Education Solutions limited, Pearson Education.
4. Kate J. Chase ,"PC Hardware and A+ Handbook" –PHI (Microsoft)

Reference Books:

1 Scott. Mueller, 2008, Upgrading and Repairing PCs, 18/e, QUE, Pearson,
2 Cheryl A Schmidt ,The Complete Computer upgrade and repair book,3/e , Dreamtech

Probability and Statistics
(Common to CSE& IT Branches)

Credits : 3 **External Marks: 70**
Course Code: 16BS2005 **Internal Marks: 30**

Course Objectives:

- Understand probability, Baye's theorem & its applications, random variables, their distributions and expectations.
- Describe Binomial, Poisson distributions, normal distribution and its properties.
- Understand the concept of Sampling, identify a statistic and its sampling distribution, and calculate standard error, point & interval estimations.
- Perform hypothesis tests for small and large sample tests.
- Use appropriate tabular and graphical formats for displaying univariate (bivariate) data sets and carry out correlation, regression.

Course Outcomes:
On Completion of this course, students should be able

1. Describe probability distribution for a range of random variables for discrete and continuous and apply the Baye's theorem on industrial related problems.
2. Calculate the different characteristics of probability distributions under different conditions using Binomial, Poisson and Normal.
3. Calculate sample related values, identify a statistic and its sampling distribution, and calculate standard error, point & interval estimations.
4. Construct the hypothesis, identify appropriate test and apply in a range of statistical test.
5. Apply appropriate tabular and graphical formats for displaying univariate (bivariate) data sets and carry out correlation, regression analysis.

Unit I
Probability, Random Variables and Distribution functions : Probability –Conditional probability – Baye's Theorem and its applications. Random variables –Discrete and Continuous Random Variables, their properties –probability distribution-Distribution function & their properties. Mathematical Expectation and its properties.

Unit-II
Standard Probability distributions and Properties:
Binomial, Poisson, normal distribution its properties and problems - Fitting of binomial, Poisson and normal distributions.

Unit-III
Theory of Estimation:
Introduction to Population-sample-parameter-statistic-sampling distribution of a statistic-standard error. Point Estimation – Interval Estimation –Confidence Internal for parameters in normal population, Proportions and means of t-test.

Unit IV

Testing of Hypothesis:

Introduction to concept of hypothesis – types of hypothesis- errors in testing of hypothesis-level of significance-procedure of tests of significance – Large sample tests (mean and proportion tests)-student t-Test(single mean & difference of means)- Chi-Square test for independence of attributes and goodness of fit.

Unit-V

Correlation, Regression and Curve fitting:

Concept of correlation–types of correlation-scatter diagram-Karl-Pearson correlation coefficient and its properties-Regression-Linear regression and its properties-non-linear regression-curve fitting-Straight line, 2nd degree parabola, Power curve ($y=ax^b$), exponential curves($y= ab^x$, $y = ae^{bx}$).

Text Books:

1. Dr. T. K.V.Iyengar, Dr. B. Krishna Gandhi, S. Ranganatham, Dr. M.V.S.N. Prasad, Probability and Statistics S. Chand Publications.
2. S.P Gupta and V.K Kapoor, Fundemental of Mathematical Statistics, S.Chand Publications

ReferenceBooks:

1. Probability, Statistics and Random processes. T. Veerrajan, Tata Mc.Graw Hill, India.
2. Probability, Statistics and Queuing theory applications for Computer Sciences 2 ed, Trivedi, John Wiley.
3. Miller and John E.Freund, Probability and statistics for engineers, Prentice Hall of India.
4. Probability and Statistics, D. K. Murugeson & P. Guru Swamy, Anuradha Publishers.

Mathematical Foundations of Computer Science

Credits : 3.5 **External Marks : 70**
Course Code: 16CS2003 **Internal Marks : 30**

Course Objectives:
Students are expected to learn:

- Understand the theory and techniques of logic, graphs and trees, and algebraic systems
- Apply the knowledge and skills obtained to investigate and solve a variety of discrete mathematical problems.
- Communicate mathematical ideas.

Course Outcomes:
Upon successful completion of this course, students will be able to:

1. Apply, equivalence formula, tautological implications in finding normal forms, theory of inference and differentiate propositional logic and predicates, and explain Mathematical Induction principle and apply the same.
2. Explain the basic properties of relations (POSETS, LATTICES and apply the same in solving the problems) and functions.
3. Identify the basic properties of graphs and related structures and solve the related problems.
4. Identify the basic properties of Trees and solve minimum cost spanning tree problems.
5. Solve and formulate, generating functions and recurrence relations.

Unit I
Logic & Mathematical Reasoning: Propositional calculus: statements and notations, connectives, Truth tables, Tautologies, Equivalence of formulas, Tautological implications, Normal forms, Theory of inference for statement calculus. **Predicate Calculus:** predicate logic, statement functions, variables and quantifiers, free and bound variables.
Mathematical induction– Principle of Mathematical Induction, Exercises.

Unit II
Relations: Properties of Relations, Equivalence relations, partial orders, Lattices, properties of Lattices, Special types of Lattices(Proofs not required).
Functions Types Functions, The pigeonhole principle, Invertible functions (Proofs not required)

Unit III
Graph Theory : Basic Concepts of Graphs, Matrix representation of graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerain & Hamiltonian graphs, Planar Graphs, Graph coloring.

Unit IV
Trees: Introduction and applications of trees, Tree traversals, Spanning Trees, Minimum cost spanning trees

Unit V

Recurrence Relations : Generating Function of Sequences, Calculating coefficient of Generating function, Partial Fractions, **Recurrence relations**: First order and second order Linear Homogeneous and Non-Homogeneous recurrence relations, method of generating functions.

Text Books:

1. Kenneth H.Rosen, "Discrete Mathematics and its Applications", 6th Edition, Special Indian edition , Tata McGraw – Hill Pub. Co. Ltd., New Delhi, (2007).
2. B.Kolman et.al, Discrete Mathematical Structures, 5th Ed^{n}, Pearson Education, New Delhi.

REFERENCE BOOKS:

1. Trembly J.P. and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 30th Re-print (2007).
2. Discrete Mathematics for Computer Scientists & Mathematicians, 2/e Mott, Kandel, Baker, PHI

Digital Logic Design

Credits : 3.5 **External Marks: 70**
Course Code: 16EC2011 **Internal Marks: 30**

Course Objectives:
The course is designed with the objective to:

- To solve a typical number base conversions
- To optimize logic gates for digital circuits using various techniques
- To apply knowledge of adders for higher order digital circuits.
- To develop advanced sequential circuits
- 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. **Distinguish** different number systems and digital codes.
2. Design different arithmetic logic gates.
3. Distinguish different combinational logic circuits and design logic circuits using these combinational circuits
4. Design logic circuits using PLDs.
5. Distinguish different sequential logic circuits and design logic circuits using these 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, Compliment 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 upto 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).

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

Reference Books:

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

Object Oriented Programming

Credits : 3.5 **External Marks: 70**
Course Code: 16CS2004 **Internal Marks: 30**

Course Objectives:
To study the object-oriented programming principles and techniques. Upon completion, students should be able to use an object-oriented language to develop rather complex programs.

Course Outcome:

1. Explain the difference between object oriented programming and procedural programming and gain basic knowledge on Object Oriented concepts.
2. The students will learn potential C++ features like overloading, constructors and destructors and type conversions in computer problem solving.
3. Understand the principle of code reusability in managing complex software projects.
4. Understand and demonstrate the concepts of object-oriented design, polymorphism to large scale software.
5. Learn syntax, how to utilize standard Templates in writing programs, handle the Exceptions and working with File I/O.

Unit – I :
Object-Oriented Programming Concepts:
Comparison between Procedural Programming Paradigm and Object-Oriented Programming Paradigm, Basics of Object Oriented Programming, Tokens, Data types, Declarations, Operators, Expressions, Operator Precedence, Control Structures, Functions.

Unit – II :
Introduction to OOP:
Classes and Objects, Constructors & Destructors, Operator Overloading & Type Conversions.

Unit - III :
Inheritance:
Derived classes, Syntax of Derived Classes, Making Private members Inheritable, Single, Multilevel, Multiple, Hierarchical, Hybrid inheritance, Abstract Class.

Unit – IV :
Polymorphism:
Pointers, Virtual Functions and Polymorphism - Pointers to Objects, this Pointer, Pointers to Derived Classes, Virtual and Pure Virtual Functions.

Unit - V
Templates, Exception Handling, Console I/O and File I/O :
Class Templates, Function templates, Member function templates, Exception Handling, Managing console I/O operations, working with files.

Text Books:

1. E. Balagurusamy, Object oriented Programming using C++ PHI.
2. Herbert Scheldt, C++: Complete Reference.

Reference Books:

1. N. Barkakati, Object Oriented Programming in C++: PHI
2. Robat Laphore. Object Oriented Programming through C++

Free Open Source Software

Credits : 2 **External Marks: 70**
Course Code: 16CS2005 **Internal Marks: 30**

Course Objectives:
The student will be able to:

- Describe the basic elements of the Python language and the Python interpreter and discuss the differences between Python and other modern languages.
- Analyze and demonstrate the use of lists and tuples in Python.
- Describe and use Python dictionaries correctly and demonstrate the use of dictionary methods.
- Define, analyze and code the basic Python conditional and iterative control structures and explain how they can be nested.
- Implement basic PERL programs
- Work with files. packages and sub modules using PERL

Course Outcomes:

1. Able to write and debug Python programs which make use of the fundamental control structures and method-building techniques common to all programming languages.
2. Able to use data types, input, output, iterative, conditional, and functional components of the language in his or her programs.
3. Able to use sequences and files in python script.
4. Able to implement basic perl programs using control structures.
5. Able to identify the use of packages and sub modules in perl.

Unit-I
Introduction to Free & Open source software, Introduction to Python - History, Features, Installing Python, Running Python, Comments, Operators, Identifiers, Variables

Unit-II
Conditional Statements, Loops, Statements and Syntax, Numbers,

Unit-III
Sequences: Strings, Lists, Tuples, Dictionaries , Files and Input/output

Unit-IV
PERL Overview - Parsing Rules - Variables and Data - Statements and Control Structures
Unit-V
Subroutines, packages and modules, Working with Files

Text Books:
1. Wesley J. Chun "Core Python Programming" Prentice Hall
2. Martin C. Brown "Perl: The complete Reference" McGraw-Hill

Reference Books:
1. Mark Lutz " Programming Python, 4th Edition" O'Reilly Media
2. David Beazley and Brian K. Jones " Python Cookbook " O'Reilly

Web Links:
1. https://docs.python.org/3/tutorial/index.html
2. http://perldoc.perl.org/perlintro.html

Matrices and Applications
(Open Elective –I)

Credits : 2 **External Marks: 70**
Course Code: 16OE2011 **Internal Marks: 30**

Course Objectives:

- To calculate the rank of a matrix and solve linear system of equations by different methods.
- Understand the concept of eigen values, eigen vectors of real and complex matrices, Cayley's Hamilton theorem and its applications.
- To solve Linear system of equations by Numerical Methods.
- To acquire the knowledge of reduction of quadratic to canonical form and study its nature.
- To acquire the knowledge of matrix computations using mat lab.

Course Outcomes:
On completion of this course, students should be able

1. Calculate the rank of a matrix and solve linear system of equations by different methods.
2. Calculate eigen values, eigen vectors of real and complex matrices, apply Cayley's Hamilton theorem to calculate the powers and inverse of matrices.
3. Solve Linear system of equations by LU –Factorization, Matrix Inverse, Gauss seidal Method, Eigen Values by Iteration (Power Method), Tridiagonalization and QR-Factorization.
4. Deduce quadratic to canonical form by different methods.
5. Compute matrix operations using mat lab.

Unit – I
Matrices and Linear System of equations
Matrices-Rank of Matrix-By Definition-Echelon form, Normal form- PAQ form-Solution of homogeneous and non homogeneous Linear System of equations – condition of consistency - Direct methods- Gauss elimination, Gauss Jordan .

Unit-II
Eigen values and Eigen vectors
Eigen values - Eigen vectors – Properties – Cayley -Hamilton Theorem (without proof) - Inverse and powers of a matrix by using Cayley-Hamilton theorem.
Complex matrix-conjugate matrix – Hermitian and skew Hermitian matrix- eigen values and eigen vectors- properties.

Unit-III
Numerical Methods in Linear Algebra
Linear System : LU –Factorization , Matrix Inverse, Gauss seidal Method, Eigen Values by Iteration (Power Method), Tridiagonalization and QR-Factorization.

Unit-IV
Quadratic forms
Quadratic forms- Reduction of quadratic form to canonical form – Rank - Positive, negative definite - semi definite - index – signature.

Unit-V Computation by using MAT LAB
Solving a linear system, Gaussian elimination, Finding Eigenvalues and Eigenvectors.

Text Books:

1. Higher Engineering Mathematics, 42nd edition, 2012 - B. S. Grewal, Khanna Publishers, New Delhi
2. Engineering Mathematics Volume - II, 6th editions respt., 2012, T.K.V Iyengar, & others, S.Chand Co. New Delhi.
3. Getting Started with Mat Lab, Rudra Pratap, Oxford University press, 2014 print.
4. Advanced Engineering Mathematics, Erwin Kreyszig,8th Edition.

Reference Books:

1. Mathematical Methods, 4th edition, 2009, B.V Ramana, Tata McGraw Hill, New Delhi.
2. Ravindranath, V. and Vijayalaxmi, A., 2nd edition, 2012, A Text Book on Mathematical Methods, Himalaya Publishing House, Bombay.
3. Dean G. Duffy, Advanced engineering mathematics with MatLab, CRC Press.
4. Advanced Engineering Mathematics, 8th edition, 2009, Erwin Kreyszig- Shree Maitrey Printech Pvt.Ltd, Noida.

Introduction to MAT LAB
(Open Elective –I)

Credits : 2 **External Marks: 70**
Course Code: 16OE2013 **Internal Marks: 30**

Course Objective:

By the end of this half-semester minicourse, students in this class will understand the basic principles of programming and of implementing mathematical concepts in MATLAB. Specifically, they will be able to write numerical algorithms and evaluate the computational results using graphical representations. The ultimate goal is to motivate the students for their profession and for future courses in curriculum.

Course Outcomes:
By the end of this course, the student will be able to

1. Translate mathematical methods to MATLAB code
2. Generalize results and represent data visually.
3. Students should be able to apply computer methods for solving a wide range of engineering problems
4. Students should be able to utilize computer skills to enhance learning and performance in other engineering and science courses
5. Students should be able to demonstrate professionalism in interactions with industry

Unit-1
Introduction to Matlab
Historical Background, Applications, Scope of MATLAB, Importance of MATLAB for Engineers, Features, MATLAB Windows (Editor, Work Space, Command History, Command Window).
Operations with Variables, Naming and Checking Existence, Clearing Operations, Commands, Data types, Operators.

Unit-II
Data and Data Flow In Matlab
Vectors, Matrix Operations & Operators, Reshaping Matrices, Arrays, Colon Notations, Numbers, Strings, Functions, File Input-Output, Importing and Exporting of data.

Unit-III
Matlab Programming
Conditional Statements, Loops, Writing Script Files, Error Correction, Saving Files, Worked out Examples.

Unit-IV
Matlab Advanced
Plotting, Graphics, Creating Plot & Editing Plot, GUI (Graphical User Interface).
Matlab- Algebra, Calculus, Differential, Integration, Polynomials, solving a system of linear equations.

Unit-V

Simulink

Introduction, Importance, Model Based Design, Tools, Mathematical Modeling, Converting Mathematical Model into Simulink Model, Running Simulink Models, Importing Exporting Data, Solver Configuration, Masking Block/Model.

Text Books:

1. Getting Started With Matlab: A Quick Introduction For Scientists And Engineers (English) by Rudra Pratap, OXFORD University Press.
2. Matlab Programming by Y. Kirani Singh, B.B. Chaudhuri, PHI Publication

Reference Books:

1. MATLAB® Programming For Engineers Fourth edition by Stephen J. Chapman
2. Applied Numerical Methods Using MATLAB 1st Edition by Won Y. Yang , Wenwu Cao, Tae-Sang Chung, John Morris.

Fundamentals of Material Science
(Open Elective –I)

Credits : 2 **External Marks: 70**
Course Code: 16OE2014 **Internal Marks: 30**

Course Objectives:

- To understand different engineering materials and their structures.

Course Outcomes:

On completion of this course, students should be able

1. To gain thorough knowledge in engineering materials and their structures.

Unit-I:
Introduction
Introduction, classification of materials, crystal defects.

Unit-II:
Plastic deformation of single crystals
Plastic deformation of single crystals. Deformation by slip,. Deformation of single crystal. Deformation by twinning.

Unit-III:
hot working, cold working. Recovery, recrystallization and grain growth. Solidification mechanism.

Unit-IV:
Mechanical properties
Mechanical properties. Tensile stress-strain diagrams, proof stress, yield stress diagrams, modules of elasticity. Hardness Testing: -Rockwell, Brinell and Vickers.

Unit-V:
Impact toughness, Charpy V-Notch, fracture, ductile, brittle, Griffith criteria for brittle failure, creep, creep mechanisms, fatigue-mechanism-factors to improve fatigue resistance

Text Books:

1. An introduction to material Science – V Raghavan.
2. Mechanical Metallurgy – GE Dieter.
3. Material Science – Callister.

Reference Books:

1. Material Science for Engineers – Vanvlack.
2. Material Science for Engineers – Schakleford.

Introduction of Electronic Measurements
(Open Elective –I)

Credits : 2 **External Marks: 70**
Course Code: 16OE2015 **Internal Marks: 30**

Course Objectives:

- Study of performance characteristics of different electronic measuring instruments.
- Subject introduces Signal Generator and Wave Analyzers for analysis of EM spectrum.
- Deals about Oscilloscopes and internal circuitry for measurement of electronic parameters.
- Brief discussion about all AC bridges, design methods and its applications.
- This subject includes transducers for the measurement of non electrical parameters and its signal conditioning techniques using electronic circuitry

Course Outcomes:

1. Identify electronic instruments, their Characteristics and use.
2. Describe various signal generators, wave analyzers for distortion measurements
3. Measure Amplitude, Frequency and Phase of various signals using different types of CRO's.
4. Design the AC bridges for measurement of resistance, inductance, and capacitance for frequency changes.
5. Explain various types of transducers and their applications for measuring non- electrical parameters.

