File Ref.No.220483/GA - IV - E1/2018/Admn

UNIVERSITY OF CALICUT

Abstract

General and Academic Branch - Faculty of Engineering - B.Tech Information Technology (IT) programme - OBE based Curriculum (I to VIII) and Syllabus of first to eighth semester w.e.f 2019 Admn on wards -Approved by the Academic Council - Implemented - Orders issued.

G & A - IV - E

U.O.No. 9101/2022/Admn Dated, Calicut University.P.O, 25.04.2022

Read:-1. U.O.No.7631/2021/Admn dated 05.08.2021.

2. Item no. 5 of the minutes of the Board of Studies in Computer Engineering and IT held on 04..02.2022.

3. Item no. 2 of the minutes of the meeting of the Faculty of Engineering held on 26.02.2022.

4. Item No.II A in the minutes of the LXXXIII meeting of Academic Council, held on 30.03.2022.

5. Orders of the Vice-chancellor in the file No.220365/GA-IV-E1/2019/admn dated:07.04.2022

ORDER

1. The OBE based curriculum (I to VIII semester) and syllabus of Information Technology up to 6th semester, with effect from 2019 admission on wards was implemented vide paper read (1) above.
2. The meeting of the Board of Studies in Computer Engineering and IT held on 04.02.2022, vide paper read (2) above, approved the B.Tech Syllabus of 7th and 8th semester Information Technology (2019 scheme)
3. The Faculty of Engineering held on 26.02.2022 approved the Syllabus of Information Technology from (S7-S8), as per paper read (3) above.
4. The Minutes of the meeting of the Faculty of Engineering has been approved by the LXXXIII meeting of Academic Council, vide paper read (4) above,and the Vice Chancellor has ordered to implement the same, vide paper read (5) above
5. Orders are issued accordingly. (Curriculum (I to VIII semester) and Syllabus of Information Technology up to 8th semester- w.e.f 2019 Admission onwards appended)

Arsad M

Assistant Registrar

To

1. The Principal, CUIET.
2. The Controller of Examinations

Copy to:PA to VC/PA to Registrar/PA to CE/DR, B.Tech/EX & EG sections/ GA I F/SF/DF/FC

Forwarded / By Order

UNIVERSITY OF CALICUT

CURRICULUM

(1 TO 8 SEMESTERS)

&

SYLLABUS

B. Tech. – Information Technology

(2019 SCHEME)

(Applicable to 2019 admission onwards)

B. TECH INFORMATION TECHNOLOGY CURRICULUM

1st to 8th SEMESTERS

Every course of B. Tech. Program shall be placed in one of the ten categories as listed in table below.

Sl. No	Category	Credits
1	Humanities and Social Sciences including Management courses	3
2	Basic Science courses	24
3	Engineering Science Courses	14
4	Program Core Courses	79
5	Program Elective Courses	15
6	Open Elective Courses	3
7	Internship, Seminar, Project Work and Course-Viva	16
8	Mandatory Non-credit Courses	-----
9	Practical Sessions	15
10	Mandatory Student Activities	1
	Total Mandatory Credits	170
11	Value Added Course (Optional)	20

Semester-wise credit distribution shall be as below:

Sem	1	2	3	4	5	6	7	8	Total
Credits	19	19	20	20	22	22	23	24	169
Activity Points	50/ 25*				50				100/ 75*
Credits for Activity	1								1
Grand Total									170

***applicable for Lateral Entry (LE) students.**

BASIC SCIENCE COURSES: Math, Physics, Chemistry, Biology for Engineers, Life Science etc.

ENGINEERING SCIENCE COURSES: Basic Electrical, Basic Electronics, Engineering Graphics, Programming, Basic Printing, Basic Civil, Engineering Mechanics, Workshops etc.

HUMANITIES AND SOCIAL SCIENCES INCLUDING MANAGEMENT COURSES: English, Humanities, Management, Finance & Accounting, Economics etc.

MANDATORY NON-CREDIT COURSES: Environmental Science, Constitution of India, Life Skills & Ethics for Engineers, Communicative English, and Concept based Engineering. There will be only internal evaluation of non-credit courses, and no University examinations will be conducted. A minimum 50% internal mark is to be obtained for securing a pass in these subjects. A student has to pass the exam within 4 chances, failing which the student has to undergo course repeat for the subject.

VALUE ADDED COURSE: Students can attend various value-added MOOC (Massive Open Online Courses) like NPTEL courses conducted by nationally or internationally reputed institutions with in India offered by institutions like IIT, IIST etc., or abroad (from foreign universities) and earn a maximum of 20 additional credits for getting 'Honours' degree in the discipline with a condition that he/she should have secured an aggregate of 8.0 CGPA up till final semester without any history of backlogs. Thus, the candidate can earn a maximum of 190 credits during his/her period of study up to 8th semester. The selected course can be from the same discipline or in any other relevant discipline pertaining to engineering/management/social science. 4 credits will be awarded to a student on successful completion of each MOOC. Thus, a student will be eligible to get an undergraduate degree with 'Honours' when he/she successfully earns an additional requirement of 20 credits through the successful completion of 5 MOOCs.

Successful completion of a MOOC is considered only when a student scores a minimum score of 60 (or equivalent to 60%) and above in the respective course. The additional value-added MOOC courses can be of 8 to 12 weeks duration. Each student who wishes to do a MOOC should get prior permission from the respective Head of the Department, before registering for the same with the institution which is hosting the course. The Head of the Department should verify the details of the course and ensure that the course content is relevant to his/her discipline before giving the approval. The details of MOOC courses undertaken by a student (if any) and the credits earned must be consolidated by the Tutor, forwarded by HoD and approved by the Principal. The same has to be entered in the University portal by the college officials before the commencement of every end semester university examination.

HONOURS: -

Calicut University is providing this option for academically extra brilliant students to acquire Honours. Honours is an additional credential a student may earn if she/he opts for the extra 20 credits needed for this in her/his own discipline with a condition that he/she should not have failed in any of the subjects till final semester and have secured an aggregate of 8.0 CGPA up till final semester. Honours is not indicative of class. Honours is intended for a student to gain expertise/specialize in an area inside his/her major B-Tech discipline to enrich knowledge in emerging/advanced areas in the branch of engineering concerned and interdisciplinary areas including management. However, the additional credits thus far earned by the student shall be included in the grade card but shall not be considered in calculating the CGPA. Upon completion of Honours, a student will be better equipped to perform research in her/his branch of engineering and allied sectors. On successful achievement of 20 credits from the honours and 170 credits from their respective B-tech syllabus, the student will earn a total credit of 190 at the end of the programme which he/she will be eligible to get the Degree Certificate as "Bachelor of Technology in Information Technology, with Honours."

The details of the students eligible for conferring the Honours Degree must be sent to the university by the principal, with the details of his marks up to seventh semester and the number of value-added courses and credits earned before the commencement of the 8th semester university examination.

COURSE CODE AND COURSE NUMBER:

Each course is denoted by a unique code consisting of two alphabets followed by two numerals like IT19 807 (P)**.** The first two letter code refers to the department offering the course. IT stands for Information Technology. The

second two digits represent the year in which the syllabus is implemented, thus the digit 19 represents the year 2019. Out of the next three digits, the first digit represents the semester in which the subject belongs, Eg. In 807, 8 means 8th semester and 07 is the 7th subject in that semester. The last alphabet represents whether the subject belongs to the Practical or laboratory category. Eg. (P) Means the subject belongs to the Practical category.

L-T-P-STRUCTURE: -

Notations	Description
L	Lecture hours- For theory-based courses hours are represented in this form Eg 3-0-0, means 3-hour lecture per week is dedicated for this subject
T	Tutorial hours- These hours may be assigned for solving numerical problems and allied activities. Eg. 3-1-0, means 1 hour per week is dedicated for this purpose.
P	Practical/ Drawing/Interactive session/Visits etc- These hours may be dedicated for conducting laboratory sessions, practical classes, Engineering/machine drawing classes, interactive sessions, group discussions and even industrial visits pertaining to a specific subject for better learning. Eg.0-0-1 means 1 hour per week is dedicated for the above-mentioned purpose.

Description
Theory based courses (other the lecture hours, these courses can have tutorial and practical hours, e.g., L-T-P structures 3-0-0, 3-1-2, 3-0-2 etc.)
Laboratory based courses (where performance is evaluated primarily on the basis of practical or laboratory work with LTP structures like 0-0-3, 1-0-3, 0-1-3 etc.)