Unit I

Performance Characteristics Of Instruments: Static characteristics, accuracy, resolution, precision, expected value, error and sensitivity. Errors in measurement and dynamic characteristics: speed of response, fidelity, lag and dynamic error.
Voltmeters: Multirange, range extension.
Ammeters: Shunt and thermocouple type ammeter.
Ohmmeters: Series type and shunt type.

Unit II

Signal Generators - standard and AF sine and square wave signal generators, function Generators, Wave Analyzers, Harmonic distortion analyzers .

UniT III

Cathode Ray Oscilloscopes: CRT features, Block Diagram of CRO, Dual beam CRO, measurement of amplitude and frequency, Dual trace oscilloscope, Digital storage oscilloscope.

Unit IV

AC Bridges:

Measurement of inductance: Maxwell's bridge, Anderson bridge.
Measurement of capacitance: Schearing bridge. Wheatstone bridge and Wien Bridge

Unit V

Transducers: Classification of Transducers**,** LVDT, Thermocouples, thermistors, Data acquisition systems.

Text Books:

1. Electronic instrumentation – H.S.Kalsi, Tata McGraw Hill, 2004, 2/e.
2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PHI, 2002, 5/e.

Reference Books:

1. Electronic Instrumentation & Measurements - David A. Bell, PHI, 2003, 2/e.
2. Electronic Test Instruments, Analog and Digital Measurements - Robert A.Witte, Pearson Education, 2004, 2/e.

IT Systems Management
(Open Elective – I)

Credits : 2 **External Marks: 70**
Course Code: 16OE2017 **Internal Marks: 30**

Course Objectives:

- Provides extensive theoretical knowledge of IT infrastructure
- Enhances the student's computing environment knowledge.
- Provides broad based knowledge of IT System management.
- Develops management skills required for an increasingly international business environment.
- Builds upon the essential core network and storage management with greater emphasis .

Course Outcomes:

1. Be able to describe the business value and processes of ICT services in an organisation and apply that knowledge and skill with initiative to a workplace scenario
2. Be able to analyze and evaluate the impact of new and current ICT services to an organisation;
3. Be able to describe how effective IT Infrastructure Management requires strategic planning with alignment from both the IT and business perspectives in an organisation;
4. Characteristics of the network that affect user satisfaction.
5. Be able to define, track, and maintain data and data resources.

Unit 1
IT Infrastructure: Overview
Definitions, Infrastructure management activities, Evolutions of Systems since 1960s (Mainframes-to-Midrange-to-PCs-to-Client-server computing-to-New age systems) and their Management, growth of internet, current business demands and IT systems issues, complexity of today's computing environment.

Unit 2
IT Infrastructure Management
Factors to consider in designing IT organizations and IT infrastructure, Determining customer's Requirements, Identifying System Components to manage, Data, applications, Tools and their integration, Patterns for IT systems management, Information Technology Infrastructure Library (ITIL).

Unit 3
Current computing environment
Complexity of current computing, multiple technologies, multiple vendors, multiple users, e-Waste disposal.
IT system Management: Common tasks in IT system management, approaches for organization Management, Models in IT system design, IT management systems context diagram, patterns for IT system Management

Unit 4

Data communications and Network Management Overview

Communications protocols and Standards, Case Histories of Networking and Management, Challenges of Information Technology Managers, Network Management: Goals, Organization, and Functions.

Unit 5

Storage Management

Types of Storage management, Benefits of storage management, backups, Archive, Recovery, Disaster recovery. Space management, Hierarchical storage management, and Network attached storage.

Textbooks:

1. IT Infrastructure & Its Management, By Phalguni Gupta, Tata McGraw-Hill Education. (Unit 1,2,3,5)
2. Network Management, Principles and Practice, Mani Subrahmanian, Pearson Education. (Unit 4)

References:

1. Ivanka Menken, ITIL V3 Foundation Certification Exam Preparation Course in a Book for Passing the ITIL V3 Foundation Exam, Second Edition (The Art of Service), 2009.
2. Van Haren, Passing the ITIL Foundation, Van Haren Publishing, 2011.

Computer Aided Engineering Drawing
(Open Elective – I)

Credits : 2 **External Marks: 70**
Course Code: 16OE2019 **Internal Marks: 30**

Course Objectives:
Students will have
- to study the basics include generation points lines, curves, polygons, Dimensioning
- to study the object selection commands include edit, zoom, cross hatching, pattern filling, utility commands
- to study about the wireframe modeling which include 2D and 3D
- to study about projections include Isometric projections, orthographic projections
- to study the building drawing include plan, Front elevation, sectional elevation

Course Outcomes:
Students will get ability
1. to understand the basics include generation points lines, curves, polygons, Dimensioning
2. to learn the object selection commands include edit, zoom, cross hatching, pattern filling, utility commands
3. to learn about the wireframe modeling which include 2D and 3D
4. to learn about projections include Isometric projections, orthographic projections
5. to learn the building drawings include plan, Front elevation, sectional elevation

Unit – I
Basics: Introduction**,** Generation of points, lines, curves, polygons, Dimensioning

Unit – II
Object Selection Commands: edit, zoom, cross hatching, pattern filling, utility commands

Unit-III
Wire Frame Modeling: 2D wire frame modeling, 3D wire frame modeling

Unit-IV
Projections: Isometric projections, orthographic projections, orthographic to isometric projections vice versa.

Unit-V
Building Drawings (2 D): Plan, Front Elevation and Sectional Elevation of buildings

Text Books:
1. Engineering Graphics, K.C. john, PHI Publications
2. Machine Drawing, K.LNarayana ,P. Kannaiah and K.venkata reddy / New age International publishers.

References:
1. Autocad 2009, Galgotia publications, New Delhi
2. Text book of Engineering Drawing with Auto-CAD, K.venkata reddy/B.S. Publications.
3. Engineering drawing by N.D Bhatt , Charotar publications.

Digital Logic Design Lab

Credits : 1.5 **External Marks: 50**
Course Code: 16EC2106 **Internal Marks: 25**

Course Objectives:
This course is designed to develop the skill and knowledge required for designing digital circuits that are used in low cost, high speed, innovative and programmable devices for real time embedded applications.
The objective of this course is to introduce students to entire circuit designs, services and business models of Electronics Commerce related applications. The course aims are

- To provide students in-depth practical base of the Digital Electronics.
- To familiarize the students regarding designing of different types of the Digital circuits.
- To provide the computational details for Digital Circuits.

Course Outcomes:

1. Understand Introduction to Boolean algebra, Binary connectives, Basic Logic Gates, Evaluation of truth functions, Function calculus as Boolean algebra,
2. Design Procedure of Binary Adder-Subtractor, Multiplexers and Demultiplexers.
3. Classifications & model of sequential circuits, latches, Flip-Flops,

List Of Experiments:

1. Logic gates
2. 3-8 Decoder -74138
3. 8 x 1 Multiplexer -74151 and 2x4 Demultiplexer-74155
4. 4bit comparator – 7485
5. D Flip-Flop – 7474
6. Decade counter – 7490
7. 4bit counter – 7493
8. Shift registers – 7495
9. Universal shift register – 74194/195
10. RAM (16x4) – 74189 (Read and Write operations)
11. Stack and queue implementation using RAM
12. ALU design

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

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

Free Open Source Software Lab

Credits : 1.5 **External Marks: 50**
Course Code: 16CS2104 **Internal Marks: 25**

Course Objectives:

- To identify the difference between open sources vs free software
- To work in open source environment.
- To develop programs with the help of open source - Python
- To identify the importance of PERL
- To learn the file handling using open source technologies.

Course Outcomes:

1. Have enough knowledge about available open sources
2. Able to work in open source environments.
3. Have enough knowledge about each open source technology and its importance.
4. Have knowledge on Python, PERL etc,
5. Able to find differences between open sources Vs free software Vs commercial softwares

List of Experiments:

1. Implement a Python program that obtains the name from the user and prints the message "Hello *Username* , Welcome to the Python World!".
2. Implement a Python program to print all the prime numbers below n. n value should be taken from the user at the time of execution.
3. Implement Sorting Program in Python : Enter a list of numbers and sort the values in largest-to-smallest order.
4. Implement a Python program for finding the factorial of a given number.
5. Implement a STACK program by using PYTHON.
6. Implement a QUEUE program by using PYTHON.
7. Implement a Python Program for creating a dictionary and display its keys alphabetically.
8. Implement a Python Program that reads and displays the contents of a file
9. Implement a PERL program that creates sorting sub routine which sorts the Strings alphabetically
10. Implement a PERL Program to display the contents of a file

Text Books:

1. Wesley J. Chun "Core Python Programming" Prentice Hall
2. Martin C. Brown "Perl: The complete Reference" McGraw-Hill

Reference Books:

1. Mark Lutz " Programming Python, 4th Edition" O'Reilly Media
2. David Beazley and Brian K. Jones " Python Cookbook " O'Reilly

OOPs through C++ Lab

Credits : 1.5 **External Marks: 50**
Course Code: 16CS2105 **Internal Marks: 25**

Course Objective:

To strengthen their problem solving ability by applying the characteristics of an object oriented approach with extensive programming projects.

Course Outcomes:

1. Able to write programs with basic constructs of C++.
2. Use Classes and Objects to implement data structure operations.
3. Able to perform different operations like string operations, complex number addition using concepts of OOPs.
4. Able to create new class and reduce complexity for large applications using code reusability.
5. Able to write programs that operate with generic types.
6. Able to write programs that performs operations on Files.

List of Experiments:

1. Write a C++ program to convert centigrade into Fahrenheit. Formula: C= (F-32)/1.8
2. Develop a simple calculator using if-else if and switch-case.
3. Write a C++ program to convert decimal to binary.
4. Program that implements stack operations using classes and objects.
5. Program performing complex number addition using friend functions.
6. Program for complex number addition using operator overloading.
7. Program to perform string operations by overloading operators.
8. Program on hierarchical inheritance showing public, private and protected inheritances.
9. Program for computation of students result using hybrid inheritance.
10. Program implementing bubble-sort using templates.
11. Program on virtual functions.
12. Program for handling PushOnFull and PopOnEmpty Exceptions for a Stack.
13. Program for copying one file to another file using streams.
14. Program for writing and reading a class object to a file.

Text Books:

1. E. Balagurusamy, Object oriented Programming using C++ PHI.
2. Herbert Scheldt, C++: Complete Reference.

Reference Books:

1. N. Barkakati, Object Oriented Programming in C++: PHI
2. Robat Laphore. Object Oriented Programming through C++

Professional Ethics and Morals
(Common to All Branches)

Credits : 0
Course Code: 16HS2201

Course Objectives:

- To help students regulate their behavior in a professional environment as employees.
- To make students aware of the impact of taking non-ethical engineering decisions.
- To understand that mind and desire control is needed for being ethical.
- To understand organizational culture and to adapt to varying cultures without compromising ethical values.

Course Outcomes:

On completion of this course, students should be able

1. Realize the importance of human values.
2. Understand that excessive desires of the mind make a person unethical and restless, while fewer desires lead to peace and professional progress.
3. Assess different types of risks involved in unethical practices. Know various means of protesting against unethical practices.
4. Assess the benefits of restraining from unethical practices like bribery, extortion, nepotism, nexus between politicians and industrialists.
5. Summarize case studies of ethical violations in Chernobyl meltdown, Challenger disaster, Ford Pinto design, Kingfisher Airlines financial misappropriation.

Unit-I :

Introduction To Terminology In Ethics:

Integrity, Honesty, Courage, Empathy, Personality, Character, Self-Confidence, Respect for Others – Work culture, Social responsibility, Responsibilities as a citizen, Cooperation and commitment – Religion vs. Spirituality, Philosophy, Customs and practices – Self-interest, Fear, Deception, Ignorance, Ego, Uncritical acceptance of authority.

Unit- II:

Mind And Its Mysteries:

What is Mind? Mind and body, Mind and food – Mental faculties – Theory of perception, Memory, Imagination, Thought-Culture, Desires – Cultivation of Virtues, Control of Senses and Mind – Concentration, Meditation and Enlightenment.

Unit-III :

Risk And Safety In Engineering:

Estimating risk – What is acceptable risk? – Engineer's liability, Changing legal rights of the employees by non-participation, by protest – Environmental laws and judicial intervention in related matters.

Unit-IV :

Non-Ethical Practices In Vogue:

Conflict of Interest, Occupational crime – How multinational corporations influence government decisions, public policy – Engineers as managers, advisors and experts, Engineers as moral

leaders – Problem of bribery, extortion, grease payments, nepotism – Nexus between politicians and industrialists.
Case Study: Chinese Minister Sentenced to Death for Corruption.

Unit-V :

Case Studies – Variety Of Moral Issues In Profession:
Chernobyl nuclear disaster, Fukushima reactor meltdown, Challenger blowup, Ford Pinto design, Highway safety, Kingfisher Airlines financial misappropriation.

Text Books:

1. Charles E Harris, Micheal J Rabins, Engineering Ethics, Cengage Learning Pub.
2. Mike Martin and Roland Schinzinger, Ethics in Engineering, McGraw Hill Pub.
3. Swami Sivananda, Mind, Its Mysteries and Control, Divine Life Society Pub.

Computer Organization and Architecture

Credits : 3.0 **External Marks: 70**
Course Code: 16CS2006 **Internal Marks: 30**

Course Objectives:

- To conceptualize the basics of organizational and architectural issues of a digital computer.
- To discuss in detail the operation of the arithmetic Unit including algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
- To study the hierarchical memory system including cache memories and virtual memory.
- To study the different ways of communicating with I/O devices and standard I/O interfaces.
- To analyze processor performance improvement using parallel processing and multiprocessor

Course Outcomes:

1. Describe computer components and understand error detection, error correction method and gain knowledge on data representation in digital computer.
2. Explain central processing unit and knowledge of instruction execution, instruction format and addressing mode and ability to implement different arithmetic operation on digital computer.
3. Ability to understand different types of memory unit such as main memory, cache memory, virtual memory, secondary memory.
4. Ability to understand different type of input output unit and knowledge of how input and output unit will be connected to CPU and mode of data transfer from CPU to memory.
5. Distinguish parallel processing and multiprocessor in computer system and knowledge of interconnection structure of multiprocessor.

Unit-I:

Basic structure of computer:

Functional Units, Basic operational concepts, computer type, Bus structures, Performance, software, multiprocessor and multicomputer. Data representation Fixed-point representation and floating point representation.

Unit-II

Computer Arithmetic:

Addition and subtraction, multiplication algorithms, division algorithms, floating point arithmetic operations. Decimal arithmetic Unit and decimal arithmetic operations

Unit-III

Register Transfer and Micro operation:

Register transfer language, register transfer, bus and memory transfer, arithmetic micro operation, logic micro operation, shift micro-operation and arithmetic logic shift Unit.

Central Processing Unit:

General register organization, Stack organization, Instruction formats, Addressing modes, Program control and Reduced Instruction Set Computer.

Unit-IV

Memory organization:

Memory hierarchy, Primary memory, Auxiliary memory, Associative memory, Cache memory: mapping functions, Virtual memory and Memory management hardware.

Input-output organization: I/O interface. I/O Bus and interface modules, I/O versus Memory Bus. Asynchronous data transfer, Modes of Transfer: Programmed I/O, Interrupt driven I/O, Direct memory Access, DMA controller and transfer.

Unit-V

Parallel Processing:

Pipelining Arithmetic and Instruction Pipeline, Basics of vector processing and Array Processors. **Multiprocessor**: Characteristics of multiprocessors, Interconnection structures and interprocessor communication and synchronization.

Text Book:

1. Morris Mano, M., 2005, "Computer System Architecture," 3/e, Pearson Education,.

Reference Books:

1. Hamacher, Vranesic, Zaky, 2007 "Computer Organization," 5/e, McGraw Hill,.
2. William Stallings, 2006 "Computer Organization and Architecture: Designing for Performance," 7/e, Pearson Education,.
3. John P. Hayes, 1998 "Computer Architecture and Organization," 3/e, TMH,.
4. Govindarajulu, B., 2010 "Computer Architecture and Organization," 2/e, TMH.

Formal Languages and Automata Theory

Credits : 3.5 **External Marks: 70**
Course Code: 16CS2007 **Internal Marks: 30**

Course Objectives:

- Understand various computing models like finite state Machine, pushdown Automata and Turing Machine.
- Learn different types of grammars
- Be aware of Decidability and Undecidability of various problems.

Course Outcomes:

1. Construct the finite automata with & without output and minimize the finite automata
2. Convert finite automata into regular expression and vice versa.
3. Design grammars for regular and context free languages.
4. Explain the equivalence between CFG and PDA & equivalence between acceptance by final state and acceptance by empty stack of PDA
5. Design & Classify Turing Machines and determine the decidability of computational problems

Unit – I:

Finite Automata : Strings, Alphabet, Language, Operations, Finite state machine, definitions, finite automaton model, acceptance of strings, and languages, deterministic finite automaton and non deterministic finite automaton, transition diagrams and Language recognizers. NFA with Epsilon transitions - Significance, acceptance of languages. Conversions and Equivalence: Equivalence between NFA with and without Epsilon transitions, NFA to DFA conversion, minimization of FSM, equivalence between two FSM's, Finite Automata with output- Moore and Mealy machines.

Unit – II:

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 – III:

Grammar Formalism: Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion, Context free grammar, derivation trees, sentential forms. Right most and leftmost derivation of strings, Ambiguity in context free grammars, minimization of Context Free Grammars. Chomsky normal form, Greibach normal form, Enumeration properties of CFL (proofs omitted).

Unit – IV:

Push Down Automata: Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty stack and its equivalence. Equivalence of CFL and PDA, interconversion (Proofs not required).

Unit – V :

Turing Machine & Computability Theory: Turing Machine, definition, model, design of TM, Computable functions, recursively enumerable languages, counter machine, types of Turing machines (proofs not required). Chomsky hierarchy of languages, linear bounded automata and context sensitive language, Universal Turing Machine, post correspondence problem.

Text Books:

1. Hopcroft H.E.and Ullman J. D. "Introduction to Automata Theory Languages and Computation". Pearson Education
2. Daniel I.A. Cohen, John Wiley Introduction to Computer Theory,.