DEPARTMENTS: -

Each course is offered by a Department and their two-letter course prefix is given in Table

Departments and their codes

Sl.No	Department	Course Prefix
01	Electrical & Electronics Engineering	EE
02	Electronics & Communication Engineering	EC
03	Information Technology	IT
04	Mechanical Engineering	ME
05	Printing Technology	PT

INDUCTION PROGRAM

A mandatory induction program for first semester students is designed for three weeks. This unique three-week immersion foundation programme designed especially for the fresher's, includes a wide range of activities right

from workshops, lectures and seminars by eminent people, visits to local areas, familiarization to branch, department and innovations, physical activity, yoga, literacy, sports tournaments, social work and much more. The programme is designed to mould students into well-rounded individuals, aware and sensitized to local and global conditions and foster their creativity, improve their level of confidence, to involve with the existing environment, inculcate values and ethics, and help students to discover their passion. Foundation Programme also serves as a platform for the fresher's to interact with their batch mates, faculty and seniors and start working as a team with them. The program is structured around the following four themes:

The programme is designed to attain the following objectives:

- **Values and Ethics**: Focus on fostering a strong sense of ethical judgment and moral fortitude.
- **Creativity**: Provide channels to exhibit and develop individual creativity by expressing themselves through art, craft, music, singing, media, dramatics, and other creative designs/activities.
- **Leadership, Communication and Teamwork**: Develop a culture of teamwork and group communication.
- **Social Awareness**: Nurture a deeper understanding of the existing local and global environment and our role in that place as a responsible citizen of the world.

SUBJECTS AND GROUPS IN 1st and 2nd SEMESTER			
GROUP	**SUBJECT CODE**	**SUBJECT NAME**	**COMP/OPT**
A	MA19 100	Calculus and Linear Algebra	COMP FOR SEM1
	MA19 200	Differential Equations and Vector Calculus	COMP FOR SEM 2
B	CH19 100	Engineering Chemistry	OPT (1/2) IN BOTH SEMESTERS
	PH19 100	Engineering Physics	
C	GS19 100	Engineering. Graphics	OPT (1/2) IN BOTH SEMESTERS
	EM19 100	Engineering Mechanics	
D	EC19 100	Concepts of Electronics Engineering	COMP FOR EC IN SEM 1
	EE19 100	Concepts of Electrical Engineering	COMP FOR EE IN SEM 1
	ME19 100	Concepts of Mechanical Engineering	COMP FOR ME IN SEM 1
	IT19 100	Introduction to Computing and Problem Solving	COMP FOR IT IN SEM 1
	PT19 100	Concepts of Printing Technology	COMP FOR PT IN SEM 1
E*	EC19 101	Basics of Electronics Engineering	OPT (1/4) FOR SEM1 & OPT (2/4) FOR SEM 2- RELEVANT SUBJECTS
	EE19 101	Basics of Electrical Engineering	
	CE19 101	Basics of Civil Engineering	
	ME19 101	Basics of Mechanical Engineering	
F	ES19 100	Environmental Science	COMP FOR SEM 1
	DE19 200	Concept Based Engineering	COMP FOR SEM 2
G	CH19 100(P)	Engineering Chemistry Lab	OPT (1/2) IN BOTH SEMESTERS
	PH19 100(P)	Engineering Physics Lab	
H**	EE19 100(P)	Electrical Engineering Workshop	OPT (2/4) IN BOTH SEMESTERS
	EC19 100(P)	Electronics Engineering Workshop	
	CE19 100(P)	Civil Engineering Workshop	
	ME19 100(P)	Mechanical Engineering Workshop	
	IT19 100(P)	Introduction to Computing and Problem Solving Lab	
	PT19 100 (P)	Printing Technology Workshop	
I	CM19 100	Communicative English	COMP FOR SEM 1
	LL19 200	Language Lab	COMP FOR SEM2

COMP- COMPULSORY SUBJECT;

OPT – OPTIONAL SUBJECT

* Concerned branches have to avoid choosing Basic of Engineering (E) ie., Mechanical Engineering students are not permitted to choose Basics of Mechanical Engineering and same is applicable for other branches also.

** EE19 100(P), EC19 100(P), ME19 100(P), IT19 100 (P), PT19 100 (P) are COMPULSORY for respective branches in SEMESTER 1.

SCHEME OF 1ST SEMESTER B.Tech INFORMATION TECHNOLOGY COURSE

Subject code	Subject Name	HOURS			MARKS		Duration of End Semester Examination	Credits
		L	T	P	Internal	End Semester		
MA19 100	Calculus and Linear Algebra	3	1	0	50	100	3	4
PH19 100/CH19 100	Engineering Physics/ Engineering Chemistry	3	1	0	50	100	3	4
GS19 100/ EM19 100	Engineering Graphics/	3	0	2	50	100	3	4
	Engineering Mechanics	3	2	0				
IT19 100	Introduction to Computing and Problem Solving	2	1	0	50	100	3	2
CE19 101/ EC19 101/ EE19 101	Basics of Civil Engineering/ Basics of Electronics Engineering /Basics of Electrical Engineering	2	1	0	50	100	3	2
ES19 100	Environmental Science	2	0	1	100	-	-	0
CM19 100	Communicative English	2	0	0	100	-	-	0
PH19 100(P) /CH19 100(P)	Engineering Physics Lab/ Engineering Chemistry Lab	0	0	2	100	-	-	1
EC19 100(P)/ EE19 100(P)/ CE19 100 (P)	Electronics Engineering Workshop /Electrical Engineering	0	0	2	100	-	-	1

	Workshop / Civil Engineering Workshop							
IT19 100 (P)	Introduction to Computing and Problem Solving Lab	0	0	2	100	-	-	1
	TOTAL	**30**			**750**	**500**		**19**

COMMUNICATIVE ENGLISH

Objective is to develop in the under-graduate students of engineering a level of competence in English required for independent and effective communication for their professional needs. Coverage: Listening, Barriers to listening, Steps to overcome them, Purposive listening practice, Use of technology in the professional world. Speaking, Fluency & accuracy in speech, Positive thinking, improving self-expression, Tonal variations, Group discussion practice, Reading, Speed reading practice, Use of extensive readers, Analytical and critical reading practice, Writing Professional Correspondence, Formal and informal letters, Tone in formal writing, Introduction to reports. Study Skills, Use of dictionary, thesaurus etc., Importance of contents page, cover & back pages, Bibliography, Language Lab.

SCHEME OF 2nd SEMESTER B.Tech INFORMATION TECHNOLOGY COURSE

Subject code	Subject Name	HOURS			MARKS		Duration of End Semester Examination	Credits
		L	T	P	Internal	End Semester		
MA19 200	Differential Equations And Vector Calculus	3	1	0	50	100	3	4
PH19 100/ CH19 100	Engineering Physics / Engineering Chemistry	3	1	0	50	100	3	4
EM19 100/ GS19100	Engineering Mechanics/	3	2	0	50	100	3	4
	Engineering Graphics	3	0	2				
CE19101/ EE19 101	Basics of Civil Engineering /Basics of Electrical Engineering	2	1	0	50	100	3	2
EC19 101	Basics of Electronics Engineering	2	1	0	50	100	3	2
DE19 200	Concept Based Engineering (Design engineering)	2	0	1	100	-	-	0
LL19 200	Language Lab	0	0	2	100	-	-	0
PH19 100(P)/ CH19 100(P)	Engineering Physics Lab/ Engineering Chemistry Lab	0	0	2	100	-	-	1
EE19 100(P)/ CE19 100(P)	Electrical Engineering Workshop /Civil Engineering Workshop	0	0	2	100	-	-	1
EC19 100 (P)	Electronics Engineering Workshop	0	0	2	100	-	-	1
	TOTAL	**30**			**750**	**500**		**19**

SCHEME OF 3rd SEMESTER B.Tech INFORMATION TECHNOLOGY COURSE

Code	Subject	Hours/Week			Marks		Duration of Semester End examination	Credits
		L	T	P	Internal	End Semester		
EN19 301	Engineering Mathematics III	3	1	0	50	100	3	4
EN19 302	Discrete Computational Structures	3	1	0	50	100	3	3
IT19 303	Programming in C	3	1	0	50	100	3	3
IT19 304	Computer Organization & Design	3	1	0	50	100	3	4
IT19 305	Switching Theory & Logic Design	3	1	0	50	100	3	4
EN19 306	Life Skills and Ethics for Engineers	2	0	2	100	-	-	0
IT19 307(P)	Programming in C Lab	0	0	3	50	100	3	1
IT19 308(P)	Digital Electronics Lab	0	0	3	50	100	3	1
	TOTAL	**17**	**5**	**8**	**450**	**700**	**21**	**20**
		30						

LIFE SKILLS& ETHICS FOR ENGINEERS

Life skills are those competencies that provide the means for an individual to be resourceful and positive while taking on life's vicissitudes. Development of one's personality by being aware of the self, connecting with others, reflecting on the abstract and the concrete, leading and generating change, and staying rooted in time-tested values and principles is being aimed at. This course is designed to enhance the employability and maximize the potential of the students by introducing them to the principles that underlie personal and professional success, and help them acquire the skills needed to apply these principles in their lives and careers. Professional ethics is highly needed for an engineer. This course will focus on to improvise the ethical quality of an engineer to meet the changing demands and requirements of the society.