Reference Books :

1. John C Martin, Introduction to languages and the Theory of Computation, TMH
2. Lewis H.P. & Papadimition "Elements of Theory of Computation", C.H. Pearson /PHI.
3. Mishra and Chandrashekaran, Theory of Computer Science – Automata languages and computation -2nd edition, PHI.
4. Sipser ,Introduction to Theory of Computation –2nd edition Thomson

Database Management Systems

Credits : 3.5 **External Marks : 70**
Course Code: 16CS2008 **Internal Marks : 30**

Course Objectives:

- To introduce basic RDBMS concepts, SQL, Database Design and Query processing. And also to introduce transaction processing, issues and techniques relating to concurrency and recovery in multi-user database environments, and various Data structures for External Data storage and efficient retrieval

Course Outcomes:

Students will be able to:

1. Differentiate Database Systems from File Systems and Define the Terminology, Features, Classifications, Characteristics embodied in Database Systems.
2. Interpret, Design and Implement an E-R Model.
3. Create /Modify the Structure and write optimized SQLQueries to extract and modify Information from Tables or Views.
4. Apply proper Techniques such as Normalization and analyze the applicability of a Specific Normal form in designing a Database.
5. Explain broad range of Database Management issues including Data integrity, Concurrency and Recovery and Compare various Indexing, Hashing and File Organization Techniques.

Unit I :

Database System Applications; Database Systems versus file Systems; View of Data : Data Abstraction,Instances and Schemas ; Data Models :The ER Model ,Relational Model, Other Data Models ;Database Languages: DDL , DML ,Database Access from Application Programs; Data base Users and Administrators; Transaction Management ;Database System Structure: Storage Manager, the Query Processor.(Korth)

Unit II :

Database Design and ER diagrams :Beyond ER Design; Entities, Attributes and Entity sets; Relationships and Relationship sets; Additional features of ER Model ;Conceptual Design with the ER Model ;Introduction to the Relational Model; Integrity Constraint Over relations ; Enforcing Integrity constraints; Querying relational data ; Logical database Design :ER to Relational. Introduction to Views: Destroying/Altering tables and Views.(Ramakrishnan)

Unit III:

SQL: Queries, Constraints ,Triggers: Over view ;The Form of a Basic SQL Query ; Nested Queries: Introduction to Nested Queries, Correlated Nested Queries, Set-Comparison Operators; Aggregative Operators ; NULL values : Comparison using Null values; Logical connectives AND, OR, and NOT, Impact on SQL Constructs, Outer Joins ,Disallowing NULL values; Complex Integrity Constraints in SQL; Triggers and Active Data bases. (Ramakrishnan)

Unit IV :

Schema refinement and Normal forms: Problems Caused by Redundancy ,Decompositions, Problem related to Decomposition; Functional Dependencies ;Reasoning about FDS ; FIRST, SECOND, THIRD Normal Forms ,BCNF ;Properties of Decompositions: Lossless join

Decomposition, Dependency preserving Decomposition ; Schema refinement in Database Design.(Ramakrishnan)

Transaction Concept; Transaction State; Implementation of Atomicity and Durability; Concurrent Executions ; Serializability; Recoverability; Lock –Based Protocols :Locks, Granting of locks,2PL,implementation of locking ; Timestamp Based Protocols.(Korth)

Unit V:

Recovery System :Failure classification; Log – Based Recovery; Shadow Paging; Recovery with Concurrent Transactions ; Buffer Management; Failure with loss of nonvolatile storage; (Korth)

Data on External Storage; File Organization and Indexing: Cluster Indexes, Primary and Secondary Indexes; Index Data Structures: Hash Based Indexing, Tree based Indexing; Comparison of File Organizations; B+ Trees :A Dynamic Index Structure (Ramakrishnan)

Text Books:

1. Raghurama Krishnan, Johannes Gehrke: Database Management Systems.TATA McGrawHill , 3rd Edition
2. Silberschatz, Korth :Database System Concepts. McGraw hill,5th Edition

Reference Books:

1. Peter Rob ,Carlos Coronel: Data base Systems design Implementation and Management. Cengage Learning, 7th Edition
2. Elmasri, Navrate:Fundamentals of Database Systems. Pearson Education,6th Edition
3. C.J.Date: Introduction to Database Systems. Pearson Education,4th Edition
4. https://www.coursera.org/course/db

Operating Systems

Credits : 3 **External Marks: 70**
Course Code: 16CS2009 **Internal Marks: 30**

Course Objectives:

- Understand structures and functions of operating systems
- Learn about Processes, Threads and scheduling Algorithms
- Understand the principals of concurrency and Deadlocks
- Learn various memory management Schemes
- Study files system and Mass storage Devices.

Course Outcomes:

1. Explain the different structures of operating system and design various scheduling algorithms.
2. Propose solutions for achieving process synchronization and design deadlock prevention, detection, avoidance algorithms.
3. Compare and contrast various memory management schemes,
4. Design and implement file systems.
5. Familiarize with disk scheduling and device drivers.

Unit I

Computer System and Operating System Overview: Overview of Computer Operating System, Operating systems functions, Types of operating systems, system calls.

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

Unit II

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

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

Unit III

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 IV

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

File System Implementation: File system structure, file system implementation, directory implementation, allocation methods, free-space management.

Unit V

Mass-storage structure: Overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling, block and character devices.

Text Books:

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

Reference Books:

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

Principles of Programming Languages

Credits : 2.5 **External Marks: 70**
Course Code: 16CS2010 **Internal Marks: 30**

Course Objectives:

- To provide an exposure to core concepts and principles in contemporary programming languages
- To expose alternative features and constructs in a language
- To introduce formal languages for specifying syntax and semantics of programming languages
- To explore various important programming concepts such as abstract data types and object-oriented programming concepts.

Course Outcomes:

Students will be able to:

1. Explain program translation process, respective tools and specify syntax.
2. Explain and differentiate scope, bindings and specify semantics of a programming language.
3. Select among various data types and control flow constructs in a language.
4. Describe various features of subroutines and control abstraction.
5. Apply Object Oriented Programming concepts to programming.

Unit I

Introduction The Art of Language Design, Programming Language categories, Why Study Programming Languages, Compilation and Interpretation, Programming Environments, over view of Compilation

Programming language syntax, Specifying Syntax: Regular Expressions and Context -Free Grammars: Tokens and Regular expressions, Context -Free Grammar, Derivation of parse trees

Unit II

Names, Scopes and Bindings: The Notion of Binding Time, Object Lifetime and Storage Management, Scope Rules, Implementing Scope, Meaning of Names within a Scope, The Binding of Referencing Environments, Macro Expansion, Separate Compilation

Semantic Analysis: Role of Semantic Analyzer, Attribute Grammars, Evaluating Attributes, Action Routines

Unit III

Control flow: Expression Evaluation, Structured and Unstructured Flow, Sequencing, Selection, Iteration, Recursion, Non determinacy

Data Types: Type Systems, Type Checking, Records(Structures) and Variants(Unions) ,Arrays, Strings, Sets, Pointers and Recursive Types, Lists, Files and input/output, Equality Testing and Assignment

Unit IV

Subroutines and Control Abstraction: Review of stack Layout, Calling Sequences, Parameter Passing, Generic Subroutines and Modules, Exception Handling, Co-routines

Unit V

Data Abstraction and Object Orientation: Object Oriented Programming, Encapsulation, Inheritance, Initialization, Finalization, Dynamic Method Binding, Multiple Inheritance

Text Books:

1. Michael L Scott, 2009, Proggramming Language Pragmatics, 3/e, Elsevier, Morgan KaufMann.

Reference Books:

1. Robert W Sebesta, Concepts of Programming Languages, 8/e, PEA
2. Louden, Programing Languages, 2/e, Cengage.
3. Horowitz, Galgotia, Fundamentals of Programming Languages,

Renewable Energy Sources
(Open Elective –II)

Credits : 2 **External Marks: 70**
Course Code: 16OE2023 **Internal Marks: 30**

Course Objectives:

- To Outline the concept regarding the physics of the sun
- To Outline the concept regarding the collection of solar energy and storage of solar energy
- To Outline the concept regarding different types of wind mills an different types of biogas digesters.
- To Outline the concept regarding geothermal energy conversion.
- To Outline the concept regarding direct energy conversion.

Course Outcomes:
After completion of this course, the student will able to

1. Define different kind of solar radiation.
2. Utilize different methods of collection of solar energy and storage of solar energy.
3. Classify different types of wind mills and biogas digesters.
4. Classify different types of geothermal energy sources and utilize different types of extracting techniques.
5. Distinguish different kinds of direct energy conversion techniques.

Unit I
Principles Of Solar Radiation:
Role and potential of new and renewable source, the solar energy option, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, instruments for measuring solar radiation.

Unit II
Solar Energy Collection, Storgae And Applications
Flat plate and concentrating collectors, Different methods of storage -Sensible, latent heat . Solar Applications- solar heating/cooling technique, solar distillation and, photovoltaic energy conversion.

Unit III
Wind And Biomass Energy:
Sources and potentials, horizontal and vertical axis windmills. Principles of Bio-Conversion, Anaerobic/aerobic digestion, gas yield, I.C.Engine operation and economic aspects.

Unit IV
Geothermal And Ocean Energy:
Resources, types of wells, methods of harnessing the energy. OTEC, Principles utilization, setting of OTEC plants, Tidal and wave energy: Potential and conversion techniques,

Unit V

Direct Energy Conversion:

Need for DEC, principles of DEC. Thermoelectric generators, seebeck, peltier and joul Thomson effects, MHD generators, principles, hall effect, magnetic flux, principle of MHD, power generation with closed loop MHD systems. Fuel cells, principles, faraday's law's.

Text books:

1. Non-Conventional Energy Sources /G.D. Rai
2. Renewable Energy Technologies /Ramesh & Kumar /Narosa

Reference Books:

1. Renewable energy resources/ Tiwari and Ghosal/ Narosa.
2. Non-Conventional Energy / Ashok V Desai /Wiley Eastern.
3. Non-Conventional Energy Systems / K Mittal /Wheeler
4. Solar Energy /Sukhame

Principles of Communication
(Open Elective –II)

Credits : 2 **External Marks: 70**
Course Code: 16OE2025 **Internal Marks: 30**

Course Objectives:

- Describe various types of signals and their properties
- Explain the fundamental concepts of modulation and demodulation of analog modulation schemes.
- Understand various pulse modulation schemes and multiplexing techniques.
- Compare the different types of Digital communication systems
- Explain the basic concepts of information theory

Course Outcomes:

1. Analyze various types of signals and their properties
2. Summarize the fundamental concepts like modulation, demodulation of analog modulation schemes.
3. Discriminate the various pulse modulation schemes and multiplexing techniques.
4. Summarize the different types of Digital communication systems
5. Explain the basic concepts of information theory

Unit I
Introduction: Block diagram of communication systems, Types of signals, Fourier Transform for various signals, Fourier Spectrum, Power spectral density, Autocorrelation, correlation, convolution.

Unit II
Amplitude Modulation: Need for modulation, Types of Amplitude modulation, AM, DSB SC, SSB SC, Power and BW requirements, generation and Demodulation of AM.
Angle Modulation: Frequency & Phase modulations, advantages of FM over AM, Bandwidth consideration, Narrow band and Wide band FM, Comparison of FM & PM.

Unit III
Pulse Modulations: Sampling, Nyquist rate of sampling, Sampling theorem for Band limited signals, PAM, regeneration of base band signal, PWM and PPM
Multiplexing: Time Divison Multiplexing, Frequency Divison Multiplexing.

Unit IV
Digital Communication: Advantages, Block diagram of PCM, Quantization, effect of quantization, quantization error, Base band digital signal, DM, ADM, ADPCM and comparison.
Digital Modulation: ASK, FSK, PSK, DPSK, M -ary PSK.

Unit V

Information Theory: Concept of information, rate of information and entropy, Source coding for optimum rate of information, Coding efficiency, Shanon-Fano and Huffman coding.

Text books:

1. Principle of Communications, Taub & Schilling, TMH, 2003.
2. Communication Systems Analog and Digital – R.P. Singh, SD Sapre, TMH, 20th reprint, 2004.

Reference Books:

1. Communication Systems Engineering – John. G. Proakis, Masoud and Salehi, 2nd Ed. PHI/Pearson.
2. Electronic Communication Systems – Kennedy & Davis, TMH, 4th edition, 2004.

Introduction to PYTHON
(Open Elective –II)

Credits : 2 **External Marks: 70**
Course Code: 16OE2027 **Internal Marks: 30**

Course Objectives:.

- Help students to feel justifiably confident of their ability to write small programs.
- To provide the basic features of python programming language.
- To make students so that they can compete for jobs by providing competence & confidence in computational problem solving.
- Prepare students from other streams to make profitable use of computational methods in their chosen field.
- Prepare students who have prior programming experience or knowledge of computer science for an easier entry into computer science major.

Course Outcomes

On successful completion of the course Students will be able to:

1. Be fluent in the use of procedural statements — assignments, conditional statements, loops, method calls — and arrays.
2. Identify or characterize or define a problem.
3. Design, code, and test small Python programs that meet requirements expressed in English. This includes a basic understanding of top-down design.
4. Understand the concepts of object-oriented programming as used in Python: classes, subclasses, properties, inheritance, and overriding.

Unit I

Client /Server environment, Introduction to Python, History, features, python environment setup, Basic syntax, using command interpreter, Variable and Data Types, Basic data types in Python, script structure.

Unit II

Conditional statements, Boolean expressions, Looping Control Structures, Control Statements: Break, Continue, Pass.

Unit III

Python sequences: strings, Lists, Tuples, dictionaries, sets., string manipulation, functions, modules & import.

Unit IV

Errors and Exceptions, Handling exceptions, Files, File input/output, Text processing, file functions.

Unit V

Object oriented programming: Class, object, Object Oriented Programming concepts.

Text Books:

1. Wesley J. Chun “Core Python Programming”, Second Edition, Prentice Hall
2. Allen Downey, “Think Python”, Second Edition , Green Tea Press

Reference Books:

1. Introduction to Computation & Programming Using Python, Spring 2013 Edition, By John V. Guttag.
2. Programming in Python 3: A Complete Introduction to the Python Language (Developer's Library), by Mark Summerfield, 2nd Edition.

Computational Number Theory
(Open Elective –II)

Credits : 2 **External Marks: 70**
Course Code: 16OE2029 **Internal Marks: 30**

Course Objectives
Student will be able to
- Identify importance of divisibility, prime and composite numbers in engineering field.
- Understand the process of congruence and solve linear congruence using their properties.
- Gain knowledge and importance of Euler-Fermat Theorem, Wilson Theorem, Chinese Remainder Theorem.
- Know the application of Mobious function and Euler totient function in their relevant problems.
- Calculate Quadratic Residues and use Quadratic reciprocity law in engineering subjects.

Course Outcomes
Student is able to
1. Solve the divisibility problems, GCD, LCM, Bracket function
2. Solve congruence problems, solutions of linear congruence equations.
3. Apply Euler-Fermat Theorem, Wilson and Chinese Remainder Theorems in engineering problems
4. Apply Euler-totient function and solve engineering relevant problems.
5. Estimate the reciprocity of a number.

Unit I
Divisibility Divisibility, Statement of Division Algorithm, GCD, Prime, Composite numbers, Statement of Fundamental theorem of Arithmetic, LCM, Bracket function, Properties.
Unit II
Congruence: Congruence, linear congruence, properties and their solutions
Unit III
Euler-Fermat Theorem, Wilson Theorem, The Chinese Remainder Theorem: Statement of Euler's Theorem, Fermat Theorem, Wilson Theorem, the Chinese Remainder Theorem, properties and problem.
Unit IV
Euler's Function: Mobius function μ(n), Euler's totient function $\emptyset$(n), product formula.
Unit V
Quadratic Residues and the Quadratic Reciprocity Law: Quadratic residues, Legendre's symbol and its properties, Evolution of (-1/p) and (2/p), Gauss' lemma, the Quadratic Reciprocity law, application of the reciprocity law, the Jacobi symbol.

Text books:
1.Tom M, Apostol: Introduction to Analytic Number theory (Springer International Student Edition).
2.Abhijit das: Computational number theory, CRC Press, A Chapman & Hall Book.
References
1. Theory of Numbers by Prakash Om, Laxmi Publications (p) LTD, New Delhi.

REMOTE SENSING
(Open Elective –II)

Credits : 2 **External Marks: 70**
Course Code: 16OE202A **Internal Marks: 30**

Course Objectives
Students will have
- to study the basic components of remote sensing, electromagnetic radiation, electromagnetic spectrum
- the study about the sensors and their types
- to study the platforms and their types
- to study the image analysis
- to study about the image classification

Course Outcomes
Students will get ability
1. to understand the basic components of remote sensing, electromagnetic radiation, electromagnetic spectrum
2. to understand about the sensors and their types
3. the learn about platforms
4. to learn about the image analysis
5. to understand the image classification

Unit I
Introduction: Definition**,** Basic components of remote sensing, Electromagnetic radiation, Electromagnetic spectrum

Unit II
Sensors: Introduction, Sensors- Passive sensors, Active sensors

Unit III
Platforms: Introduction, Platforms-Airborne remote sensing, Space borne remote sensing

Unit IV
Image Analysis: Introduction, elements of visual interpretations, image enhancement

Unit V
Image classification: Introduction, supervised classification, unsupervised classification

Text Books
1. Remote Sensing and its applications by LRA Narayana University Press 1999.
2. Remote Sensing and Geographical Information systems by M.Anji Reddy, B.S.Publications.

References
1. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
2. Introduction to Remote Sensing by James B. Campbell and Randolph H. Wynne.

Linear Programming and its Applications
(Open Elective –II)

Credits : 2 **External Marks: 70**
Course Code: 16OE202B **Internal Marks: 30**

Course Objectives:

- To formulate linear programming problem and solve linear programming problem by using graphical procedure.
- To understand computational procedure of simplex method and artificial variable technique.
- To understand the step wise procedure in obtaining optimum solution to transportation problem and Hungarian method for assignment problem.

Course Outcomes:

On completion of this course, students should be able to

1. Formulate and solve linear programming problem by using graphical method.
2. Solve the linear programming problem using simplex method and artificial variable technique.
3. Solve the linear programming problem using dual simplex method.
4. Solve both balanced and unbalanced transportation problem.
5. Solve both balanced and unbalanced assignment problems.

Unit I

Formation of linear programming problem, Graphical solution to linear programming problem.

Unit II

Simplex method artificial variable techniques.

Unit III

Introduction to Dual Simplex method problems.

Unit IV

Transportation Problem:

Formulation, Optimal solution, unbalanced transportation problems

Unit V

Assignment Problem:

Formulation, Optimal solution, Traveling salesman problem.

Text Books:

1. Introduction to Operations Research by V. K. Kapoor, S. Chand Publishers
2. Operations Research, S.D.Sharma, Kedarnath Ramanadh Pub.

References Books:

1. Operations Research, J.K. Sharma, MacMilan Pub.
2. Operations Research by P. Rama Murthy, New Age Pub.
3. CPM & PERT, L.S. Srinath, Affiliated East West Press Pub.

Operating Systems Lab

Credits : 1.5 **External marks: 50**
Course Code: 16CS2106 **Internal marks : 25**
II Year II Semester

Course Objectives:

- To understand the design aspects of operating system.
- To study the process management concepts & Techniques.
- To study the storage management concepts.

Course Outcomes:

1. To use of an operating system to develop software
2. To write software systems based on multiple cooperating processes or threads
3. To implement file organization techniques
4. To implement file allocation strategies
5. To implement process scheduling & synchronization algorithms
6. To implement memory management scheme like best fit, worse fit etc.

List Of Experiments

1) Simulate the following CPU scheduling algorithms
   a) Round Robin b) SJF
2) Simulate the following CPU scheduling algorithms
   a) FCFS b) Priority
3) Simulate all file allocation strategies
   a) Sequential b) Indexed c) Linked
4) Simulate MVT and MFT
5) Simulate all File Organization Techniques
   a) Single level directory b) Two level
6) Simulate all File Organization Techniques
   a) Hierarchical b) DAG
7) Simulate Bankers Algorithm for Dead Lock Avoidance
8) Simulate Bankers Algorithm for Dead Lock Prevention
9) Simulate all page replacement algorithms
   a) FIFO b) LRU c) Optimal Etc. …
10) Simulate Paging Technique of memory management.

Text Books:

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

Reference Books:

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

Data Base Management Systems Lab

Credits : 1.5 **External Marks : 50**
Course Code: 16CS2107 **Internal Marks : 25**

Course Objectives:

To teach defining Logical Database schema, Query writing to retrieve required information from single/multiple tables , Creation and manipulation of views. Implementing Operations on relations (Tables) using PL/SQL,Writing Triggers for implementing automatic operations and constraints, Writing Cursors, Functions and Procedures for various tasks on tables, Exception handling and Packages.

Course Outcomes:

After completion of this course, the Students will be able to:

1. Create relational database.
2. Manipulate data using SQl.
3. Create PL/SQL program.
4. Retrieve required information using SQL.
5. Develop Programs using triggers and cursors.

List of Experiments

Exercise -1

Execute single line and group functions on a table.
Create tables for various relations in SQL with necessary integrity constraints, keys, data types.
Verify messages by violating the constraints.

Exercise -2

Implement the Queries in SQL for a) insertion b) retrieval c) updating d) deletion
Perform various join operations like Equi and non-equi ,outer join, self join on two tables and show the results.

Excerise-3

Execute DCL and TCL Commands.
Write a PL/SQL program for accepting a number and indicate whether it is odd or even.

Exercise-04

Write a PL/SQL program to find the largest of three integers.
Write a PL/SQL program to find the factorial of a given integer and store the integer with it's factorial in a table .

Exercise-05

Write a PL/SQL program to display the sum of digits of given number.
Write a PL/SQL program to display the reverse of given number.

Exercise -06

Write a PL/SQL program to accept two numbers N1 and N2 and perform division operation. And also handle the exception "Divide by zero "when N2 is zero.

Write a PL/SQL program to accept the customer id from the user and display the corresponding customer name and address from customer table. Raise user defined exception "invalid- id" when customer id is <=0 and catch built in exceptions "no data found " and display suitable messages for each exception.

Exercise-07

Write a PL/SQL program using Cursors to update the salaries of Employees as follows.
And also count and display the no. of records have been updated.*/

if sal<1000 then update the salary to 1500.
if sal>=1000 and <2000 then update the salary to 2500.
if sal>=2000 and <=3000 then update the salary to 4000.

Exercise-08

Write a PL/SQL program using triggers to automatically store all the deleted records from employee table in a separate table called "employees history " along with date of deletion,user-id of the person who deleted.

Exercise -09

Write a PL/SQL program to which computes and returns the maximum of two values using a function.

Write a PL/SQL procedure to display all the records of employee table in a neat format.

Exercise-10

Write a PL/SQL program to create a Package to group logically related variables,types and sub programs and use the package elements later.

Text Books:

1. Raghurama Krishnan, Johannes Gehrke: Database Management Systems.TATA McGrawHill , 3rd Edition
2. Silberschatz, Korth :Database System Concepts. McGraw hill,5th Edition

Reference Books:

1. https://www.coursera.org/course/db
2. Peter Rob ,Carlos Coronel: Data base Systems design Implementation and Management. Cengage Learning, 7th Edition
3. Elmasri, Navrate:Fundamentals of Database Systems. Pearson Education,6th Edition
4. C.J.Date: Introduction to Database Systems. Pearson Education,4th Edition

Advanced English Communication Skills Lab
(Common for All Branches)

Credits : 1.5 **External Marks :50**
Course Code: 16HS2102 **Internal Marks :25**

Course Objectives:

- To provide students with a wide range of vocabulary to enable them to take language tests for higher education and employment
- To prepare students for making presentations
- To enable students to participate in group discussions
- To prepare students for facing interviews confidently

Course Outcomes:

1. Students will be able to state meanings, synonyms, antonyms, analogies, idioms, phrases, one word substitutes, word roots, prefixes and suffixes for words in general.
2. Students will be able to present and interpret data on select topics using pre-existing slides.
3. Students will be able to contribute proactively and extrapolate in group discussions.
4. Students will be able to prepare Résumé / CV and face interview.
5. Students will be able to develop communication skills by playing different roles.

Course Syllabus

Unit I
Vocabulary Extension for facing competitive examinations

Unit II
Paper, PowerPoint and Video Presentations

Unit III
Group Discussion

Unit IV
Job Application and Résumé / CV Writing—Interview Preparation

Unit V
Speaking: Role-play

Course Material:

Text books:
Advanced Communication Skills Lab. Version 1.0 (Software). K-VAN Solutions Pvt. Ltd.

Reference Books:
1. Rani, K. Nirupa et al. *Speak Well*. Orient Blackswan: Hyderabad, 2012.
2. Prasad, M. Hari et al. *Strengthen Your Steps*. Maruthi: Hyderabad, 2010.
3. Prasad, M. Hari et al. *Strengthen Your Communication Skills*. Maruthi: Hyd, 2014.
4. Ashraf, M. Rizvi. *Effective Technical Communication*. Tata McGraw-Hill, 2005.

Self Study Course - I

Credits : 1 **Internal Marks: 75**

Course Code: 16CS2201

Course Objectives

This course is designed to

- Identify the sources of information.
- Collect relevant information.
- Interpret information.
- Move from problem to solution.

Course Outcomes

The students shall be able to

1. Acquire the ability to locate different sources of information.
2. Acquire the ability to filter and select relevant information.
3. Acquire the ability to apply information to real world problems and solve them.

Methodology / Procedure:

Self study course – I (2 periods per week) includes referring library books, e–learning, internet accessing and presentation.

- Latest and advanced topics shall be identified in the interested area.
- Literature survey shall be conducted on the selected topic.
- Required information shall be collected related to the topic as a soft / hard copy.
- A brief report shall be prepared on the topic.
- An oral presentation shall be given on the report before the Committee.

UNIX Internals

Credits : 3.0 **External Marks: 70**
Course Code: 16CS3011 **Internal Marks : 30**

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

- Understand the Unix file system, Unix commands, and shell programming concepts.
- State library functions and system calls in Unix.
- Explain the Unix process structure and various types of signals for handling of a process.
- Illustrate the Inter Process Communication (IPC) mechanisms used in Unix OS.

Course Outcomes:

1. Demonstrate the basic set of commands and utilities in Unix systems.
2. Ability to read, write and debug shell scripts.
3. Implement the important Unix library functions and system calls.
4. Describe process control and handle a process by using signals..
5. Familiar with Inter Process Communication (IPC) using pipes, shared memory, semaphores and message queues.

Unit I
Introduction to Unix file system, vi editor, file handling utilities, file permissions, process utilities, disk utilities, text processing utilities, backup utilities and networking commands. Detailed commands to be covered are date, cal, cp, mv, rm, cd, pwd, mkdir, rmdir, wc, ls, cat, tac, touch, head, tail, uniq, grep, egrep, fgrep, cut, paste, join, comm, cmp, diff , sort, nl, tee, more,pg, tr, ln, unlink,chmod, umask, ulimit, du,df, mount, umount, who, who am i,w, find, telnet, rlogin, awk, tar, cpio. **(TextBook 1 &2)**

Unit II
Shell Scripting : Unix system organization, What is shell, shell variables, User defined variables, system defined variables; shell responsibilities, pipes, redirection: input redirection, output redirection, error redirection; shell meta characters, shell commands, shell as a programming language, **c**onditional statements, loops, command line arguments. **(TextBook 1 &2)**

Unit III
System calls, library functions, low level file access, usage of open, create, read, write, close, lseek, stat, fstat, umask, dup and dup2, the standard I/O : fopen, fopen, fclose, fflush, fseek, fgetc, getc, getchar, fputc, putc, putchar, fgets, gets ; formatted I/O, stream errors, streams and file descriptors, file and directory maintenance : chmod, chown, unlink, link, symlink, mkdir, rmdir, rename,remove,chdir, getcwd. **(TextBook 2)**

Unit IV

Process and Signals : What is process, process identification, hierarchy of Unix processes, starting a new process, Waiting for a process, zombie process, orphan process, process control, fork, Vfork, exit, exec family functions, common signals, signal functions, reliable and unreliable signals, interrupted system calls, kill, raise, alarm, pause, abort, system, sleep functions. **(TextBook 2)**

Unit V

Inter Process Communication: pipes, process communication in pipes, pipe system call, parent-child process, named pipes Vs name less pipes, semaphores, message queues and shared memory. **(TextBook 2)**

Text Books:

1. Advanced programming in the Unix environment, W.Richard Stevens, Stephen A.Rango, Addision-Wesley professional, 2 nd Edition.
2. Your unix the ultimate guide, Sumitabha Das, TMH, 2 nd Edition.

Reference Books:

1. Advanced UNIX Programming, Dr. N.B.Venkateswarlu, B.S.Publications,2 Edition.
2. UNIX Network Programming, Inter Process Communication, W.R. Stevens, PHI/Pearson, 2 nd Edition.
3. Unix Internals the New Frontiers, U.Vahalia, Pearson Education

Computer Networks

Credits : 3.0 **External marks: 70**
Course Code: 16CS3012 **Internal marks: 30**

Course Objectives:
Upon completing the course, the student will:

- Explain Data Communications System and its components, different types of network topologies and protocols.
- Demonstrate different layers of ISO and TCP/IP models and illuminate its function.
- Apply knowledge of different techniques of error detection and correction to detect and solve error bit during data transmission.
- Analyze main protocols such as HTTP, FTP, SMTP, TCP, UDP, IP.

Course Outcomes:
After completing this course, the student will be able to:

1. Identify and enumerate different types of network topologies, protocols and the layers of the OSI and TCP/IP models and explain the functions of each layer.
2. Explain the protocols of Data Link Layer and MAC Sublayer and illustrate how a network can detect and correct transmission errors.
3. Classify and compare the major routing and congestion control algorithms and understand how a packet is routed over the internet.
4. Describe how TCP and UDP function, its uses and summarize the differences between them.
5. Analyze the features and operations of various Application layer protocols such as http, DNS, and SMTP.

Unit I:
Introduction: Data Communication, Components, Data Representation, Data Flow; **Networks**: Distributed Processing, Network Criteria, Physical Structures, Network Models, Categories of Network, Interconnection of Networks; **The OSI models**: Layered architecture, peer-to-peer process, Encapsulation, Layers in OSI model, TCP/IP protocol suite, **Addressing**: Physical Address, Logical Address, Port Address, Specific Address. (**Text Book-2**)

Unit II
Data Link Layer: Design Issues, Services Provided to Network Layer, Framing, Error Control and Flow Control, Error Detection and Correction- Error Correcting codes, Error Detecting codes, Elementary Data Link Protocols, Sliding Window Protocols- A one-bit sliding window protocol, A Protocol Using GO BACK N, A Protocol Using Selective Repeat, Examples Data Link Protocols- HDLC; **The Medium Access Control Sublayer:** Multiple Access Protocol- ALOHA, Carrier Sense Multiple Access Protocols, Collision-Free protocols, Limited Contention Protocol. (**Text Book-1**)

Unit III

The Network Layer: Network Layer Design Issues-Services Provided to Transport Layer, Implementation of Connection Less Service, Implementation of Connection Oriented Service, Virtual-Circuit and Datagram Subnets, **Routing Algorithms:** The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broad Cast Routing, Multicast Routing, **Congestion Control Algorithms:** General Principles of Congestion Control, Congestion Prevention Policies, **The Network Layer in Internet**-The IP Protocol, IP Address-IPV4, IPV6. (**Text Book-1**)

Unit IV

The Transport Layer: Process-to-Process Deliver, Client/Server Paradigm, Multiplexing, Connectionless verses Connection Oriented Services, Reliable verses Unreliable; **UDP:** Well-known Ports for UDP, User Datagram, Checksum, UDP Operations and Uses of UDP; **TCP:** TCP Services, TCP Features, TCP Segment, a TCP Connection- Connection Establishment, Data Transmission, Connection Termination. (**Text Book-2**)

Unit V

The Application Layer: DNS- Domain Name System- The DNS Name Space, Resource Records, Name Servers, SNMP, Electronic Mail- Architecture and Services, The User Agent, Message Format, Message Transfer, Final Delivery, **The World Wide Web-** Architectural Overview, Static Web Document, Dynamic Web Document; Hyper Text Transfer Protocol (HTTP). (**Text Book-1**)

Text Books:

1) Andrew S. Tanenbaum, Computer Networks, 5th Edition, Pearson Education, 2016.
2) Behrouz A Forouzan, Data Communications and Networking, 4th Edition, McGraw-Hill, 2006.

Reference Books:

1) S Keshav, An Engineering approach to computer Networking, 2nd Edition, Pearson Education.
2) J.F.Kurose, K.W.Ross, Computer Networking a Top-Down approach featuring the internet, 2nd Edition, Pearson Education.

Reference Link :

1. http://nptel.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Computer%20networks/New_index1.html

Software Engineering

Credits : 3.5 **External Marks : 70**
Subject Code: 16CS3013 **Internal Marks : 30**

Course Objectives:

- Give the basic knowledge in Software Engineering process, focus on the different process models.
- Learn how to perform feasibility study of the projects under the requirement engineering process and system models.
- Categorize different design concepts and architecture styles, evaluating the steps for designing a good model.
- Demonstrate testing, cost estimation and evaluation product metrics.
- Focus on risk and quality management.

Course Outcomes:

1. Understand the engineering issues that form the background to develop complex and evolving software-intensive systems.
2. Apply an effective software engineering process, based on knowledge of widely used development life cycle models.
3. Analyze and translate requirements specification into an implementable design, following a structured and organized process.
4. Formulate a testing strategy for a software system, employing techniques such as black box and white box testing strategies.
5. Evaluate the quality of the requirements, analysis and design work during the module.

Unit I:

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths. Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI). **Process models:** The waterfall model, Incremental process models, Evolutionary process models, The Unified process**.(Text Book-1)**

Unit II:

Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document. **Requirements engineering process:** Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management. **System Models:** Context Models, Behavioral models, Data models, Object models.**(Text Book-2)**

Unit III:

Design Engineering: Design process and Design quality, Design concepts, the design model. **Creating an architectural design:** Software architecture, Data design, Architectural styles and patterns, Architectural Design. **Performing User interface design:** Golden rules, User interface analysis and design, interface analysis, Interface design steps, Design evaluation. **(Text Book-1)**

Unit IV:

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging. **Product metrics:** Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance. **Estimation:** COCOMO II Model **(Text Book-1).**

Unit V:

Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement. **Quality Management:** Quality concepts, Software quality assurance, Software Reviews, Formal Technical reviews, Statistical Software quality Assurance, Software Reliability.**(Text Book1)**

Text Books:

1. Roger S Pressman-Software Engineering, 7/e , McGraw Hill Education
2. Somerville- Software Engineering, 7/e, Pearson Education

Reference Books:

1. Software Engineering- K.K. Agarwal & Yogesh Singh, New Age International Publishers
2. Software Engineering: Chandramouli Subramanian, Saikat Dutt, Chandramouli Seetharaman, B G Geetha- Pearson Education

Reference Link: http://nptel.ac.in/courses/106101061/

Design and Analysis of Algorithms

Credits : 3.5 **External Marks: 70**
Course Code: 16CS3014 **Internal Marks: 30**

Course Objectives

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

Course Outcomes

1) Measure the performance and calculate the Time & Space complexities of algorithms.
2) Design effective algorithms based on Divide and Conquer and Greedy methods.
3) Discuss various problems suitable to Dynamic programming.
4) Construct a state space tree to solve different problems using Backtracking technique.
5) Find an optimal solution by applying different Branch and Bound techniques and illustrate Non-deterministic algorithms.

Unit I

Introduction: Essence of Algorithm Design and Analysis, Pseudo code Conventions, Analysis Framework: Space & Time Complexity, Case Analysis, Amortized analysis, Asymptotic Notations: Big-Oh notation, Omega notation, Theta notation.

Unit II

Divide and conquer: General method, Applications: Binary search, Quick sort, Merge sort, Strassen's Matrix multiplication.

Greedy method: General method, Applications: Job sequencing with deadlines, Knapsack problem, Minimum cost spanning trees, Single source shortest path problem,

Unit III

Dynamic Programming: Principle of Optimality, Applications: Matrix chain multiplication, Optimal Binary Search Trees (OBST), 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem.