SCHEME OF 4th SEMESTER B.Tech INFORMATION TECHNOLOGY COURSE

Code	Subject	Hours/Week			Marks		Duration of Semester End examination	Credits
		L	T	P	Internal	End Semester		
EN19 401	Engineering Mathematics IV	3	1	0	50	100	3	4
IT19 402	Digital Data Communication	3	1	0	50	100	3	3
IT19 403	Data Structures and Algorithms	3	1	0	50	100	3	3
IT19 404	Operating Systems	3	1	0	50	100	3	4
IT19 405	Object Oriented Programming using Java	3	1	0	50	100	3	4
EN19 406	Constitution of India	2	0	2	100	-	-	0
IT19 407(P)	Data structures Lab	0	0	3	50	100	3	1
IT19 408(P)	Object Oriented Programming Lab using Java	0	0	3	50	100	3	1
	TOTAL	**17**	**5**	**8**	**450**	**700**	**21**	**20**
		30						

SCHEME OF 5th SEMESTER B.Tech INFORMATION TECHNOLOGY COURSE

Code	Subject	Hours/Week			Marks		Duration of Semester End examination	Credits
		L	T	P	Internal	End Semester		
EN19 501	Engineering Economics and Principles of Management	3	1	0	50	100	3	3
IT19 502	Signals and Systems	3	1	0	50	100	3	3
IT19 503	Database Management Systems	3	1	0	50	100	3	4
IT19 504	Theory of Computation	3	1	0	50	100	3	4
IT19 505	Software Engineering	3	1	0	50	100	3	3
IT19 506	Program Elective I	3	1	0	50	100	3	3
IT19 507(P)	Database Management Systems Lab	0	0	3	50	100	3	1
IT19 508(P)	Operating Systems Lab	0	0	3	50	100	3	1
	TOTAL	**18**	**6**	**6**	**400**	**800**	**24**	**22**
		30						

PROGRAM ELECTIVE I	
IT19 506(A)	Web and Internet Technology
IT19 506(B)	Advanced Data structures
IT19 506(C)	Information Theory and Coding
IT19 506 (D)	Queuing Theory & Modelling
IT19 506(E)	Logic for Computer Science
IT19 506(F)	Distributed Systems

SCHEME OF 6th SEMESTER B.Tech INFORMATION TECHNOLOGY COURSE

Code	Subject	Hours/Week			Marks		Duration of Semester End examination	Credits
		L	T	P	Internal	End Semester		
IT19 601	Compiler Design	3	1	0	50	100	3	4
IT19 602	Computer Networks	3	1	0	50	100	3	4
IT19 603	Microprocessors	3	1	0	50	100	3	3
IT19 604	Data mining	3	1	0	50	100	3	3
IT19 605	Program Elective II	3	1	0	50	100	3	3
IT19 606	Open Elective I	3	1	0	50	100	3	3
IT19 607(P)	Microprocessors Lab	0	0	3	50	100	3	1
IT19 608(P)	Mini Project	0	0	3	100	-	-	1
	TOTAL	**18**	**6**	**6**	**450**	**700**	**21**	**22**
		30						

*** Submission of report for internship done during the break of semester 6 can be done during the start of semester 7.**

PROGRAM ELECTIVE II	
IT19 605 (A)	Human Computer Interaction
IT19 605 (B)	Soft Computing
IT19 605 (C)	Embedded Systems
IT19 605 (D)	Graph Theory
IT19 605 (E)	Web Programming
IT19 605 (F)	Advanced Database Management Systems

OPEN ELECTIVE I	
IT19 606(A)	Cyber Law & Ethics
IT19 606(B)	Data Visualization
IT19 606(C)	Internet of Things
IT19 606(D)	Operational Research
IT19 606(E)	Management Information Systems
IT19 606(F)	Object Oriented Modeling and Design

OPEN ELECTIVE:

These elective subjects are open to all students of various engineering disciplines. Any student can opt an elective subject based on his/her interest. These elective topics are of general in nature and focused on thrust areas. The number of students that can be accommodated in an elective is limited to 50, the allotment can be on first come first

serve basis.

SCHEME OF 7th SEMESTER B.Tech INFORMATION TECHNOLOGY COURSE

Code	Subject	Hours/Week			Marks		Duration of Semester End examination	Credits
		L	T	P	Internal	End Semester		
IT19 701	Design & Analysis of Algorithms	3	1	0	50	100	3	4
IT19 702	Computer Graphics & Multimedia	3	1	0	50	100	3	4
IT19 703	Artificial Intelligence	3	1	0	50	100	3	3
IT19 704	Cloud Computing	3	1	0	50	100	3	3
IT19 705	Program Elective III	3	1	0	50	100	3	3
IT19 706(P)	Compiler Design Lab	0	0	3	50	100	3	1
IT19 707(P)	Networks Lab	0	0	3	50	100	3	1
IT19 708(P)	Project Phase I	0	0	4	100	-	-	3
*IT19 709(P)	Internship	0	0	0	100	-	-	1
	TOTAL	**15**	**5**	**10**	**550**	**700**	**21**	**23**
		30						

PROGRAM ELECTIVE III	
IT19 705 (A)	Machine Learning
IT19 705 (B)	Stochastic Processes
IT19 705 (C)	Ad-Hoc and Sensor Networks
IT19 705 (D)	Mobile Communication
IT19 705 (E)	Computational Complexity
IT19 705 (F)	Digital Signal Processing

*** Submission of report for internship done during the break of semester 6 can be done during the start of semester 7.**

INTERNSHIP

Students need to undergo a minimum of 10-15 days internship in an Industry/Firm which relates to their field of study. The Internship should give exposure to the practical aspects of day-to-day industrial works. In addition, the student may also work on a specified task or project which may be assigned to him/her. The students will have an opportunity to develop observational skills, develop confidence to identify and understand the issues related with machines/systems and come up with solutions to rectify the same. This motive of the programme is ultimately focused on the mutual benefit to the students, industry and society. The outcome of the internship should be presented in the form of a report.

Total marks: 100, minimum marks required to pass the internship is 50, split-up of the marks are as follows

Attendance	: 10
Coordinator	: 20
Technical Content of the Report	: 30
Presentation	: 40

PROJECT PHASE I:

A Project topic must be selected either from research literature or the students themselves may propose suitable topics in consultation with their guides. The guides may encourage socially relevant project which can be interdisciplinary in nature.

Faculty members and students can interact with members of the local body, practicing engineers, industry and research institutions, to identify the issues which are predominant in that area/state and needs immediate attention. Such issues may be categorized and converted into a research problem so that they can study the feasibility of doing a research project in that area. This method of addressing the problems of society will enhance the culture and social concern of the students. This initiative can produce engineers with social commitment.

The objective of project work is to enable the student to take up investigative study in the broad field which can be of interdisciplinary in nature, either fully theoretical/simulation/practical or involving both theoretical and practical work. The department can assign a group of four students, under the guidance of a faculty to do the project work. Thus the assigned faculty can constantly interact with these students and mentor them properly to gain confidence in taking up a research work and supporting them for making it a reality. This initiative is expected to provide a good base for the student(s) in taking up a research & development project.

Faculty along with students in the Institutions/departments can apply for project grants with research organizations like Kerala State Council for Science Technology and Environment (KSCSTE) for doing projects. Faculty/students can also approach Agricultural, Veterinary, Fisheries, and Health Sciences Universities for doing projects in a variety of fields where they require technical support from the engineering sector. These types of funded research projects will improve the creativity and outlook of the students which will be beneficial to the society.

The assignment to normally include:

- Survey and study of published literature on the assigned topic;
- Preparing an Action Plan for conducting the investigation, including team work;
- Working out a preliminary Approach to the Problem relating to the assigned topic;
- Block level design documentation;
- Conducting preliminary Analysis/ Modelling/ Simulation/ Experiment/ Design/ Feasibility;
- Preparing a Written Report on the Study conducted for presentation to the department;
- Final seminar, as oral presentation before the evaluation committee.

Total marks: 100, minimum marks required to get a pass is 50, Mark distribution is as follows

Project Guide	: 30
Interim evaluation by the evaluation committee	: 20
Final presentation	: 30
Report evaluation by the evaluation committee	: 20

SCHEME OF 8th SEMESTER B.Tech INFORMATION TECHNOLOGY COURSE

Code	Subject	Hours/Week			Marks		Duration of Semester End examination	Credits
		L	T	P	Internal	End Semester		
IT19 801	Cryptography and Network Security	3	1	0	50	100	3	4
IT19 802	Foundation of Data Science	3	1	0	50	100	3	3
IT19 803	Program Elective IV	3	1	0	50	100	3	3
IT19 804	Program Elective V	3	1	0	50	100	3	3
IT19 805(P)	Seminar	0	0	6	100	0	-	2
IT19 806(P)	Project Phase II	0	0	8	100	0	-	6
IT19 807(P)	Viva Voce	0	0	0	0	100	-	3
	TOTAL	**12**	**4**	**14**	**400**	**500**	**12**	**24**
		30						

PROGRAM ELECTIVE IV	
IT19 803 (A)	Image Processing
IT19 803 (B)	Neural Networks and Deep Learning
IT19 803 (C)	Recommender System
IT19 803 (D)	Optimization Techniques
IT19 803 (E)	Software Quality Management
IT19 803 (F)	Mobile Application Development

PROGRAM ELECTIVE V	
IT19 804 (A)	Information Retrieval
IT19 804 (B)	Parallel and Distributed Algorithms
IT19 804 (C)	Data Analytics
IT19 804 (D)	Natural Language Processing
IT19 804 (E)	Cyber Security
IT19 804 (F)	High Speed Networks

SEMINAR

To encourage and motivate the students to read and collect recent and reliable information from their area of interest confined to the relevant discipline from technical publications including peer reviewed journals, conference, books, project reports etc., prepare a report based on a central theme and present it before a peer audience. A faculty member can guide maximum of five students of his area of interest to have better interaction

and creative support in guiding the seminar. Each student shall present the seminar for about 20 minutes duration on the selected topic. The report and the presentation shall be evaluated by a team of internal members comprising three senior faculty members based on style of presentation, technical content, adequacy of references, depth of knowledge and overall quality of the report.

Total marks: 100, minimum marks required to pass the seminar is 50, split-up of the marks are as follows

Attendance	: 10
Seminar Guide	: 20
Technical Content of the Report	: 30
Presentation	: 40

PROJECT PHASE II:

The objective of project work II & dissertation is to enable the students to extend further the investigative study taken up in Project Phase I. This work can be either fully theoretical/practical or involving both theoretical and practical work, socially relevant initiatives (work from local body/village) funded project from a research organization. The project is under the guidance of a faculty (project Guide) from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry. This project work is expected to provide a good overall training for the students in research and development, execution of a theory into practical by facing the challenges with confidence by developing technical leadership. The assigned project work is normally evaluated based on the following points:

- Depth of knowledge in the topic assigned/work executed based on the report prepared under Phase I;
- Review and finalization of the approach to the identified problem relating to the assigned topic/work;
- Detailed Analysis/ Modelling/ Simulation/ Design/ Problem Solving/ Experiment as needed;
- Final development of product/process, testing, results, conclusions and future directions;
- Preparation of a paper for Conference presentation/Publication in Journals, if available;
- Preparation of a Dissertation in the standard format for evaluation by the Department;
- Final Presentation before a Committee

Total marks: 100, minimum marks required to pass 50

Project Guide	: 30
Interim evaluation, by the evaluation committee	: 20
Quality of the report evaluated by the above committee	: 20
Final evaluation by a three member faculty committee	: 30

Activities that a student can engage in and the maximum quantum of points that can be earned from them are listed below.

Annexure-I

i) National Level Activities			
Code	**Name of activity**	**Max. Activity Points**	**Minimum Duration**
NA1	N S O	70	Two Semesters
NA2	N C C	70	Two Semesters
NA3	N S S	70	Two Semesters
ii) College Level Activities			

CA1	Active Member/Office bearer of Professional Societies (Student Chapters)	30/40	Four Semesters
CA2	Elected Office bearer of Student forums	30	Two semesters
CA3	Member/Captain- College Athletic/ Games teams	20/30	Two Semesters
CA3	Executive Member of Student Clubs	20	Two Semesters
CA4	Volunteer for important College functions	20	Two Semesters
CA5	Committee member/ Organizer of Tech Fest/ Cultural Fest/ Conference	20/30	Two Semesters
CA6	Placed within top three in Paper presentation/debate/ cultural competitions etc.	30	
CA7	Placed within top three in State level Sports/Games	30	
Additional 20 points to be given for CA3/CA7 if the achievement is at the national level.			
iii) Entrepreneurship			
EA1	Any Creative Project Execution	40	
EA2	Awards for Projects	60	
EA3	Initiation of Start-ups	60	
EA4	Attracted Venture Capital	80	
EA5	Filed a Patent	80	
EA6	Completed Prototype Development	80	
iv) Self Initiatives			
SA1	Attend a National Conference	20	
SA2	Attend an Int. National Conference	30	
SA3	Published/got an Award for a technical paper.	30/40	
SA4	Organizer of student technical Conf/Competition	30	
SA5	Foreign language skills	50	
SA6	Webinar related to the Engineering/Management/Social science (Max of Ten)	2	
SA7	Online courses taken & completed	Maximum 50	10 weeks

ACTIVITY POINTS: -

The Tutor, HOD and Principal must ensure that the students have acquired the required mandatory 50 activity points (25 activity points in the case of LE students) by the end of 4th and another 50 activity points by the end of 8th semester. The accumulated activity points of all students must be consolidated and entered in to the university portal by the college officials upon completion of the 4th semester (50/ 25 points) and the 8th semester (50 points) before the commencement of the respective University examinations.

GROUP A

MA19 100	CALCULUS AND LINEAR ALGEBRA	3-1-0-4 (L-T-P-C)

COURSE OBJECTIVES:

- To familiarize with functions of several variables that is essential in most branches of Engineering.
- To develop the tool of Power series for learning Advanced Engineering Mathematics.
- To develop the tool of Fourier series for learning Advanced Engineering Mathematics.
- To develop the essential tool of Matrices and Linear Algebra in a comprehensive manner.

SYLLABUS:

***Module I*: Sequences and Series.** (12 hours)

Indeterminate forms and L'Hospital's rule ; Definition of sequences and series; Convergence of sequence and infinite series, Tests for convergence of infinite series-Comparison test, Ratio test, Root test, Raabe's, Logarithmic test; convergence of Alternating series (Leibnitz's test), absolute convergence.

***Module II*: Power Series.** (8 hours)

Taylor's and Maclaurin's theorems with remainders, Power series, Taylor's Series, Maclaurin's series, series for exponential, trigonometric, hyperbolic and logarithmic functions. Leibnitz formula for derivative of product of two functions.

***Module III*: Multivariable Calculus.** (10 hours)

Functions of several variables; Limit, continuity and partial derivatives, total derivative; Maxima, minima and saddle points; Radius of curvature, Circle of curvature, evolutes and involutes.

***Module IV*: Fourier Series.** (10 hours)

Periodic functions, Trigonometric series, Fourier series, Euler Formula, Even and Odd functions, Fourier series for Even and Odd functions, Functions having arbitrary period, Fourier series of functions having arbitrary period, Half range expansions, Half range sine and cosine series.

***Module V*: Matrices.** (12 hours)

Rank of a matrix, Solution of System of linear equations-Homogeneous and non-homogeneous; Hermitian, skew –Hermitian and Unitary matrices; Eigen values and Eigen

vectors; Cayley Hamilton theorem; Diagonalisation of matrices; Quadratic forms; Orthogonal Transformation.

COURSE OUTCOMES:

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

- Use the derivatives to find critical points, inflection points and local extrema.
- Understand the basic concept of partial differentiation and its applications in engineering.
- Develop skills in computations and applications of infinite sequences and sums.
- Expand the periodic function by using Fourier series and apply it in signals and systems.
- Use matrices and determinants for solving system of linear equations and apply it in engineering problems.

TEXT BOOKS:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley& Sons,2006.
2. Veerarajan T., Engineering Mathematics for First year, Tata McGraw-Hill, New Delhi2008.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw-Hill, New Delhi, 11th Reprint, 2010.
4. D.Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint,2008.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, Edition, 2010.

Internal Continuous Assessment *(Maximum Marks-50).*

70% - Tests (minimum 2)
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100).*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks
Two questions from each module with choice to answer one question.

MA19 200	DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS	3-1-0-4(L-T-P-C)

COURSE OBJECTIVES:

- To introduce effective mathematical tools for the solutions of differential equations that model physical process
- To acquaint with mathematical tools needed in evaluating multiple integrals and their usage.
- To familiarize with concept of vector differentiation and vector integration.