Unit IV

Graph traversals: DFS & BFS, Connected components, Articulation point & Bi-Connected components.

Backtracking: General method, Applications: n-Queens problem, Sum of subsets problem, Graph Coloring, Hamiltonian cycles.

Unit V

Branch and Bound: Least Cost (LC) Search, FIFO Branch and Bound & LC Branch and Bound, Applications: 0/1 knapsack problem, Travelling sales person problem.

NP-Hard and NP-Complete problems: Basic concepts, Non-deterministic algorithms, Cook's theorem.

Text Book:

1) Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Second Edition, Universities Press, India, 2010,

Reference Books:

1) Anany Levitin, "Introduction to Design & Analysis of Algorithms", Second Edition, Pearson Education, India, 2008.
2) Aho, Ullman and Hopcroft, "Design and Analysis of algorithms", Pearson Education, Fourth Edition, India, 2009.

Web reference:

1) http://nptel.ac.in/courses/106101060/

Java Programming

Credits : 2.5 **External Marks : 70**
Course Code: 16CS3015 **Internal Marks : 30**

Course Objective

- The objective of the course is to teach the basic concepts and techniques which form the **object oriented programming paradigm.**
- Well equipped with Java SDK environment to create, debug and run simple Java programs

Course Outcomes:

After completion of this course, the student will be able to:

1. Become familiar with the fundamentals and acquire programming skills in the Java language.
2. Understand fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods, using class libraries, etc.
3. Able to understand and apply various object oriented features like inheritance, polymorphism to solve various computing problems and take the statement of a business problem and from this determine suitable logic for solving the problem.
4. Identify Java's standard packages and the different levels of member access and how they relate to packages and implement error handling techniques using exception handling.
5. Able to explore common issues encountered when creating a cross-platform multi-threaded application and also develop efficient Java applets.

Unit - I

INTRODUCTION TO JAVA: Evolution of Java, Java Buzzwords, The Java Virtual Machine, An overview of Java- Simple Java Program, Naming Conventions in Java, Data types, Variables, Expressions, Automatic type Conversion, Operators, Control Statements , Input and Output, Arrays, Strings. **[Chapters [1,3,4,5]- Text Book 1]**

Unit -II

CLASSES & OBJECTS: Class fundamentals, Declaring Objects, Initializing the instance variables, Access Control, Constructors, Methods in Java- Overloading Methods, Static Methods, Recursion, final keyword, this keyword, garbage collection, finalize() method.
[Chapters [6, 7] - Text Book 1]

Unit -III

INHERITANCE: Inheritance Basics, Types of Inheritance, The Keyword 'super', Final with inheritance.
POLYMORPHISM: Method Overriding, Dynamic Method Dispatch, Abstract Classes.

INTERFACES: Interface, Multiple Inheritance using Interface, Abstract Classes vs. Interfaces.
[Chapters [8, 9] - Text Book 1]

Unit -IV

PACKAGES: Packages, Different Types of Packages, Access Protection, Importing Packages.
EXCEPTION HANDLING: Exception-handling fundamentals, throw Clause, throws Clause, Types of Exceptions: Built-in Exception, User Defined Exception.
[Chapters [9, 10] - Text Book 1]

Unit -V

THREADS: Java Thread Model, Main Thread, Creating a Thread and Running it, Terminating the Thread, Creating Multiple Threads, Thread Synchronization, Thread Priorities.
APPLETS: Applet Basics, Applet Life Cycle, A Simple Applet, HTML applet tag, Applet Parameters. **[Chapters [11, 13] - Text Book 1]**

Text Books:

1. Herbert Schildt, *"Java The complete reference"*, 8th Edition, McGrawHill, 2011.
2. E.Balaguruswamy, *"Programming with Java A Primer"*, 4th Edition, TataMcGraw-Hill, 2009.

References:

1 Timothy budd, *"An introduction to object-oriented programming"*, 3rd Edition, Pearson Education, 2009.
2. Y. Daniel Liang, "*Introduction to Java programming"*, 9th Edition, Pearson education, 2012.

Reference Lnks:

1. http://en.wikibooks.org/wiki/Java_Programming - Java Learning WikiBook
2. http://www.javabeginner.com - Java Beginner Tutorial

Fundamentals of Fuzzy Logic
(Open Elective - III)

Credits : 2.0 **External Marks: 70**
Course Code: 16CS3031 **Internal Marks: 30**

Course Objectives

The student will be able to

- Understand the concepts of fuzzy sets, membership functions and their operations.
- Frame linguistic variables and analyze the fuzzy quantifiers.
- Frame simple fuzzy sets.
- Fuzzify any desired area of classical Mathematics using Fuzzy controllers.
- Apply the concepts of Defuzzification.

Course Outcomes

Student is able to

1. Perform different fuzzy operations on fuzzy sets or membership functions.
2. Construct linguistic variables and estimate the fuzzy quantifiers as per the requirement.
3. Construct a simple Fuzzy set.
4. Develop simple Fuzzy expert system to Fuzzify any desired area with suitable controllers using different inference rules.
5. Apply defuzzification process to convert a Fuzzy set to a crisp value.

Unit I

Fuzzy set Theory: Crisp Sets- an overview, Fuzzy sets – membership functions -types of membership functions-Triangular, Trapezoidal, Gaussian-examples. Basic Fuzzy set operations-union, intersection, complement. Properties of Fuzzy Sets, Fuzzy relations – Cartesian product, operations on fuzzy relations.

Unit II

Fuzzy Logic: Classical Logic – an overview, Fuzzy propositions, Fuzzy connectives, Fuzzy quantifiers, Fuzzy Inference.

Unit III

Construction of Fuzzy sets: Methods of construction –an overview, Direct methods with one expert, Direct methods with multiple experts, constructions from Sample data –examples.

Unit IV

Fuzzy Expert System – Fuzzification : Fuzzy Controllers, Fuzzy Expert System- Fuzzification-Fuzzy membership values, linguistic Hedges, Fuzzy Logical operators, Fuzzy Inference rules.

Unit V

Fuzzy Expert System- Defuzzification: Defuzzification-Centre of gravity method, centre of sums method, Mean of Maximum method-examples.

Text books:

1. Fuzzy Sets and Fuzzy Logic-Theory and Applications, George. J. klir / Bo Yuan, Prentice-Hall of India Pvt Limited.
2. Neural Networks, Fuzzy Logic, and Genetic Algorithms, S.Rajasekharan, G.A.Vijayalakshmi Pai, PHI.

References

1. Fuzzy Logic with Engineering Applications, Timothy J.Ross, 3rd edition, John wiley & sons Ltd.

Energy Audit Conservation and Management
(Open Elective - III)

Credits : 2 **External Marks: 70**
Course Code: 16OE3033 **Internal Marks : 30**

Course objective:

- To introduce basic principles of energy auditing.
- To know something about energy management and functions of Energy manager.
- To provide knowledge about energy efficient motors.
- To impart knowledge on power factor improvement, lighting and energy instruments
- To analyse economic aspects.

Course Outcomes:

1. Apply principles of energy auditing and propose energy conservation schemes.
2. Demonstrate principle and organizing energy management program.
3. Analyze illumination methods and propose energy conservation measures.
4. Demonstrate the operation of various energy instruments.
5. Propose Air–conditioning or heating method for a building.
6. Analyze and compute the economic aspects of energy consumption.

Unit I

Basic Principles Of Energy Audit Energy audit- definitions, concept , types of audit, energy index, cost index ,pie charts, Sankey diagrams, load profiles, Energy conservation schemes- Energy audit of industries- energy saving potential, energy audit of process industry, thermal power station, building energy audit.

Unit II

Energy Management: Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting- Energy manger, Qualities and functions, language.

Unit III

Energy Efficient Motors Energy efficient motors , factors affecting efficiency, loss distribution, constructional details, characteristics - variable speed , variable duty cycle systems, RMS hp- voltage variation-voltage unbalance- over motoring- motor energy audit.

Unit IV

Power Factor Improvement, Lighting And Energy Instruments Power factor – methods of improvement, location of capacitors, Pf with non linear loads, effect of harmonics on power factor, power factor motor controllers - Good lighting system design and practice, lighting control ,lighting energy audit - Energy Instruments- wattmeter, data loggers, thermocouples, pyrometers, lux meters, tongue testers ,application of PLC’s.

Unit V

Economic Aspects And Analysis Economics Analysis-Depreciation Methods, time value of money, rate of return, present worth method , replacement analysis, life cycle costing analysis- Energy efficient motors- calculation of simple payback method, net present worth method- Power factor correction, lighting - Applications of life cycle costing analysis, return on investment .

Text Books:

1. Energy Management by W.R. Murphy & G. Mckay Butter worth, Elsevier publications. 2012
2. Energy Efficient Electric Motors by John. C. Andres, Marcel Dekker Inc. Ltd – 2nd Edition, 1995
3. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill Publishing Company Ltd, New Delhi.

Reference Books:

1. Energy management by Paulo' Callaghan, Mc – Graw Hill Book company – 1st edition, 1998
2. Energy management hand book by W.C. Turner, John wiley and son, 2001.
3. Energy management and good lighting practice: fuel efficiency booklet12 – EEO.

Introduction to Signal Processing
(Open Elective - III)

Credits : 2 **External Marks : 70**
Course Code: 16OE3035 **Internal Marks : 30**

Course Objectives

- To study the different types of discrete time signals and systems and their properties.
- To test the different systems based on their properties and calculate the frequency response
- To define the Discrete Fourier series and Discrete Fourier transform properties.
- To calculate the Fourier series and Fourier transform for the different discrete time signals and also calculate the Fourier Transform of a given sequence based on FFT algorithms
- To design a FIR and IIR filters using different techniques

Course Outcomes

1. Discriminate the discrete systems based on their basic properties
2. Determine the frequency response of different signals using DFT
3. Translate the DFT approach into algorithm approach- FFT
4. Design IIR filters using different techniques
5. Design FIR filters using different techniques

Unit I

Signals and Systems Introduction: Basic elements of DSP , concepts of frequency in Analog and Digital signals- Sampling theorem, Discrete time signals and sequences, – Analysis of discrete time LTI systems – Z transform – Convolution – Correlation, Frequency domain representation of discrete time signals and systems.

Unit II

Discrete Fourier series: Properties of discrete Fourier series, DFS representation of periodic sequences.

Discrete Fourier transform: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT. Relation between Fourier transform and Z-transform

Unit III

Fast Fourier Transform: Radix-2 decimation in time and decimation in frequency algorithms, inverse FFT.

Unit IV

Digital filter realization: Principle of digital filter realization, structures of All-zero filters. Design of FIR (Finite impulse response) filters, linear phase, windows-rectangular, Berlitt, Hanning, Hamming and Blackman. Some example of practical filter design.

Unit V

Design of infinite impulse response filters (IIR) from analog filters. Bilinear transformation, Butterworth, Chebyshev, Elliptic filters. Optimisation method of IIR filters. Some example of practical filter design.

Text Books:

1. Digital Signal Processing, Principles, Algorithms, and Applications – John G. Proakis, Dimitris G.Manolakis, Pearson Education/PHI, 2007.
2. Discrete Time Signal Processing – A.V.Oppenheim and R.W. Schaffer, PHI.

Reference Books:

1. Digital Signal Processing – Andreas Antoniou, Tata McGraw Hill , 2006.
2. Digital Signal Processing – MH Hayes, Schaum's Outlines, Tata Mc-Graw Hill, 2007.

Fundamentals of Computer Graphics
(Open Elective - III)

Credits : 2 **External Marks : 70**
Course Code: 16OE3037 **Internal Marks : 30**

Course Objectives:

- To enlighten the working principles of display devices, and concepts of resolution.
- To understand the fundamental data-structures and algorithms used for output primitives.
- To design graphics programmes using mathematical and theoretical foundations.
- To hypothesize 3D models of objects.
- To organize steps and plan for generation of animations.

Course Outcomes:

1. Understand the working principles of display devices, and concepts of pixel, resolution.
2. Apply mathematics and logic to develop algorithms for various output primitives like lines, circles, polygons.
3. Learn to manipulate 2D pictures by designing various transformations.
4. Generate 3D computer graphics using interpolation and approximation functions. And derive Projection Transformations.
5. Detect visible surfaces using various routines, thus hiding back faces in 3D graphics, and generate Computer Animation.

Unit I

Introduction: Application areas of computer graphics, overview of graphic system, video-display devices, raster-scan systems, random scan systems, input devices, Pixels and frame buffers.

Unit II

Output Primitives: Points and lines, line drawing algorithms, mid-point circle algorithm,
Filled area primitives: scan-line polygon fill algorithm, boundary-fill and flood-fill algorithm.

Unit III

2-D Geometrical Transformations: Translation, scaling, rotation, reflection and shear transformation matrix representations and homogeneous co-ordinates, composite transformations, transformations between coordinates.

Unit IV

2-D Viewing: The viewing pipe-line, window, view-port, viewing transformation, Cohen-Sutherland, Sutherland-Hodgeman polygon clipping algorithm.
3D Graphics**:** 3D basic Transformations, Projections, Curve generation**,** Hermite curve, Bezier curve and B-spline curve, B-spline surfaces.

Unit V

Visible surface detection algorithms: Back-face, Z-buffer, Scan-line algorithm, Painter's algorithm, Animation.

Text Books:

1. " Computer Graphics C version" Donald Hearn and M. Pauline Baker, Pearson/PHI

References:

1. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
2. Computer Graphics, Steven Harrington, TMH.
3. "Computer Graphics Principles & practice", second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.

Global Positioning Systems (GPS) and Survey Methods
(Open Elective - III)

Credits : 2 **External Marks: 70**
Course Code: 16OE3038 **Internal Marks: 30**

Course Objectives:
Students will have

- to study the overview of GPS include basic concepts and overview
- to study the GPS signals include signal structure, anti spoofing etc
- to study about GPS coordinate frames, time references
- to study about GPS orbits and satellite position determination
- to study the **GPS Survey Methods include** Single Point or Point Vs Relative, Static Vs Kinematic, Real time Vs Post mission

Course Outcomes:
Students will get ability

1. to understand the overview of GPS include basic concepts and overview
2. to learn the GPS signals include signal structure, anti spoofing etc
3. the learn about GPS coordinate frames, time references
4. to learn about GPS orbits and satellite position determination
5. to understand **GPS Survey Methods include** Single Point or Point Vs Relative, Static Vs Kinematic, Real time Vs Post mission

Unit I
Overview of GPS: Basic concept, system architecture, space segment, user segment, GPS aided Geo-augmented navigation (GAGAN) architecture

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 coordinates, 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 Survey Methods: Single Point or Point Vs Relative, Static Vs Kinematic, Real time Vs Post mission

Textbooks:

1. G S RAO, **Global Navigation Satellite Systems,** McGraw-Hill publications, New Delhi, 2010
2. B. Hoffman – Wellenhof, H. Liehtenegger and J. Collins, 'GPS – Theory and Practice', Springer
– Wien, New York (2001).

Reference Books:

1. James Ba – Yen Tsui, 'Fundamentals of GPS receivers – A software approach', John Wiley & Sons (2001).

Engineering Optimization Techniques
(Open Elective - III)

Credits : 2 **External Marks : 70**
Course Code: 16OE3039 **Internal Marks : 30**

Course Objectives:

- To be able to formulate nonlinear optimization problems.
- To provide knowledge about formulation of sensitivity analysis.
- To be able to solve various kinds of single, multiple variable constrained optimization problems using standard optimization.

Course Outcomes:
On completion of this course, students should be able to

1. Solve single variable and multi variable optimization problems using classical optimization techniques.
2. Conduct sensivity analysis of multivariable linear programming problems.
3. Solve non linear constraint optimization problems using elimination methods.
4. Solve non linear constraint optimization problems using direct root methods.
5. Calculate optimum solution of unconstrained geometric programming problems.

Unit I
Introduction to Classical Optimization Techniques: Single variable optimization with constraints, multi – variable optimization with constraints, method of Lagrange multipliers, Kuhn-Tucker conditions

Unit II
Sensivity analysis Change in the constraints, cost coefficients.

Unit III
Direct Root Methods: - Newton, Gradient of a function, steepest descent method.

Unit IV
Elimination Methods: - Fibonacci, Golden Section

Unit V
Geometric Programming: Polynomials – arithmetic - geometric inequality

Text Books:

1. Engineering Optimization, Theory and Applications, S.S. Rao, New Age International Pub.
2. Optimization for Engineering Design, Kalyanmoy Deb, PHI Pub.

Reference Books:

1. Optimization Techniques, Theory and Practice, M. C. Joshi, K. M. Moudgalya, Narosa Pub.
2. Engineering Optimization, A Ravindran, K M Ragsdell, G V Reklaitis

UNIX Internals Lab

Credits : 1.5 **External Marks: 50**
Course Code: 16CS3108 **Internal Marks : 25**

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

- Understand the basic Unix commands and shell programming concepts.
- Understand the library functions and system calls in Unix.
- Describe the Unix process structure and various types of signals for handling of process.
- Discuss the working mechanism of IPC using pipes, semaphores message queues and shared memory.

Course Outcomes:
After the completion of this course the student will

1. Run various Unix commands on a standard Unix Operating system
2. Develop shell scripts to automate common tasks.
3. Experiment with various library functions and system calls in Unix operating system
4. Write Programs related to process control and signal handling.
5. Implement IPC using pipes, semaphores, message queues and shared memory.

List Of Experiments

1. Use the cut command on the output of a long directory listing in order to display only the file permissions. Then pipe this output to sort and uniq to filter out any double lines. Then use the wc to count the different permission types in this directory.
2. Use the cat command to create a file containing the following data. Call it mytable. Sort the mytable. Swap fields 2 and 3 of mytable. Call it mytable. Print the new file mytable.
3. a) Write a shell script to check whether the user is eligible for vote or not by using date and awk commands
   b) Write a shell program which prints whether the system is heavily loaded, medially loaded or lowly loaded by using who command
4. a) Write a shell program which informs as soon as a specified user whose name is given along the command line is logged into the system.
   b) Write a program which reads a file name and 3 directory names along the command line and print "YES" if the file is found in any of the directories otherwise print" not found".
5. a) Write a system program to remove a file using remove system call
   b) Write a system program to rename a file using rename system call
6. a) Write a system program to link a file using link system call
   b) Write a system program to open a file and unlink it
7. a) Write a system program that creates a child using fork() system call

b) Write a system program that creates a Orphan.

8. a) Write a system program that creates a Zombie
   b) Write a system program that waits for its child to terminate using wait() system
9. Write a UNIX system program that demonstrates system calls
   (i) kill (ii) raise (iii) alarm (iv) pause (v) abort (vi) sleep
10. Write a C program to simulate producer and consumer problem using pipes
11. Write UNIX system program or programs to demonstrate the IPC mechanism semaphores-oriented system calls.
12. Write UNIX system program or programs to demonstrate the IPC mechanism Message queues-oriented system calls.
13. Write UNIX system program or programs to demonstrate the IPC mechanism shared memory-oriented system calls.

Text Books:

1. Advanced programming in the Unix environment, W.Richard Stevens, Stephen A.Rango, Addision-Wesley professional, 2 nd Edition.
2. Your unix the ultimate guide, Sumitabha Das, TMH, 2 nd Edition.

Reference Books:

1. Advanced UNIX Programming, Dr. N.B.Venkateswarlu, B.S.Publications,2 Edition.
2. UNIX Network Programming, Inter Process Communication, W.R. Stevens, PHI/Pearson, 2 nd Edition.
3. Unix Internals the New Frontiers, U.Vahalia, Pearson Education.

Computer Networks Lab

Credits : 1.5 **External Marks : 50**
Course Code: 16CS3109 **Internal Marks : 25**

Course Objectives

- Build and understanding of the fundamental concepts of computer networking.
- Analyze the different layers in networks and define, use, and differentiate such concepts as OSI-ISO, TCP/IP.
- To be familiar with contemporary issues in networking technologies and allow the student to gain expertise in maintenance of individual networks.
- To know that how the routing algorithms worked out in network layer.

Course Outcomes

1. To apply knowledge of different techniques of error detection and correction to detect and solve error bit during data transmission.
2. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.
3. Understand and building the skills of routing mechanisms during packet delivery.
4. To explain the congestion control algorithms and understand how a packet is routed.
5. To be familiar with network tools and network programming.

List Of Experiments

1) Implement a data link framing method for counting characters in a given frame.
2) Implement a data link framing methods for the bit stuffing in a frame.
3) Implement a data link framing methods for character stuffing in a frame.
4) Implement a data link framing method for even and odd parity.
5) Implement the CRC encoding mechanism in data link layer.
6) Implement the CRC decoding mechanism in data link layer.
7) Implement Dijkstra's algorithm to compute the shortest path through a graph.
8) Take an example subnet graph and obtain routing table for each node using distance vector routing algorithm.
9) Implement a Hierarchical routing algorithm.
10) Take an example subnet of hosts. Obtain broadcast tree for it.
11) Implement the token bucket congestion control algorithm.
12) Implement the leaky bucket congestion control algorithm.

Text Books:

1) Andrew S Tanenbaum, Computer Networks, 5th Edition, Pearson Education, 2016.
2) Behrouz A Forouzan, Data Communications and Networking, 4th Edition, McGraw-Hill, 2006

Reference Books:

1) S Keshav, An Engineering approach to computer Networking, 2nd Edition, Pearson Education.
2) J.F.Kurose, K.W.Ross, Computer Networking a Top-Down approach featuring the internet, 2nd Edition, Pearson Education.

Java Programming Lab

Credits : 1.5 **External Marks : 50**
Course Code: 16CS3110 **Internal Marks : 25**

Course Objectives:

- To develop skills to design and analyze the applications with respect to java programming.
- To strengthen the ability to identify and apply the suitable object oriented concept for the given real world problem.

Course Outcomes:

1. Able to write, compile and execute simple java programs.
2. Understand and apply Object Oriented features to solve well specified problems.
3. Able to make use of reusability on scenario based and define ADT for business problems.
4. Able to create user defined packages and handle exceptions at run time.
5. Apply Threading concept based on application requirement and design Applet programming.

List of Experiments:

1. A) Write a java program that displays welcome dear user followed by user name. Accept user name from the user.
   B) Write a java program that prompts the user for an integer and then prints out all the prime numbers up to that integer.

2. A) Write a java program to create a class Rectangle. The class has attributes Length and Width. It should have methods that calculate Area and Perimeter of the Rectangle. It should have readAttributes() method to read Length and Width from the user.
   B) The Fibonacci sequence is defined by the following rule: The first two values in the sequence are1 and 1. Every subsequent value is the sum of the two values preceding it.

3. A) Write a java program that uses both Recursive and Non-Recursive functions to find the factorial of a given number.
   B) Write a java program that checks whether the given string is Palindrome or not. Ex: MALAYALAM is a Palindrome.
   C) Write a java program for sorting a given list of names in ascending order.

4. A) Write a java program to illustrate method overloading and method overriding.
   B) Write a java program that illustrates how java achieved Run Time Polymorphism.

5. A) Write a java program to demonstrate the use of subclass.
   B) Write a java program for abstract class to find areas of different shapes.
   C) Write a java program for STACK ADT using interfaces.

6. A) Write a Java program to implement the concept of importing classes from user defined package and creating packages.
   B) Write a java program to implement the concept of Exception Handling by using predefined and user defined exceptions.

7. A) Write a java program to implement the concept of Threading by Extending Thread class and by Implementing Runnable Interface.
   B) Write a program using Applet to display a message in the Applet and for configuring Applets by passing parameters.

Text Books:

1. Herbert Schildt: "Java The complete reference", 8th Edition, Tata McGraw Hill, 2011.
2. E.Balaguruswamy: "Programming with Java A Primer", 4th Edition, Tata McGraw Hill, 2009.

References:

1. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI.
2. Beginning in Java 2, Iver Horton, Wrox Publications.

Self Study Course - 2

Credits : 1.0
Course Code: 16CS2202 **Internal Marks: 75**

Course Objectives:
This course is designed to
- Identify the sources of information.
- Collect relevant information.
- Interpret information.
- Move from problem to solution.

Course Outcomes:
The students shall be able to
1. Acquire the ability to locate different sources of information.
2. Acquire the ability to filter and select relevant information.
3. Acquire the ability to apply information to real world problems and solve them.

Methodology / Procedure:

Self study course – II (2 periods per week) includes referring library books, e–learning, internet accessing and presentation.

- Latest and advanced topics shall be identified in the interested area.
- Literature survey shall be conducted on the selected topic.
- Required information shall be collected related to the topic as a soft / hard copy.
- A brief report shall be prepared on the topic.
- An oral presentation shall be given on the report before the Committee.

Web Technologies

Credits: 3.5 **External Marks: 70**
Course Code: 16CS3016 **Internal Marks: 30**

Course Objectives:
The main objectives of this course are

- Understanding the need of web applications & available technologies.
- Creating web pages by using HTML and applying JavaScript validations
- Understanding the use of XML in Advanced Web Technologies
- Understanding Database Connectivity concepts
- Creating interactive web pages by Using Servlets and JSP

Course Outcomes:
The above exercise shall make the students competent in the following ways and will be able to learn following parameters at the end of the course..

1. Able to build Web pages using HTML
2. Able to validate the forms using JavaScript
3. Able to applying styles to web pages
4. Able to retrieve data from XML Files Using Parsers
5. Able to integrate Database Applications with the Web Applications.

Unit I:
HTML Introduction, Common tags - Headings, Links, Paragraphs, Lists, Tables, images, forms, Frames;
Introducing Cascading Style sheets: Inline styles, External Style Sheets, Internal Style Sheets, Style Classes, Multiple Styles **[Text Book-1]**

Unit II:
Introducing Java Script: Introduction, Embedding JavaScript in an HTML Page, Handling Events, Using Variables & Arrays in Java Script
AJAX: Introduction, Creating a simple AJAX Application **[Text Book-1]**

Unit III:
XML: Introduction, XML Basics, Document Type Definition, XML Schemas,
XML Processors: DOM and SAX **[Text Book-1]**

Unit IV:
JDBC: Introduction, Exploring JDBC Drivers, Describing JDBC APIs, JDBC Drivers, Exploring JDBC Processes with java.sql package.
Introduction to Servlets, Exploring the features of Java Servlets, The Servlet Lifecycle, The Servlet API, web.xml Configuration, Reading parameters (ServletConfig, ServletContext).
[Text Book-1]

Unit V

Introduction to JSP: Understanding JSP, Describing the JSP Lifecycle, Creating Simple JSP pages, JSP Implicit Objects, Using Cookies & Session Tracking, accessing a Database from a JSP Page, Introduction to MVC Architecture **[Text Book-1]**

Text Books:

1. Web Technologies Black Book, Kogent Learning Solutions Inc, Dreamtech Press

Reference Books:

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech
2. The complete Reference Java 2 Fifth Edition by Patrick Naughton and Herbert Schildt. TMH
3. Java Server Pages –Hans Bergsten, SPD O'Reilly 2. Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia.

Reference Links:

1. https://www.mooc-list.com/course/introduction-web-development-coursera
2. https://www.edx.org/course/introduction-html-javascript-microsoft-dev211-1x-0
3. http://infolab.stanford.edu/~ullman/fcdb/oracle/or-web.html

Compiler Design

Credits : 3.5 **External Marks: 70**
Course Code: 16CS3017 **Internal Marks : 30**

Course Objectives:
After completing this course, the student should be able to:

- Describe the design of a compiler including its phases and components and basic understanding of grammars and language definition.
- Identify the similarities and differences among various parsing techniques and grammar transformation techniques.
- Understand the syntax analysis, intermediate code generation, type checking, the role of symbol table and its organization.
- Providing students with practical programming skills necessary for constructing a compiler.
- Understand, design code generation and optimization schemes.

Course Outcomes:
After completing this course, the student should be able to:

1. To use the knowledge of patterns, tokens & regular expressions for solving a problem.
2. To apply the knowledge of lex tool & yacc tool to develop a scanner & parser.
3. To write the new code optimization techniques to improve the performance of a program in terms of speed & space.
4. To employ the knowledge of modern compiler & its features.
5. To experiment the tools and technologies used for designing a compiler.

Unit I:
Overview of Compilation: Phases of Compilation – Lexical Analysis, Regular Grammar and regular expression for common programming language features, pass and phases of translation, interpretation, bootstrapping, LEX - lexical analyzer generator. **(Text Book1 & 2)**

Unit II
Top down Parsing: Context free grammars, Top down parsing – Backtracking, LL (1), Recursive Descent Parsing, Predictive Parsing.
Bottom up Parsing: Shift Reduce parsing, LR and LALR parsing, Error recovery in parsing, handling ambiguous grammar, YACC – automatic parser generator. **(Text Book1 & 2)**

Unit III
Semantic analysis: Intermediate forms of source Programs – abstract syntax tree, polish notation and three address codes. Attributed grammars, Syntax directed translation, Type checker.
Symbol Tables: Symbol table format, organization for block structures languages. Block structures and non block structure storage allocation: static, runtime stack and heap storage allocation. **(TextBook 1)**

Unit IV

Code optimization: Consideration for Optimization, Scope of Optimization, local optimization, loop optimization, frequency reduction, DAG representation.

Data flow analysis: Flow graph, global optimization, redundant sub expression elimination, Induction variable elements, live variable analysis, Copy propagation. **(Text Book1)**

Unit V

Code generation: Object code forms, machine dependent code optimization, register allocation and assignment generic code generation algorithms, DAG for register allocation. **(Text Book1)**

Text Books:

1. Alfred V. Aho, Ravi Sethi & Jeffrey. D. Ullman, "Compilers Principles, Techniques & Tools", Pearson Education, third edition, 2007.
2. Andrew N. Appel, "Modern Compiler Implementation in C", Cambridge University Press, 2004.

Reference Books:

1. John R. Levine, Tony Mason, Doug Brown, "lex & yacc", O'Reilly Media, Inc., 1992.
2. Kenneth C. Louden, Compiler Construction: Principles and Practice, Course Technology Inc; International edition, 1997

Reference link:

1. https://www.holub.com/software/compiler.design.in.c.html

Software Testing and Project Management

Credits : 3.5 **External Marks : 70**
Course Code: 16CS3018 **Internal Marks : 30**

Course Objectives:

- Finding defects which may get created by the programmer while developing the software.
- To prevent defects.
- To understand the essential characteristics of tool used for test automation
- Gaining confidence in and providing information about the level of quality.
- Be familiar with the different methods and techniques used for project management.

Course Outcome

1. Have an ability to apply software testing knowledge and engineering methods.
2. Have an ability to design and conduct a software test process for a software testing project.
3. Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation**.**
4. Have basic understanding and knowledge of **contemporary** issues in software testing, such as component-based software testing problems.
5. Have an ability to use software testing methods and modern software testing tools for their testing projects

Unit I

Software Testing Strategy and Environment: Establishing testing policy, structured approach to testing, test factors, Economics of System Development Life Cycle (SDLC) Testing Software Testing Methodology Defects hard to find, verification and validation, functional and structural testing, workbench concept, eight considerations in developing testing methodologies, testing tactics checklist

Unit II

Software Testing Techniques: Black-Box, Boundary value, Bottom-up, Branch coverage, Cause-Effect graphing, CRUD, Database, Exception, Gray-Box, Histograms, Inspections, Prototyping, Random Testing, Risk-based Testing, Regression Testing, Structured Walkthroughs, Performance Testing, White-Box-Testing

Software Testing Tools: Taxonomy of Testing tools, Methodology to evaluate automated testing tools, Load Runner, Win runner and Rational Testing Tools, Silk test, Java Testing Tools, JUNIT and Cactus.

Unit III

Testing Process: Eleven Step Testing Process: Assess Project Management Development Estimate and Status, Develop Test Plan, Requirements Phase Testing, Design Phase Testing,

Program Phase Testing, Execute Test and Record Results, Acceptance Test, Report test results, testing software installation, Test software changes, Evaluate Test Effectiveness. Testing Specialized Systems and Applications Testing Client/Server – Web applications, Testing Security, Testing a Data Warehouse

Unit IV

Conventional Software Management: The waterfall model, conventional software Management performance. Evolution of Software Economics: Software Economics, pragmatic software cost estimation.

Unit V

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.

Text Books:

1. Effective Methods for Software Testing, 2nd Edition, William E. Perry , Second Edition, Wiley India, 2006.
2. Software Quality, Mordechai Ben-Menachem/Garry S. Marliss,Thomson Learning publication,1997.
3. Software Project Management, Walker Royce: Pearson Education, 2005.(**Unit -IV&V)**

Reference Books:

1. Gao, Tsao and Wu, "Testing and Quality Assurance for Component-based Software", Artech House Publishers.

Reference Link

1. http://www.testingexcellence.com/istqb-tutorial/
2. https://books.google.co.in/books/about/Software_Testing_Techniques.html?id=Ixf97h356zcC

Artificial Intelligence

Credits : 2.5 **External Marks: 70**
Course Code: 16CS3019 **Internal Marks : 30**

Course Objective

- The student should be made to study the concepts of Artificial Intelligence.
- The student should be made to learn the methods of solving problems using Artificial Intelligence.
- The student should be made to introduce the concepts of Expert Systems and machine learning.

Course Outcomes

1. The student should be able to identify problems that are amenable to solution by AI methods.
2. The student should be able to identify appropriate AI methods to solve a given problem.
3. The student should be able to formalize a given problem in the language/framework of different AI methods. Implement basic AI algorithms.
4. The student should be able to design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports.
5. The student should have knowledge in expert system.

Unit I

Introduction to AI and Production Systems: Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics -Specialized production system- Problem solving methods - Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction - Related algorithms, Measure of performance and analysis of search algorithms.

Unit II

Representation of Knowledge: Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge.

Unit III

Knowledge Inference: Knowledge representation -Production based system, Frame based system. Inference - Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster - Shafer theory.

Unit IV

Planning and Machine Learning: Basic plan generation systems - Strips -Advanced plan generation systems – K strips -Strategic explanations -Why, Why not and how explanations. Learning- Machine learning, adaptive Learning.

Unit V

Expert Systems: Architecture of expert systems, Roles of expert systems - Knowledge Acquisition – Meta knowledge, Heuristics. Typical expert systems - MYCIN, DART, XOON, Expert systems shells.

Text Book

1. Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Mc Graw Hill-2008. (Unit s- I, II, IV & V)
2. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007. (Unit -III).

References

1. Peter Jackson, "Introductionto Expert Systems", 3rd Edition, Pearson Education, 2007.
2. Stuart Russel and Peter Norvig "AI – A Modern Approach", 2nd Edition, Pearson Education 2007.
3. Deepak Khemani "Artificial Intelligence", Tata Mc Graw Hill Education 2013.

Reference Link

1. http://nptel.ac.in

Data Warehousing and Data Mining
(Elective - I)

Credits : 3.0 **External Marks: 70**
Course Code: 16CS3020 **Internal Marks: 30**

Course Objectives:

This course helps the students to understand the overall architecture of a Data Warehouse techniques and methods for Data gathering and Data pre-processing and different Data Mining techniques.

Course Outcomes:

After successful completion of the course students will be able to:

1) Recognize types of Data, Data Quality, need of preprocessing and different measures of similarity and dissimilarity.
2) Differentiate between methods for modeling multidimensional data, design and implement data warehouse.
3) Explain in detail major techniques and algorithms involved in data mining including techniques and algorithms for data pre processing, association rule mining, data classification and data clustering.
4) Evaluate and improve the performance of a classifier.
5) Compare and contrast Partitioning, Hierarchical and Density based clustering algorithms.