SYLLABUS:

Module I: **First order ordinary differential equations.** (10 hours)

Differential equations reducible to homogeneous, Exact, linear and Bernoulli's equations, Equations of the first order and higher degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairout's type. Applications of differential equations of first order- orthogonal trajectories.

Module II: **Ordinary differential equations of higher orders**. (10 hours)

Second order linear differential equations with constant coefficients, method of variation of parameters, second order linear differential equations with variable coefficients, Cauchy- Euler equations, Legender's linear equations.

Module III: **Multiple integrals and their applications.** (12 hours)

Double integrals (cartesian and polar co-ordinates), Change of order of integration of double integrals, change of variables (cartesian to polar), applications: areas and volumes, triple integrals, volume of solids, change of variables (rectangular to cylindrical, rectangular to spherical polar).

Module IV: **Vector differential calculus.** (10 hours)

Vector functions of a single variable, Differentiation of vector functions, scalar and vector fields, gradient of scalar field, divergence and curl of vector fields, physical meaning, relation between the vector differential operators.

Module V: **Vector integral calculus.** (10 hours)

Integration of vectors, scalar line integrals, surface and volume integrals of vector functions, Gauss divergence theorem, Stokes theorem, Greens theorem (without proof).

COURSE OUTCOMES:

At the end of the course the student will be able to.

- Acquire basic knowledge of differential equations and methods of solving them.
- Model and analyse differential equations in a wide range of physical phenomena

and has got applications across all branches of engineering.

- Model physical phenomena involving continuous changes of variables and parameters
- Apply the concept of vector functions and learn to work with conservative vector field.
- Apply computing integrals of scalar and vector field over surfaces in three-dimensional space.

TEXT BOOKS/ REFERENCE BOOKS:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002 Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley& Sons, 2006.
2. Erwin Kreyszig, Advanced engineering mathematics, 9th Edition, John Wiley & sons 2006.
3. E.A.Coddington, An introduction to ordinary differential equations, Prentice Hall 1995.
4. S L Ross, Differential Equation, 3rd ed., Wiley India 1984.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
6. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers,36th Edition, 2010.

Internal Continuous Assessment *(Maximum Marks-50).*

70% - Tests (minimum 2)

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100).*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

GROUP B

CH19 100	ENGINEERING CHEMISTRY	3-1-0-4 (L-T-P-C)

COURSE OBJECTIVES:

- To enable the students to acquire knowledge in the concepts of chemistry for engineering applications.
- To familiarize the students with different application oriented topics like polymers, nanomaterial's, lubricants, fuels, storage devices, etc.
- To focus the students on the chemistry of compounds resulting from pollution, waste generation and environmental degradation and to apply the knowledge in solving these current environmental problems effectively.
- To develop abilities and skills that is relevant to the study and practice of chemistry.

SYLLABUS:

***Module I*:** (10 Hours)

Water: hardness, determination of hardness by edta method, softening (lime-soda and ion exchange methods), numerical problems based on hardness and lime soda method, purification of water for domestic use.

Polymers: classification, addition polymerization (free radical, cationic, anionic, and coordination mechanism of polymerisation), condensation polymerization, crystallinity in polymers (amorphous, crystalline and semi-crystalline), concept of glass transition temperature (Tg), factors affecting Tg.

Conducting polymers: introduction, synthesis, structure, properties and applications of conducting polymers like polyacetylene and polyaniline.

***Module II*:** (10 Hours)

Lubricants: classification of lubricants (solid, liquid, and semisolid), Mechanism of lubrication (thick film, thin film, and extreme pressure), properties of lubricants (viscosity, flash and fire point, cloud and pour point, aniline point, and corrosion stability).

Fuels: classification of fuels, calorific value, determination of calorific value using bomb calorimeter; numerical problems based on calorific value, liquid fuels (petroleum), refining of petroleum, cracking and reforming, petrol knock and octane number, diesel knock and cetane number, bio-diesel.

Module III: (10 Hours)

Nanoscience: introduction, classification of nanomaterials, synthesis of nanomaterials (hydrolysis and reduction), fullerenes and carbon, nanotubes, properties and applications of CNTs.
Green chemistry : definition, importance and limitations, twelve principles of green chemistry with their explanations and examples.

Module IV: (10 Hours)

Electrochemistry: electrochemical cells, salt bridge, Helmholtz double layer, single electrode potential, EMF and its measurement by Poggendorf's compensation method, determination of single electrode potential using SHE, electrochemical series and its applications, Nernst equation and its applications; numerical problems based on potential and Nernst equation, concentration cells (electrode and electrolyte concentration cells), glass electrode and pH measurement using glass electrode (Numerical problems).

Storage and fuel cells: lead acid accumulator and nickel cadmium battery, fuel cells, H_2/O_2 fuel cell, solar cells.

Module V: (12 Hours)

Corrosion: theories of corrosion, dry corrosion (self protecting corrosion products, pilling-bed worth rule), wet corrosion (corrosion of iron in acidic, neutral and basic conditions), galvanic corrosion and galvanic series, differential aeration corrosion, stress corrosion, factors influencing corrosion, corrosion control by cathodic protection.

Protective coatings: inorganic metallic coatings (galvanizing, tinning, cementation, electroplating), inorganic non-metallic coatings (phosphate, chromate, chemical oxide, anodising), organic coatings (paints).

COURSE OUTCOMES:

The student will be able to

- Analyze the importance of hardness of water and the basic concept of polymers
- Rationalize the properties of lubricants and the major fuels used in the daily life
- Explore the basic idea of nanoscience and the significance of environmental protection by studying the green chemistry
- Streamline the worth of electrical storage using batteries or fuel cells by learning the electrochemistry
- List major chemical corrosion reactions and prevention methods that are used in the protection of metals

TEXT BOOKS:

1. A textbook of Engineering Chemistry by Dr. Sunitha Rattan, S. K. Kataria Publisher.
2. Engineering Chemistry by N. Krishnamurthy and D. Madhavan, PHI Learning, Pvt Ltd.

REFERENCE BOOKS:

1. Seymour R.B, Introduction to Polymer Chemistry, McGraw Hill, New York.
2. Billmeyar F.W, Text book of Polymer Science, Wiley Inter-science, New York.
3. L.H. Sperling, Introduction to Physical Polymer Science, Wiley Interscience, New York.
4. P.K. Goel, Water Pollution, Causes, Effects and Control, New Age International F. A. Cotton,

and G. Wilkinson, Advanced Inorganic Chemistry, 3rd Ed., Wiley Eastern Ltd.
5. P. W. Atkins, Physical Chemistry, J.D. Paula, Oxford University Press.
6. V. Kumar, Introduction to Green Chemistry, Vishal Publishing House.
7. V.S. Muraleedharan and A. Subramania – Nano Science and Technology, Ane Books.
8. B. S. Bahl and ArunBahl S. Advanced Organic Chemistry, Chand & Company.
9. L. S. Brown and Thomas A. Holme, Chemistry for Engineering Students, Cengage Learning.
10. Engineering Chemistry by Jain and Jain, Dhanpat Rai Publishers.
11. Engineering Chemistry by P. Rath, Cengage Learning.
12. Engineering Chemistry by M.J Shultz, Cengage Learning, New Delhi.
13. Engineering Chemistry by R. Mukhopadhyay and S. Datta, New Age International Publishers.
14. A textbook of Engineering Chemistry by S. S. Dara and S. S. Umare, S. Chand Pvt Ltd.

Internal Continuous Assessment *(Maximum Marks-50).*

70% - Tests (minimum 2)
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class

University Examination Pattern *(Maximum Marks-100).*

PART A**: Analytical/problem solving SHORT questions **10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions **5 x 10 marks= 50 marks
Two questions from each module with choice to answer one question.

PH19 100	ENGINEERING PHYSICS	3-1-0-4 (L-T-P-C)

COURSE OBJECTIVES:

- To impart the basic concepts and ideas in physics.
- To develop scientific attitudes and enable the students to correlate the concepts of physics with the core programmes.

SYLLABUS:

Module I: (10 Hours)

Interference: coherence, interference in thin films and wedge shaped films (reflected system) Newton's rings; measurement of wavelength and refractive index of liquid, interference filters, antireflection coating.

Diffraction: Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit, plane transmission grating, grating equation; measurement of wavelength, Rayleigh's criterion for resolution of grating, resolving power and dispersive power of grating.

Polarization of Light: types of polarized light, double refraction, Nicol Prism, quarter wave plate and half wave plate, production and detection of circularly and elliptically polarized light, induced birefringence; Kerr Cell, polaroid & applications.

Module II: (10 Hours)

Quantum Mechanics: uncertainty principle and its applications, formulation of time dependent and time independent Schrodinger equations, physical meaning of wave function, energy and momentum operators, eigen values and functions, one dimensional infinite square well potential , quantum mechanical tunnelling (qualitative).

Statistical Mechanics: macrostates and microstates, phase space, basic postulates of Maxwell-Boltzmann, Bose-Einstein and Fermi Dirac statistics, distribution equations in the three cases (no derivation), Fermi level and its significance.

Module III: (10 Hours)

Waves: one dimensional wave; differential equation and solution. three dimensional waves: differential equation and its solution (no derivation), transverse vibrations of a stretched string.

Acoustics: Intensity of sound, loudness, absorption coefficient, reverberation and reverberation time, significance of reverberation time, Sabine's formula (no derivation), factors affecting acoustics of a building.

Ultrasonics: production of ultrasonic waves; magnetostriction effect and piezoelectric effect, magnetostriction oscillator and piezoelectric oscillator, detection of ultrasonics; thermal and piezoelectric methods, applications of ultrasonics - NDT and medical.

Module IV: (12 Hours)

Photonics: basics of solid state lighting, LED, photodetectors, photo voltaic cell, junction and avalanche photo diodes, photo transistors, thermal detectors, solar cells; V-I characteristics.

Optic fibres: principle of propagation-numerical aperture, optic fibre communication system (block diagram), industrial, medical and technological applications of optical fibre, fibre optic sensors, basics of intensity modulated and phase modulated sensors.

Module V: (10 Hours)

Laser: properties of lasers, absorption, spontaneous and stimulated emissions, population inversion, Einstein's coefficients, working principle of laser, optical resonant cavity, Ruby laser, Helium-Neon laser, semiconductor laser (qualitative), applications of laser, holography (recording and reconstruction).

Superconductivity: superconducting phenomena, Meissner effect. Type-I and Type-II superconductors, BCS theory (qualitative), high temperature superconductors, Josephson Junction, SQUID; Applications of superconductors.

COURSE OUTCOMES:

Students will be

- Familiarised with the basic principles of Physics and its significance in engineering systems and technological advancements.
- Able to apply the theories of Physics in the field of Engineering and Technology.
- Exposed to the different branches of Physics and their field of applications in engineering.
- Able to understand the modern developments in Physics and to utilized them in technological developments.
- Able to develop the scientific attitudes and to correlate the concepts of Physics to core programmes

TEXT BOOKS:

1. Physics for Engineers- M.R.Seenivasan- New Age Publishers 1996 Edition.
2. Beiser A, Concepts of Modern Physics, McGraw Hill India Ltd.
3. Brijlal and Subramanyam, A Text Book of Optics, S.Chand & Co.
4. Mehta V K, Principles of Electronics, S.Chand & Co.
5. Rajendran V and Marikani A, Physics I, Tata McGraw Hill Co Ltd.

REFERENCE BOOKS:

1. Aruldhas G, Engineering Physics, PHI Ltd.
2. Bhattacharya and Tandon, Engineering Physics , Oxford India.
3. Dominic and Nahari, A Text Book of Engineering Physics, Owl Books Publishers
4. Hecht E, Optics, PearsonEducation.
5. Mehta N, Applied Physics for Engineers, PHILtd.
6. Palais J. C, Fiber Optic Communications, Pearson Education.
7. Pandey B. K and Chathurvedi S, Engineering Physics, Cengage Learning.
8. Philip J, A Text Book of Engineering Physics, Educational Publishers.

9. Premlet B, Engineering Physics, McGraw Hill India Ltd.
10. Sarin A and Rewal A, Engineering Physics, Wiley India Pvt Ltd.
11. Sears and Zemansky, University Physics, Pearson.
12. Vasudeva A. S, A Text Book of Engineering Physics, S. Chand &Co.
13. Kakani A. S, A Text Book of Electronics, New Age International (p) publishers 2000 Edition.

Internal Continuous Assessment *(Maximum Marks-50).*

70% - Tests (minimum 2)

20% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks.***

Two questions from each module with choice to answer one question.

GROUP C

GS19 100	ENGINEERING GRAPHICS	3-0-2- 4 (L-T-P-C)

COURSE OBJECTIVES:

- Graphics is the language of engineers and hence make the student capable of conceiving shape and geometry of various objects and to effectively communicate their design ideas through drawings and sketches as per standards.
- Enable students to prepare & understand engineering drawings.

SYLLABUS:

Module I: (8 hours)

Engineering Graphics – introduction - Drawing instruments and their use – lines, Lettering and dimensioning – Scales- Familiarization with Standard Code of practice for general engineering drawing. Theory of projections - Projections of points in different quadrants.

Module II: (16 hours)

a) Projections of straight lines - True length and inclinations of a line with reference planes. Traces of lines – Line parallel to both reference planes - Perpendicular to one of the reference planes - Inclined to one and parallel to other reference plane - Inclined to both the reference planes – Rotating line method – Rotating plane method.

b) Projections of planes - lamina of geometrical shapes - Plane lamina parallel, inclined and perpendicular to the reference planes - Inclined to one and perpendicular to the other reference plane - Inclined to both the reference planes - Inclined to the two reference planes but perpendicular to the profile plane.

Module III: (16 hours)

a) Projections of Solids of revolution and Frustums - Projections of solids with axis parallel to one and inclined to the other reference plane - Axis inclined to both the reference planes - Projections of solids on auxiliary planes (Solids to be drawn: Cube, Prisms, Pyramids, Tetrahedron, Cone and Cylinder).

b) Sections of solids - Sections by cutting planes parallel to the reference planes - Cutting plane inclined to one and perpendicular to other reference plane - True shape of the section by projecting on auxiliary plane (Solids to be drawn: Cube, Prisms, Pyramids, Tetrahedron, Cone and Cylinder).

Module IV: (15 hours)

a) Development of surfaces of solids - Method of parallel line & radial line developments - Development of Polyhedra, Cylinder, Cone and sectioned solids - Development of solids having hole or cut.

b) Introduction to isometric projection - Isometric scale - Isometric views - Isometric projections of Prisms, Pyramids, Cylinder, Cone, Spheres, sectioned solids and combination of them.

Module V: (10 hours)

a) Introduction to perspective projections – Classification of perspective views - Visual ray and vanishing point method of drawing perspective projection - Perspective views of plane figures such as polygons and circles - Perspective views of solids like Prisms and Cube.

b) Conventional representation of threaded fasteners - Drawing of nuts, bolts, washers and screws -Locking arrangements of nuts - Bolted and screwed joints - Foundation bolts.

c) Introduction to Computer Aided Drafting (CAD) - Preparation of engineering drawings by using any software capable of drafting and modelling - Creation of simple figures like polygon and general multiline figures only.

(Module V, Part C: For internal work assessment only, not for University Examination)

COURSE OUTCOMES:

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

- Familiarise with the Fundamentals of Engineering Drawing standards.
- Interpret 3D shapes from orthographic projections of objects and they will be able to make orthographic projections of any object.
- Draw the sectional view of the solids.
- Make developments of surfaces & solids.
- Draw the perspective projections of objects and prepare CAD drawings.

TEXT BOOKS:

1. P.I Varghese, Engineering Graphics, VIP Publications, Thrissur.
2. N D Bhatt, "Engineering Drawing", Charotar Publications.

REFERENCE BOOKS:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. John.K.C, Engineering graphics, PHI Learning Pvt, Ltd. 2009.

Internal Continuous Assessment *(Maximum Marks-50).*

60% - Assignments (minimum 10 Drawing sheets, 2 from each module) plus two assignments on CAD.

30% - Tests (minimum 2).

10% - Regularity in the class.

University Examination Pattern (*Maximum Total Marks- 100*).

PART A*:*

Q 1. Two questions (a) and (b) of 20 marks each from module II, one from module II (a) and one from module II(b), with choice to answer any one.

Q 2. Two questions (a) and (b) of 20 marks each from module III, one from module III(a) and one from module III(b), with choice to answer any one.

Q 3. Two questions (a) and (b) of 20 marks each from module IV, one from module IV(a) and one from module IV(b), with choice to answer any one.

PART B*:*

Q 4. Three Questions (a), (b) and (c) of 20 marks each from module III &V, one from module III(b), one from module V(a) and one from module V(b), with choice to answer any two.

EM19 100	ENGINEERING MECHANICS	3-2-0-4 (L-T-P-C)

COURSE OBJECTIVES:

- To acquaint with general approach of solving engineering problems.
- To illustrate the application of the theory learned in Mechanics in practical engineering problems.
- To lay clear fundamentals to core Engineering Subjects.