Unit I

Introduction : What Is Data Mining, Motivating Challenges, Origins of Data Mining, Data Mining Tasks;Data: Types of Data,Data Quality, Data Preprocessing, Measures of Similarity and Dissimilarity **(Text Book 2)**

Unit II

Data Warehouse and OLAP Technology: What is a Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining. **Concept Description** : Characterization and Comparison: What is Concept Description,Data Generalization and Summarization Based Characterization; Analytical Characterization: Analysis of Attribute Relevance; Mining Class Comparisons: Discriminating between Different Classes. **(Text Book 1).**

Unit III

Mining Frequent Patterns, Associations: Basic Concepts: Market-Basket Analysis; Frequent Itemsets,Closed item sets and Association Rules; Frequent Item set Mining Methods:Apriori Algorithm; Generating Association Rules from Frequent itemsets;Improving the efficiency of Apriori ;FPgrowth Algorithm. **(Text Book 1)**

Unit IV

Classification: Basic Concepts; Decision Tree induction; Attribute selection measures; Tree pruning; Bayes Classification methods; Rule Based Classification; Model Evaluation and selection: Metrics and methods for Evaluating classifier performance; Techniques to improve classifier accuracy. **(Text Book 1)**

Unit V

Cluster Analysis: Overview: What is Cluster Analysis, Different Types of Clusterings, Different Types of Clusters ; K–means: Basic K-means Algorithm , Bisecting K-means, Strengths and Weaknesses; Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm; DBSCAN: Traditional Density: Center–Based Approach, The DBSCAN Algorithm, Strengths and weaknesses. **(Text Book 2)**

Text Books:

1. Jiawei Han & Micheline Kamber;Data Mining Concepts and Techniques. Elsevier .3rd Edition
2. Pang -Ning Tan, Michael Steinbach, Vipin Kumar :introduction to Data Mining.Pearson Education,Inc.6th Edition

References:

1. GK Gupta :Introduction to Data Mining with Case Studies.PHI. 2nd Edition
2. Dunham, Sridhar: Data Mining: Introductory and Advanced Topics. Pearson Education

Reference Link:

1. https://www.coursera.org

Cloud computing
(Elective -1)

Credits : 3.0 **External Marks : 70**
Course Code : 16CS3021 **Internal Marks : 30**

Course objective:

1. Understand various basic concepts related to cloud computing technologies
2. Understand the architecture and concept of different cloud models: IaaS, PaaS, SaaS
3. To enable students exploring some important cloud computing driven commercial systems such as GoogleApps, Microsoft Azure and Amazon Web Services and other businesses cloud applications
4. To gain competence in Cloud Security and Open Cloud delivering highly-interactive Web applications
5. To understand and be able to cloud environment is collaborating with various webmail services and databases

Course Outcomes:

1. Understanding the key dimensions of Network based system.
2. Assessment of the economics , financial, and technological implications for selecting cloud computing for own organization
3. Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications.
4. Understand various cloud computing security controls recommendation
5. Evaluate various storage classifications and technologies.

Unit I

Systems modeling, Clustering and virtualization: Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds

Unit II

Virtualization and Cloud Platform Architecture: Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU,Memory and I/O Devices, Cloud Computing and service Models,Architectural Design of Compute and Storage Clouds, Public Cloud Platforms

Unit III

Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

Unit IV

Cloud Security: Cloud Security Risks , Security: The Top Concern for Cloud Users, Privacy and Privacy Impact Assessment, Trust, Operating System Security, Virtual Machine Security, Security of Virtualization

Unit V

Storage Systems: Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system., Apache Hadoop, Locks and Chubby, NoSQL Databases, BigTable, Megastore,

Text Books:

1. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.
2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
3. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madisetti, University Press

Reference Book:

1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH
2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH

Reference Link:

http://nptel.ac.in/courses/106106129/28

Distributed Databases
(Elective - I)

Credits : 3.0 **External Marks : 70**
Course Code: 16CS3022 **Internal Marks : 30**

Course Objectives:

- To clearly describe the difference of Centralized database and Distributed database and enable the students to design/model a distributed database.
- Explain the potential advantages and risks associated with distributed databases.
- Describe the salient characteristics of the variety of distributed database environments.
- Outline the steps involved in processing a query in a distributed database and several approaches used to optimize distributed query processing.
- Understand the Distributed object Database Management Systems
- Apply Distributed DBMS reliability techniques

Course Outcomes:

1. Design architecture of distributed database systems.
2. Analyze Query processing and query optimization methods.
3. Develop the understanding of choosing the optimized query execution plan for distributed queries.
4. Implement transaction management, concurrency Control
5. Understand reliability concepts and measures in the context of Distributed Databases

Unit I

Introduction; Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas. Overview of Relational DBMS: Relational Database Concepts, Normalization, Integrity rules, Relational data languages**.(Text Book-1)**

Unit II

Distributed DBMS Architecture: Architectural Models for Distributed DBMS, DDMBS Architecture. Distributed Database Design: Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation. **(Text Book-1)**

Unit III

Query Processing and decomposition: Query Processing Objectives, Characterization of query processors, layers of query processing, query decomposition, Localization of distributed data.
Distributed query Optimization: Query optimization, centralized query optimization, Distributed query optimization algorithms**.(Text Book-1)**

Unit IV

Distributed concurrency control: Serializability, concurrency control Mechanisms & Algorithms, Time stamped & Optimistic concurrency control Algorithms, Deadlock Management.**(Text Book-1)**

Unit V

Distributed DBMS Reliability: Reliability concepts and Measures, fault-tolerance in Distributed systems, failures in Distributed DBMS, local & Distributed Reliability Protocols, site failures and Network partitioning. **(Text Book-1)**

Text Books:

1. M.Tamer OZSU and Pauck Valduriez: Principles of Distributed Database Systems, Pearson Edn. Asia, 2001.

2. Stefano Ceri and Willipse Pelagatti: Distributed Databases, McGraw Hill.

References:

1. Van Nostrand and Reinhold ,Concurrency Control and Reliability in Distributed Systems, Publishers by Bharat Bhargava (Ed.), 1987

2. Morgan Kaufmann, Jim Gray and Andreas Reuter, Transaction Processing: Concepts and Techniques, 1992 (Copy on reserve in LWSN reception office book shelf)

3. Henry F Korth, A Silberchatz and Sudershan : Database System Concepts, MGH

4. Raghuramakrishnan and Johhanes Gehrke: Database Management Systems, MGH

Reference link:

1. http://nptel.ac.in/courses/106106093/
2. http://nptel.ac.in/courses/106106107/

Social Networks and Semantic Web
(Elective -1)

Credits : 3.0 **External Marks : 70**
Course Code: 16CS3023 **Internal Marks : 30**

Course Objective

The student should be made to

- To understand semantic web.
- To understand the role of ontology and inference engines in semantic web.
- To be able to build semantic web applications with social network features.
- Will be able to differentiate semantic web from other.
- Will be able to use ontology and inference engines in semantic web development.
- Understand human behaviour in social web and related commUnit ies, Learn visualization of social networks.

Course Outcomes:

Upon completion of the course, the student should be able to:

1. Develop semantic web related applications
2. Understand semantic web basics, architecture and technologies.
3. Represent knowledge using ontology.
4. Predict human behavior in social web and related communities.
5. Able to analyze and explain how technical changes affect the social aspects of web based Computing and to discover the capabilities and limitations of semantic web technology for social Networks

Unit I

Introduction to Semantic Web: Limitations of current Web, The Semantic solution Development of Semantic Web, The Emergence of the Social Web. **(Text Book -1)**

Unit II

Social Network Analysis: Development of Social Network Analysis – Key concepts and measures in network analysis – Electronic sources for network analysis: Electronic discussion networks, Blogs and online commUnit ies – Web-based networks – Applications of Social Network Analysis. **(Text Book -1)**

Unit III

Knowledge Representation Of The Semantic Web: Ontology and their role in the Semantic Web: Ontology-based knowledge Representation -State-of-the-art in network data representation – Ontological representation of social individuals -Ontological representation of social relationships – Aggregating and reasoning with social network data. (**Text Book – 1)**

Unit IV

Developing Social Semantic Applications : Building Semantic Web applications with social network features, Flink- the social networks of the Semantic Web commUnit y, Open academia: distributed, semantic-based publication management. (**Text Book – 1)**

Unit V Predicting Human Behaviour And Privacy Issues

Understanding and predicting human behaviour for social commUnit ies – User data management – Enabling new human experiences – Privacy in online social networks – Trust in online environment – Trust models based on subjective logic – Trust network analysis – Trust transitivity analysis. (**Text Book – 1)**

Text Books

1. Peter Mika, "Social Networks and the Semantic Web", First Edition, Springer 2007.
2. Borko Furht, "Handbook of Social Network Technologies and Applications", 1 st Edition, Springer, 2010

Reference Books

1. Liyang Yu, "A Developer's Guide to the Semantic Web", Springer, First Edition, 2011.
2. John Hebeler, Matthew Fisher, Ryan Blace and Andrew Perez-Lopez, "Semantic Web Programming",Wiley, First Edition, 2009.
3. Guandong Xu ,Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", First Edition Springer, 2011.
4. Dion Goh and Schubert Foo, "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008. 3. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, "Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling", IGI Global Snippet, 2009.
5. John G. Breslin, Alexander Passant and Stefan Decker, "The Social Semantic Web", Springer, 2009

Reference Link

1. Burt, R. S. (1984). Network items and the General Social Survey. Social Networks 6, 293-340. **https://en.wikipedia.org/wiki/Social_Semantic_Web.**

Management Information Systems (MIS)
(Open Elective -IV)

Credits : 2.0 **External Marks : 70**
Course Code: 16OE3041 **Internal Marks : 30**

Course Objectives:

- To gain knowledge on formulation and implementation best practices on technology management policies by managers.
- To identify the crucial indicators related to process management and channels of technology flow for the development of the organization.
- To identify and implement the innovation factor in every process for enhancing cutting-edge performance by the organizations.
- To understand the usage of information systems in the functional areas of business.

Course Outcomes:

1. Students will able to adapt an experiential learning perspective in the stream of information technology.
2. Students will be able to act autonomously in planning, implementing and reflecting at a professional level, on the development and use of technology to address organizational problems.
3. Students will be able to augment analytical and reflective skills in decision making.
4. Students will be able to acquire knowledge of the functional areas of business and the interrelationships among the functional areas within a business.

Unit 1

Management Information Systems MIS -Management Information systems-Concept- Nature, Importance and Scope of MIS-Structure of MIS-MIS Classification- Types of Information-Dimensions of Information-Systems-Kinds of Systems

Reference: Management Information systems, Managerial Perspectives,2/e (2006) D.P. Goyal, Macmillan Publishers India Ltd. pp.3-13

Unit 2

Basics of Computer system: A computer System-Computer Hardware Classification-Computer Software- Database Management System- Types of Database Structures or Data Models-Advances in Database Technology.

Reference: Management Information systems, Managerial Perspectives,2/e (2006) D.P. Goyal, Macmillan Publishers India Ltd. pp.91-122

Unit 3

Telecommunications and Networks: Telecommunications-Types of Signals-communication Channel-Characteristics of Communication Channels-Communications Hardware-Communication Networks

Reference: Management Information systems, Managerial Perspectives,2/e (2006) D.P. Goyal, Macmillan Publishers India Ltd. pp.150-171

Unit 4

Decision Support Systems: Decision-Making and Decision-Support Systems-Decision-Making: A Concept-Simon's Model of Decision-Making-Types of Decisions-Methods for Choosing among Alternatives-Characteristics and Capabilities of DSS-Disaster Management-System Development Approaches-System Development Stages-System Development Approaches-Systems Analysis and Design Systems Analysis-Introduction-requirement Determination-Strategies for Requirement Determination- Structured Analysis Tools -Design Methods-Detailed System Design

Reference: Management Information systems, Managerial Perspectives,2/e (2006) D.P. Goyal, Macmillan Publishers India Ltd. pp. 202-217

Unit 5

Implementation, Maintenance, Evaluation and Security of IS: System Maintenance-Evaluation of MIS-IS Security-Information System Planning- The Nolan Stage Model-The four-Stage Model of IS Planning

Reference: Management Information systems, Managerial Perspectives,2/e (2006) D.P. Goyal, Macmillan Publishers India Ltd. pp. 320-345

Text Books:

1. Management Information systems, Managerial Perspectives, 4/e (2016), D.P. Goyal, Macmillan Publishers India Ltd.

References:

1. Management Information systems, 10/e (2010), James A. O'Brien, George M. Marakas, McGraw-Hill Education.
2. Management Information systems, 12/e (2011), Kenneth C. Laudon, Jane P. Laundon, Prentice Hall.

Web-References:

1. *Information Technology for Management* (Global Text Project edition, c2009), by Henry C. Lucas (PDF at Global Text Project)
2. *Information Systems Foundations: Constructing and Criticising* (2005), ed. by Dennis N. Hart and Shirley Diane Gregor (multiple formats with commentary at ANU E Press)
3. *Information Systems: A Manager's Guide to Harnessing Technology* (derived from Creative Commons licensed edition published by Flat World Knowledge, ca. 2010), by John Gallaugher (PDF at saylor.org)

Natural Disaster Management
(Open Elective -IV)

Credits : 2.0 **External Marks : 70**
Course Code: 16OE3042 **Internal Marks : 30**

Course Objectives

- To understand basic concepts, definitions and Terminologies used in Disaster Management.
- To Understand Types and Categories of Disasters and its Impact.
- To promote Prevention and Preparedness for disaster
- To undertake Mitigation & Risk Reduction steps
- To prioritize Rescue and Relief operation, Rehabilitation & Reconstruction

Course Outcomes

1. Application of Disaster Concepts to Management.
2. Ability to Categories Disasters.
3. Preparedness plans for disaster response.
4. Monitoring and evaluation plan for disaster response, Setting up of early warning systems for risk reductions

Unit I

Understanding Disaster: Meaning, nature, characteristics and types of Disasters, Causes and effects, Disaster-A Global View, Disaster Profile of India, The Disaster Management cycle.

Unit II

Natural Disasters: causes, distribution pattern, consequences and mitigation measures for Earthquake, Tsunami, Cyclone, Floods, Droughts, Landslides
Man Made Disasters: Forest Fires, Nuclear, Biological and Chemical disaster, Road Accidents

Unit III

Disaster Preparedness Introduction to disaster Preparedness, Concept & Nature, Disaster Preparedness Plan, Disaster Preparedness for People and Infrastructure, CommUnit y based Disaster Preparedness Plan. Roles & Responsibilities of Different Agencies and Government

Unit IV

Disaster Mitigation: Meaning and concept, Disaster Mitigation Strategies, Emerging Trends in Disaster Mitigation, Mitigation management, Role of Team and Coordination

Unit V

Rehabilitation, Reconstruction And Recovery : Reconstruction and Rehabilitation as Means of Development, Damage Assessment, Role of various Agencies in Disaster Management and Development, Development of Physical and Economic Infrastructure,

Education and Awareness, The Philosophy of Coping with Disasters, Dealing with Victims Psychology, Role of Various Agencies in Recovery Measures, Monitoring and Evaluation of Rehabilitation Work, Constraints in Monitoring and Evaluation, Long-term Counter Disaster Planning

Text Books:

1. Disaster Mitigation: Experiences And Reflections by PradeepSahni
2. Natural Hazards & Disasters by Donald Hyndman & David Hyndman - Cengage Learning

References:

1. R. B. Singh (Ed) Environmental Geography, Heritage Publishers New Delhi, 1990
2. Savinder Singh Environmental Geography, PrayagPustakBhawann 1997
3. Kates, B. I & White, G. F The Environment as Hazards, oxford, New York, 1978
4. R. B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000
5. H. K. Gupta (Ed) Disaster Management, Universities Press, India, 2003
6. R. B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo, 1994
7. Dr. Satender, Disaster Management in Hills, Concept Publishing Co., New Delhi, 2003
8. A. S. Arya Action Plan For Earthquake, Disaster, Mitigation in V. K. Sharma (Ed) Disaster 9. Management IIPA Publication New Delhi, 1994
9. R. K. Bhandani An overview on Natural &Man made Disaster & their Reduction, CSIR, New Delhi
10. M. C. Gupta Manuals on Natural Disaster Management in india, National Centre for Disaster Management, IIPA, New Delhi, 2001.

Special Machines
(Open Elective -IV)

Credits : 2.0 **External Marks: 70**
Course Code: 16OE3043 **Internal Marks: 30**

Course objectives:

To develop knowledge on Principles & operation, construction, performance, maintenance, testing and performance of special motors such as BLDC motors, stepper motors and electrical motor drives.

- Understand the concepts of switched reluctance motor.
- To understand the operation and performance of steeper motor
- To understand the operation and performance of Permanent magnet DC motor
- To understand the operation and performance of Permanent Magnet Brushless DC Motor
- To understand the operation and performance of Linear Motors
- To understand the operation and performance of Electric Motors for traction drives

Course Outcomes:

1. Students will demonstrate and ability to design the structure of Electrical drive system of BLDC motor.
2. Students will be able to explain the basic properties of magnetic materials as applied to electric machines.
3. Students will be able to design torque, speed and position controller of special electrical motor drives.
4. Students will be able to design open loop and closed loop control of Stepper motors and also compare the open loop and closed loop systems
5. Students will be able to describe the operation of motor drives to meet mechanical load requirements

Unit I

Switched Reluctance Motor : Switched Reluctance Motor Principle of operation – Design of stator and rotor pole arc – Power converter for switched reluctance motor – Control of switched reluctance motor.

Unit II

Stepper Motors: Stepper Motors Construction – Principle of operation – Theory of torque production – Hybrid stepping motor – Variable reluctance stepping motor – Open loop and closed loop control.

Unit III

Brushless DC motor: Permanent Magnet Brushless DC Motor Construction – Principle of operation – Theory of brushless DC motor as variable speed synchronous motor.

Unit IV

Linear induction motors Construction– principle of operation– application of Linear induction drive for traction

Permanent Magnet Motors

Construction – Principle of working – Torque equation and equivalent circuits, electrically commutated DC motor.

Unit V

Control of special machines Control of switched reluctance motor for fraction type load, Control of BLDC motor,rotor position sensing and switching logic for BLDC.

Electric Motors for traction drives

AC motors– DC motors –Single sided linear induction motor for traction drives – Comparison of AC and DC traction.

Text Books:

1. Special electrical Machines, K.VenkataRatnam, University press, 2009, New Delhi.
2. Brushless Permanent magnet and reluctance motor drives, Clarenden press, T.J.E. Miller, 1989, Oxford.
3. Special electrical machines, E.G.Janardhanan, PHI learning private limited,

Introduction to Automobile Engineering
(Open Elective -IV)

Credits : 2.0 **External Marks : 70**
Course Code: 16OE3044 **Internal Marks : 30**

Course Objectives:

- To provide broad knowledge about the engine, transmission, braking system, steering, suspension and electrical subsystems of an automobile.

Course Outcomes:

On completion of this course, students should be able to

1. Explain construction and operation of components of engine and its lubrication system.
2. Explain the operation of the components involved in both carburetor based.
3. Explain the working of components involved in the cooling system.
4. Explain mechanism of starting and charging electrical systems, and electrical accessories. Discuss construction and operation of transmission system components including clutch, gearbox.
5. Explain construction and operation of steering, suspension and braking system components.

Unit I

Introduction: Components of four wheeler automobile – Power transmission – Rear wheel drive, front wheel drive, 4 wheel drive – Types of automobile engines, Engine lubrication: Splash, Pressure lubrication systems, Oil filters, Oil pumps..

Unit II

Fuel System: S.I. Engine: Fuel supply systems, Mechanical and electrical fuel pump, fuel filters – Carburetor,

C.I. Engines: Requirements of diesel injection systems, Types of injection systems, Fuel pump, Injection timing,

Unit III

Cooling System: Cooling requirements, Air cooling, Liquid cooling – Thermo, Water and Forced Circulation System

Ignition System: Function of ignition system – Battery ignition system, Magneto coil ignition system and Electronic ignition system.

Unit IV

Electrical System: Charging circuit, Generator, Current regulator, Voltage regulator – Starting system, Lighting systems, Horn, Wiper, Engine temperature indicator.

Transmission System: Clutches, Fluid flywheel – Gear box, Types: Sliding mesh, Constant mesh, Synchro mesh and epicyclic

Unit V

Steering System: Types of steering mechanism : Ackerman, Davis – Steering gears.
Suspension System: Objects of suspension systems and Shock absorber
Braking System: Mechanical braking system and Hydraulic brake system:

Text Books:

1. Automotive Mechanics Vol-I&II, Kripal Singh, Standard Pub.
2. Automobile Engineering, William H Crouse, Donald L Anglin, McGraw Hill Pub.

References Books:

1. Automotive Technology: Principles, Diagnosis, and Service, James D. Halderman, Pearson Pub.
2. Automotive Mechanics, G.B.S. Narang, Khanna Pub.
3. Automotive Mechanics, Joseph Heitner, Van Nostrand Reinhold Pub.

Soft Computing
(Open Elective -IV)

Credits : 2.0 **External Marks: 70**
Subject Code: 16OE3047 **Internal Marks : 30**

Course Objective:

- To provide an understanding of the soft computing field
- To provide adequate knowledge about fuzzy set theory and Fuzzy Inference.
- To expose the ideas about genetic algorithm
- To provide adequate knowledge about feedback neural networks
- To become familiar with neural networks that can learn from available examples and
- Generalize to form appropriate rules for inference systems.

Course Outcomes:

Upon completion of the course, students should:

1. Demonstrate Fuzzy set theory
2. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems
3. Analyze the genetic algorithms and their applications
4. Design single and multi-layer feed-forward neural networks
5. Apply neural networks to pattern classification problems

Fuzzy Logic

Unit I

Fuzzy Set Theory: Basic Definition and Terminology, Set Theoretic Operations, Membership Function Formulation and Parameterization, MF of two dimensions.

Unit II

Fuzzy Rules and Fuzzy Reasoning: Extension Principles and Fuzzy Relations, Fuzzy IF THEN Rules, Fuzzy Reasoning. Fuzzy Inference System Introduction, Mamdani Fuzzy Models, Sugeno Fuzzy Models.

Optimization

Unit III

Derivative-free Optimization :Genetic Algorithms , Simulated Annealing ,Random Search

ARTIFICIAL NEURAL NETWORKS

Unit IV

Supervised Learning Neural Networks: Perceptron ,Adaline, Back propagation Multi layer Perceptron , Radial Basis Function Networks

Unit V

Unsupervised Learning Neural Networks : Competitive Learning Networks ,Kohonen Self-Organizing Networks

Learning Vector Quantization, Hebbian Learning, Principal Component Analysis.

Text Book

1. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2004.

References

1. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.
2. Davis E.Goldberg,"Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.
3. S. Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003.
4. R.Eberhart, P.Simpson and R.Dobbins, "Computational Intelligence - PC Tools", AP Professional, Boston, 1996.

Sensors and Transducers
(Open Elective -IV)

Credits : 2.0 **External Marks : 70**
Course Code: 16OE3048 **Internal Marks : 30**

Course Objectives:

- To introduce measurement system and classification and analysis of errors in measurement system.
- To introduces measurement of displacement and acceleration by using respective sensors.
- To introduces measurement of mechanical quantities by using mechanical sensors
- To introduces measurement of pressure, temperature and level by using respective sensors.
- To introduces measurement of flow humidity and moisture by using respective sensors

Course Outcomes:
On completion of this course, students should be able to

1. Define basic principles of measurement systems, and describe dynamic performance characteristics and sources of error..
2. Measures displacement and acceleration by using suitable transducers.
3. Measures various mechanical quantities using appropriate instruments.
4. Measures pressure, temperature, and level signals by using respective transducers
5. Measures flow, humidity, and moisture signals by using suitable transducers

Unit I
Instrument Characteristics: Introduction, static terms and characteristics, dynamic terms and characteristics, dynamic analysis of measurement systems, classification of errors

Unit II
Displacement Measurement: Resistive, inductive and capacitive transducers to measure linear and angular displacement.
Measurement Of Acceleration: principles of seismic instruments, seismic instrument based capacitive and inductive accelerometer and vibrometer.

Unit III
Force, Load, Torque And Speed Measurements: elastic force meters, strain gauge load cell, electrical and strain gauge torsion meters and stroboscope speed measurement.
Strain Measurement: Electrical resistance strain gauges, Gauge factor and measurement of tensile and compressive strains

Unit IV

Pressure Measurement: Thermal conductivity gauge, Ionization type pressure gauges, McLeod pressure gauge, Bourdon tubes, Bellows, Diaphragm gauges.

Temperature Measurement: Expansion, Resistive, Thermocouples, Pyrometers.

Level Measurement: Resistive, Inductive and Capacitive types.

.

Unit V

Flow Measurement: Rota meter, Turbine flow meter, Hot-wire anemometer, Magnetic flow meter, Ultrasonic flow meters

Humidity: Sling Psychomotor, Recording Type Psychomotor and Absorption Hygrometer.

Moisture: Dew point meter**.**

Text Books:

1. Measurement Systems: Application and Design, D.S. Kumar, S.K. Kataria & Sons Pub.
2. A Course in Electrical & Electronic Measurements and Instrumentation, A.K. Sawhney, Dhanpat Rai Pub.

References Books:

1. Measurement systems: Application and design, Earnest. O. Doeblin, Adaptation by Manik and Dhanesh, ata McGraw Hill Pub.
2. Mechanical and Industrial Measurements, R.K. Jain, Khanna Pub.
3. Control Systems Engineering, Norman S. Nise, Wiley Student Edition Pub.

Web Technologies Lab

Credits: 2.0 **External Marks: 50**
Course Code: 16CS3111 **Internal Marks: 25**

Course Objectives:

The main objectives of this course are

To make students to create a Complete Web technology solution through creating an online book Store website.

- Understand the importance of Java Script in creating a web Application
- Understand the importance of CSS in creating a web Application
- Creating Server Side Web Applications by using S e r v l e t s .
- Understanding the advantage of using JSP over Servlets in creating applications
- Creating Database connectivity Applications.

Course Outcomes:

The above exercise shall make the students competent in the following ways and will be able to learn following parameters at the end of the course.

1. Able to build a complete website using HTML ,
2. Able to include JavaScript for validations
3. Able to use XML to store and forwarding d a t a .
4. Able to develop Web applications by using JSP with More Productivity
5. Able to develop database applications
6. Able to create a complete Web Application with all the required modules.

Lab Experiments:

1. **Design the following static web pages required for an online book store web site.**

- **HOME PAGE:**

The static home page must contain three divisions(using div tag & styles).

Top division : Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).

Left division: At least four links for navigation, which will display the catalogue of respective links.For e.g.: When you click the link “CSE” the catalogue for CSE Books should be displayed in the Right frame.

Right division: The pages to the links in the left frame must be loaded here. Initially this page contains description of the web site.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE IT MCA ECE	Description of the Web Site			

2) Login page

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE IT MCA ECE	Login : Password:			
	Submit	Reset		

3. REGISTRATION PAGE:

Create a "registration form "with the following fields

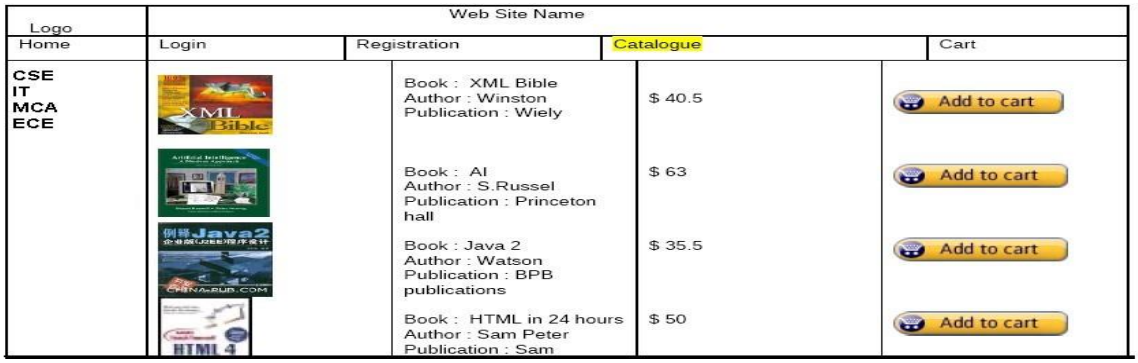
- Name (Text field)
- Password (password field)
- E-mail id (email field)
- Phone number (text field)
- Sex (radio button)
- Date of birth (3 select boxes)
- Languages known (check boxes – English, Telugu, Hindi, Tamil)
- Address (text area)

4) CATOLOGUE PAGE:

The catalogue page should contain the details of all the books available in the web site in a table.

The details should contain the following:

Snap shot of Cover Page.
Author Name.
Publisher.
Price.
Add to cart button.



5. VALIDATIONS:

Write JavaScript to validate the following fields of the above registration page.

i) Name (Name should contains alphabets and the length should not be less than 6 characters).
ii) Password (Password should not be less than 6 characters length).
iii) E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com)
iv) Phone number (Phone number should contain 10 digits only). Note : You can also validate the login page with these parameters.

6. CSS

Design a web page using CSS (Cascading Style Sheets) which includes the following:
1) Use different font, styles:
In the style definition you define how each selector should work (font, color etc.). Then, in the body of your pages, you refer to these selectors to activate the styles

7. Write an XML file which will display the Book information which includes the following:

i) Title of the book
ii) Author Name
iii) ISBN number
iv) Publisher name
v) Edition
vi) Price

Write a Document Type Definition (DTD) to validate the above XML file.

8. Install TOMCAT web server.

While installation assign port number 4040 to TOMCAT.
Access the above developed static web pages for books web site, using this server by putting the web pages developed in experiment-1 and experiment-2 in the document root. Access the pages by using the url : http://localhost:4040/online/books.html (for tomcat)

9. Write servlet program to read parameters from web.xml
10. Write a servlet program using cookie management
11. Write servlet program to illustrate HttpSession
12. Create tables in the database which contain the details of items (books in our case like Book name , Price, Quantity, Amount) of each category. Modify your catalogue page in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using JDBC.

Text Books:

1. Web Technologies Black Book, Kogent Learning Solutions Inc, Dreamtech Press

Reference Books:

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech
2. The complete Reference Java 2 Fifth Edition by Patrick Naughton and Herbert Schildt. TMH
3. Java Server Pages –Hans Bergsten, SPD O'Reilly 2. Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia.

Reference Links:

1. https://www.mooc-list.com/course/introduction-web-development-coursera
2. https://www.edx.org/course/introduction-html-javascript-microsoft-dev211-1x-0
3. http://infolab.stanford.edu/~ullman/fcdb/oracle/or-web.html

Compiler Design Lab

Credits : 1.5 **External Marks : 50**
Course Code: 16CS3112 **Internal Marks : 25**

Course Objectives:

The course aims are:

- To introduce the major concept areas of language translation and compiler design.
- To enrich the knowledge in various phases of compiler ant its use, code optimization techniques, machine code generation, and use of symbol table.
- To extend the knowledge of parser by parsing LL parser and LR parser.
- To provide practical programming skills necessary for constructing a compiler.

Course Outcome

1. To apply the knowledge of lex tool & yacc tool to devleop a scanner & parser.
2. To design & conduct experiments for Intermediate Code Generation in compiler.
3. To deal with different translators.
4. To develop program to solve complex problems in compiler
5. To learn the new code optimization techniques to improve the performance of a program in terms of speed & space.
6. To learn & use the new tools and technologies used for designing a compiler

List of Experiments:

1. Write a program to find the number of characters, words, digits, lines form the given input.
2. Design a Lexical analyzer. The lexical analyzer should ignore redundant spaces, tabs and newlines. It should also ignore comments.
3. Implement the lexical analyzer using either JLex, flex or lex or other lexical analyzer generating tools.
4. Write a program to compute FIRST function for the given grammar.
5. Write a program to compute FOLLOW function for the given grammar.
6. Write a program to implement a predictive parser.
7. Design LALR Bottom up Parser.
8. Convert the BNF rules into Yacc form and write code to generate abstract syntax tree.
9. Write program to generate machine code from the abstract syntax tree generated by the parser.

Text Books:

1. Alfred Aho, Ravi Sethi, Jeffrey D Ullman, “Compilers Principles, Techniques and tools”, Pearson Education Asia, 2003

Reference Books:

1. Allen I. Houlb “Compiler Design in C”, Prentice Hall of India, 2003
2. C. N. Fischer and R.J. LeBalnc, “Crafitng a compiler with C ”, benjamin Cummings, 2003
3. J.P.Bennet,”Introduction to Compiler Techniques”, Second Edition, Tata Mcgraw- Hills,2003

Software Testing and Case Tools Lab

Credits : 1.5 **External Marks: 50**
Course Code: 16CS3113 **Internal Marks: 25**

Course Objectives:

- Various test procesess and continuous quality improvement
- Methods of test generation from requirements
- Combinatorial test generation
- Test adequacy assessment using: control flow, data flow, and program mutations
- The use of various test tools

Course Outcome

1. Learn the procedure for Functional Testing
2. Learn to generate and run Test Scripts repeatedly for Regression Testing, Retesting.
3. Learn to check the behavior of Test Scripts
4. Know to test Web application for no. of links, no. of images, load time, web buttons etc.
5. Learn to write own Test cases and do Manual Testing

Lab Experiments

1. Write Test cases for Gmail Login Form
2. Independent Test cases for AITAM college website
3. Study of any web testing tool (e.g. selenium)
4. Record and Replay
5. Write and test a program to login a specific web page. Write and test a program to login a specific web page.
6. Conduct a test suite for any two web sites.
7. Selenium Tests with Microsoft Excel
8. Write and test a program to update 10 student records into table into Excel file
9. Write and test a program to provide total number of objects present available on the page .
10. Draw the flow Graph for Binary Search routine

Text Book:

1. Selenium Testing Tools Cookbook by Unmesh Gundecha

Reference Books:

1. https://www.packtpub.com/sites/default/files/downloads/Integration_with_Other_Tools.pdf
2. https://www.packtpub.com/sites/default/files/downloads/Distributed_Testing_with_Selenium_Grid.pdf

Intellectual Property Rights and Patent

Credits : 0.0
Course Code: 16HS3202

Course objective:

- To study the basics of intellectual property law.
- To acquire knowledge on copy right law and other formalities related to it.
- To explore knowledge on patent law and cyber law.
- To become familiar about trade mark law.
- To provide knowledge on different aspects of trade secrets.

Course outcomes:

1. Able to **study** basics of intellectual Property Law.
2. Able to **describe** copy right law and other formalities.
3. Able to **analyze** patent and cyber law.
4. Able to **explain** trade mark law.
5. Able to **summarize** different aspects of trade secrets.

Unit I

Basics of Intellectual Property Law: Introduction to Intellectual Property Law; Evolutionary past; Intellectual Property Law Basics; Types of Intellectual Property; Innovations and Inventions of Trade related Intellectual Property Rights; Agencies Responsible for Intellectual Property Registration; Infringements; Over use or Misuse of Intellectual Property Rights; and Compliance and Liability Issues.

Unit II

Copyright Law and Infringements: Introduction to Copyrights; Principles of Copyright; Subject Matters of Copyright; Rights Afforded by Copyright Law; Copyright Ownership; Transfer and Duration; Right to Prepare Derivative Works; Rights of Distribution; Rights of performers; Copyright Formalities and Registration; Limitations; Infringement of Copyright; International Copyright Law; and Semiconductor Chip Protection Act.

Unit III

Fundamentals of Patent and Cyber Law: Introduction to Patent Law; Rights and Limitations; Rights under Patent Law; Patent Requirements; Ownership and Transfer; Patent Application Process and Granting of Patent; Patent Infringement and Litigation; International Patent Law; Double Patenting; Patent Searching; Patent Cooperation Treaty; and New developments in Patent Law.

Introduction to Cyber Law; Information Technology Act; and Cyber Crime and E-commerce.

Unit IV

Trade Mark Law: Introduction to Trade Mark; Trade Mark Registration Process; Post registration procedures; Trade Mark maintenance; Transfer of rights; Inter parties Proceedings; Infringement; Dilution of Ownership of Trade Mark; Likelihood of confusion; Trade Mark claims; Trade Marks Litigation; and International Trade Mark Law.

Unit V

Principles of Trade Secrets: Introduction to Trade Secrets; Maintaining Trade Secret; Physical Security; Employee Access Limitation; Confidentiality Agreement; Trade Secret Law; Unfair Competition; Trade Secret Litigation; Breach of Contract; and Application of State Law.

Text Books:

1. Deborah E. Bouchoux: “Intellectual Property”. Cengage learning, New Delhi
2. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications

Reference Books:

1. Prabhuddha Ganguli: ‘Intellectual Property Rights” Tata Mc-Graw –Hill, New Delhi
2. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
3. R. Radha Krishnan, S. Balasubramanian: "Intellectual PropertyRights", Excel Books. New Delhi.
4. P Narayanan, Intellectual Property Law, Eastern Law House; Third Edition (2013)