SYLLABUS:

Module I: (16 hours)

Introduction to engineering mechanics - units - dimensions - vector and scalar quantities - laws of mechanics - elements of vector algebra - important vector quantities - equivalent force systems – translation of a force to a parallel position - resultant of a force system - simplest resultant of special force systems - distributed force systems - equations of equilibrium - free body diagrams - free bodies involving interior sections - general equations of equilibrium - problems of equilibrium - static indeterminacy. (Both vector and scalar formulations are to be introduced to solve problems).

Module II: (12 hours)

Friction – laws of friction – simple contact friction problems. Introduction to structural mechanics - trusses - analysis of simple trusses - method of sections – method of joints.

Module III: (12 hours)

First moment and centroid– theorems of Pappus-Guldinus - second moment of plane and composite areas – parallel and perpendicular axis theorems – polar moment of inertia of area – product of inertia and principal axis (conceptual level treatment only).
Moment of inertia of a rigid body and lamina (derivation of MI for cylinder, rod and sphere).

Module IV: (15 hours)

Dynamics: Rectangular and Cylindrical co-ordinate system **-** Combined motion of rotation and translation – Concept of instantaneous center – Motion of connecting rod of piston and crank of a reciprocating pump- Rectilinear translation – Newton's second law – D'Alembert's Principle– Application to connected bodies (Problems on motion of lift only).

Module V: *(*10 hours*)*

Mechanical vibrations – Free and forced vibration - Degree of freedom - Simple harmonic motion – Spring-mass model – Period – Stiffness –Frequency – Simple numerical problems of single degree of freedom.

COURSE OUTCOMES:

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

- Gain knowledge on basic concepts of Engineering Mechanics.
- Apply the theory of mechanics in practical level.
- Get idea on centroid, moment of inertia and mass moment of inertia of composite structures.
- Relate kinematics with kinetics equations in simple practical problems.
- Get knowledge on vibrations during motion.

TEXT BOOKS:

1. Shames I. H, Engineering Mechanics - Statics and Dynamics, Pearson Prentice.
2. Timoshenko, S & Young D. H, Engineering Mechanics, McGraw Hill.

REFERENCE BOOKS:

1. Benjamin J., Engineering Mechanics, Pentex Book Publishers and Distributors.
2. Bhavikkatti S. S., Engineering Mechanics, New Age International Publishers.
3. Hibbeler R. C., Engineering Mechanics: Statics and Dynamics. Pearson PrenticeHall.
4. Kumar, D.S., Engineering Mechanics: Statics and Dynamics, S.K. Kataria& Sons.
5. Kumar K. L., Engineering Mechanics, Tata McGraw Hill Publishing Company Ltd.
6. Rajasekaran S and Sankarasubramanian G, Engineering Mechanics, Vikas Publishing House Private Limited.
7. Tayal, A. K., Engineering Mechanics- Statics and Dynamics, Umesh Publications.

Internal Continuous Assessment *(Maximum Marks-50).*

70% - Tests (minimum 2).

20% -Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Regularity in the class.

University Examination Pattern *(Maximum Marks-100).*

PART A*: Analytical/problem solving SHORT questions* ***10 x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

GROUP D

IT19 100	INTRODUCTION TO COMPUTING AND PROBLEM SOLVING	2-1-0-2 (L-T-P-C)

COURSE OBJECTIVES:

- To learn basics of digital computers.
- To develop problem solving skills.
- To learn programming and to solve problems using python language.

SYLLABUS:

Module I: (7 hours)

Computer basics: Algorithms, a simple model of a computer- hardware and software, characteristics of computers, problem solving using computers. Computer generations and classification. Input/ Output Units: Different input and output methods.

Module II: (7 hours)

Computer memory: read only memory, RAM, different types of storage devices. Hierarchy of memory.

Processor; System Software: Operating Systems, Compiler, Interpreter, Assembler, Loader, Linker, Macro; Application Software;

Computer Languages: machine language, high level languages.

Module III: (8 hours)

Introduction to python: data types (mutable and immutable), variables, expressions and statements, operators, precedence, arithmetic and string operations, control and conditional statements, Boolean expressions and logical operators.

Module IV: (8 hours)

Functions: function definition**,** function calls, type conversions and coercion, composition of functions, built-in functions and mathematical functions, user-defined functions, parameters, arguments, parameter passing.

Module V: (9 hours)

Sequences: Manipulation on Tuple, Strings, List and Set.
Dictionaries: operations and examples. Files and exceptions: text files, directories. Introduction to Classes and Objects: attributes, instances.

COURSE OUTCOMES:

- Able to explain the functionalities of digital computer and different kinds of softwares.
- Able to design algorithmic solutions to problems.

- Able to formulate Python programs for simple algorithms.
- Able to design modular python programs using functions.
- Able to design python programs using various built in data structures (strings, lists, tuples, dictionaries).

TEXT BOOKS:

1. Lambert K A., Fundamentals of Python- First Programs, Cengage Learning India, 2015.
2. Rajaraman V., Fundamentals of computers - Hall India.

REFERENCE BOOKS:

1. Downey. A. et al., How to think like a Computer Scientist: Learning with Python, John Wiley, 2015.
2. Goel A., Computer Fundamentals Pearson Education.
3. P. Norton, Peter Norton's Introduction to Computers, Tata McGraw Hill, New Delhi.

Internal Continuous Assessment *(Maximum Marks-50).*

70% - Tests (minimum 2)

20% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class

University Examination Pattern *(Maximum Marks-100).*

PART A**: Analytical/problem solving SHORT questions **10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions **5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

GROUP E

EE19 101	BASICS OF ELECTRICAL ENGINEERING	2-1-0-2 (L-T-P-C)

COURSE OBJECTIVES:

- To impart a basic knowledge in Electrical Engineering with an understanding of fundamental concepts.

SYLLABUS:

Module I: (7 hours)

Elementary concepts of electric circuits: Kirchhoff's laws, constant voltage and current sources-Problems; Formation of network equations by mesh current and node voltage methods: matrix representation, solution of network equations by matrix methods- problems; star-delta conversion (resistive networks only-derivation is not needed) -problems.

Module II: (7 hours)

Magnetic Circuits: MMF, field strength, flux density, reluctance (definition only); comparison between electric and magnetic circuits.

Energy stored in magnetic circuits, magnetic circuits with air gap: numerical problems on series magnetic circuits.

Electromagnetic Induction: Faraday's laws, Lenz's laws- statically induced and dynamically induced emf - self inductance and mutual inductance, coefficient of coupling.

Module III: (10 hours)

Alternating Current fundamentals: Generation of alternating voltages-waveforms, frequency, period, average, RMS values and form factor of periodic waveform (pure sinusoidal)-numerical problems.

AC Circuits: Phasor representation of alternating quantities-rectangular and polar representation, Analysis of simple AC circuits: concept of impedance, power and power factor in ac circuits-active, reactive and apparent power solution of RL, RC and RLC series circuits-numerical problems.

Three phase systems: Generation of three phase voltages advantages of three phase systems, star and delta connection (balanced only), relation between line and phase voltages, line and phase currents three phase power measurement by two wattmeter method (derivation is not required)- numerical problems.

Module IV: (8 hours)

Electric Machines: DC Generator and Motor: Construction, working principle,Back EMF.

Types of motor: shunt, series, compound (short and long), principle of operation of dc motor, applications, numerical problems (voltage - current relations only).

Transformer: Construction of single phase and three phase.

Transformers (core type only): EMF equation and related numerical problems.

Losses and efficiency of transformer for full load– numerical problems (no equivalent circuit).

Module V: (7 hours)

AC Motors: Three phase induction motor-squirrel cage and slip ring induction motor working principle- synchronous speed, slip and related numerical problems (No equivalent circuit).

Power Systems: block diagram of power system, generation of power.

Block schematic representation of generating stations- hydro electric, thermal and nuclear power plants.

Renewable energy sources: solar, wind, tidal, geo thermal (block diagram & working only).

COURSE OUTCOMES:

Students will be able to

- Apply fundamental concepts and basic circuit laws to solve simple DC electric circuits.
- To understand and analyse basic magnetic circuits.
- Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state.
- To study the working principles of electrical machines.
- To get an idea about various schemes of electric power generation.

TEXT BOOKS:

1. Bhattacharya S. K., Basic Electrical & Electronics Engineering, Pearson.
2. Bird J., Electrical Circuit Theory and Technology, Routledge, Taylor & Francis Group.
3. Del Toro V., Electrical Engineering Fundamentals, Prentice Hall of India.
4. Hayt W. H., Kemmerly J. E., and Durbin, S. M., Engineering Circuit Analysis, Tata McGraw Hill.
5. Hughes, Electrical and Electronic Technology, Pearson Education.
6. Mehta V.K. and Mehta R., Basic Electrical Engineering, S. Chand Publishing.
7. Parker and Smith, Problems in Electrical Engineering, CBS Publishers and Distributors.
8. Sudhakar and Syam Mohan, Circuits and Networks Analysis and Synthesis, Tata McGraw Hill.
9. Suresh Kumar K. S, Electric Circuits and Networks, Pearson Education.

REFERENCE BOOKS:

1. D.P Kothari and I.J Nagrath, :Basic electrical Engineering", Tata McGraw Hill, 2010.
2. D.C Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. L.S. Bobrow : Fundamentals of Electrical Engineering, Oxford University Press, 2011.

Internal Continuous Assessment *(Maximum Marks-50).*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks- 100).*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks
Two questions from each module with choice to answer one question.

EC19 101	BASICS OF ELECTRONICS ENGINEERING	2-1-0-2 (L-T-P-C)

COURSE OBJECTIVES:

- To get knowledge about types, specification and common values of passive components.
- To understand the working of diodes and transistors.
- To impart knowledge about basic electronic and digital systems
- To familiarize the working of amplifiers and oscillators.
- To give basic ideas about various communication systems (no analysis required in this subject).

SYLLABUS:

Module I: (7 hours)

Passive components: Resistors: concepts of fixed & variable resistors, Carbon composition type resistors, metal film resistors, wire wound resistors, construction, power rating & tolerance.

Capacitors: different types, construction of mica and ceramic capacitors (disc & tubular), colorcode, electrolytic (Teflon) capacitors.

Inductors: construction of single layer, multilayer and variable inductors, principle of low power transformers.

Electro mechanical components: relays and contactors.

Module II: (7 hours)

Semiconductor Physics: Basic concepts, Intrinsic and extrinsic semiconductors, PN Junction diode, Principle of operation, V-I characteristics, principle of working of Zener diode, Photo diode, LED and Solar cell. Bipolar Junction Transistors, PNP and NPN structures, Principle of operation, input and output characteristics of common emitter configuration (NPN only).

Module III: (9 hours)

Digital Systems: logic expressions, Boolean laws, duality, De-Morgan's law, logic functions and gates, adders and subtractors.

Block diagram description of a dc power supply, half wave and full wave (including bridge) rectifiers, capacitor filter, working of simple zener voltage regulator.

Module IV: (7 hours)

Amplifiers and Oscillators: principle of electronic amplifiers, circuit diagram and working of common emitter amplifier, working principles of oscillators, concepts of feedback, circuit diagram & working of RC phase shift oscillator, Functional block diagram of operational amplifier, ideal operational amplifier, inverting and non-inverting amplifier.

Module V: (9 hours)

Radio Communication: modulation, principle of AM & FM, block diagrams of transmitters, waveforms, band width, principle of AM & FM demodulation, comparison of AM & FM, principle of super heterodyne receiver, block diagram.

Mobile communication: basic principles of cellular communications, concepts of cells, frequency reuse.

Optical communication: block diagram of the optical communication system, principle of light transmission through fiber, advantages of optical communication systems.

COURSE OUTCOMES:

Students will be able to

1. List the basic electronic components such as passive and electro mechanical components.
2. Illustrate the basic concept of different types of diodes and transistors.
3. Develop simple circuits using diodes and transistors.
4. Analyze simple circuits on operational amplifiers and digital gates.
5. Explain about the basic communication systems.

TEXT BOOKS:

1. Bell D. A., Electronic Devices and Circuits, Oxford University Press.
2. Tomasy W., Advanced Electronic Communication system, PHI Publishers.

REFERENCE BOOKS:

1. Boylested R. L. and Nashelsky L., Electronic Devices and Circuit Theory, Pearson Education.
2. Frenzel L. E., Principles of Electronic Communication Systems, McGraw Hill.
3. Kennedy G. and Davis B., Electronic Communication Systems, McGraw Hill.
4. Rajendra Prasad, Fundamentals of Electronic Engineering, Cengage Learning.

Internal Continuous Assessment *(Maximum Marks-50).*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100).*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

CE19 101	BASICS OF CIVIL ENGINEERING	2-1-0-2 (L-T-P-C)

COURSE OBJECTIVES:

The main objective of the course fundamentals of civil engineering is:

- To satisfy the technical requirement of understanding various principles associated with civil Engineering.
- To make the students persuade the civil engineering works that is an integral part of Engineering professional's life irrespective of the discipline.
- To give a broad perspective to the students to identify the oldest branch of engineering providing basic infrastructure for development.

SYLLABUS:

Module I: **Scope of Civil Engineering**. (8 hours)

Overview of Civil Engineering : Civil Engineering contributions to the welfare of society; specialized sub-disciplines in Civil Engineering: structural, construction, geotechnical, environmental, transportation and water resources engineering. Introduction to types of buildings as per NBC: selection of site for buildings, structural components of a residential building and their functions.

Module II: **Building Planning.** (8 hours)

Introduction to planning of residential buildings: site plan, orientation of a building, open space requirements, position of doors and windows, size of rooms.; Introduction to the various building area terms: computation of plinth area / built up area; floor area / carpet area- for a simple single storeyed building; setting out of a building.
Building drawing: plan, section and elevation of a single room building with RCC roof (sketching in the paper/note book only is expected).

Module III: **Introduction to Surveying**. (8 hours)

Surveying: objects, classification, principles; Brief description of the following instruments: (i) chain and accessories (ii) Dumpy level (iii) Theodolite. Use of levelling instrument for determining reduced levels of various stations: simple problems on leveling, use of theodolite for measuring horizontal angles (only brief description is required). Modern tools of surveying and mapping: total station, global positioning system, remote sensing and geographic information system.

Module IV: **Civil Engineering Materials & Building Construction.** (8 hours)

Brief description of Engineering properties and applications of the construction materials: bricks, stones, sand, cement, concrete, steel, timber, modern materials (Study on laboratory tests & detailed manufacturing processes of materials are not required).
Cement mortar and cement concrete: properties and applications: reinforced cement concrete fundamentals (only brief description is required).

Module V: **Building Construction.** (7 hours)

Foundations: types of foundations (sketches only), bearing capacity and settlement (definition only), functions of foundations, requirement of good foundations.

Stone and brick masonry construction: bonds used in general constructions, elevation and plan (one brick thick walls only).

Geometric, structural, and functional features of roads, bridges and dams.

COURSE OUTCOMES:

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

- Get an overview of surveying, building planning, water resources and transportation engineering.
- Understand the basics of civil engineering works that an engineer come across in professional as well as personal life.
- Prepare the layouts of buildings and other infrastructures, obtain understanding of the basic elements of the transportation system, techniques for water conservation, to prepare layouts of different buildings.
- Understand the Surveying with advanced instruments like remote sensing, GIS and GPS.
- Understand the property, use, advantages& disadvantages of different materials used in construction.

TEXT BOOKS:

1. Surveying Vol. I, II by Dr. B.C. Punamia.
2. Building planning, designing and scheduling by Gurcharan Singh.
3. Building Construction.,Rangwala, S. C. and Dalal, K. B.,Charotar Publishing house.
4. Basic Civil Engineering., S.S Bhavikatti., New Age International Pvt.Ltd,Publishers.

REFERENCE BOOKS:

1. Surveying Vol. I, II by Dr. B.C. Punamia.
2. Surveying and Levelling Vol. I and II by T.P Kanetkar and S.V Kulkarni.
3. Surveying Theory and Practice (Seventh Edition) by James M. Anderson, Edward M. Mikhail.
4. Remote sensing and Image interpretation by T.M Lillesand, R.W Kiefer. And J.W Chipman 5th edition.
5. Building Science and Planning by S.V.Doedhar.
6. Principles of Town planning by Keeble Lewis.
7. Rangwala, S. C., Essentials of Civil Engineering, Charotar Publishing House.
8. Rangwala, S. C. and Dalal, K. B., Engineering Materials, Charotar Publishing house.

Internal Continuous Assessment *(Maximum Marks-50).*

70% - Tests (minimum 2)

20% -Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Regularity in the class.

University Examination Pattern *(Maximum Marks-100).*

PART A**: Analytical/problem solving SHORT questions* ***10 x 5 marks= 50 marks
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks
Two questions from each module with choice to answer one question.

GROUP F

ES19 100	ENVIRONMENTAL SCIENCE	2-0-1-0 (L-T-P-C)

COURSE OBJECTIVES:

- To understand the problems of pollution, deforestation, solid waste disposal, degradation of environment, loss of biodiversity and other environmental issues at local and global levels.
- To create awareness among the students to address these issues and conserve the environment in a better way.

SYLLABUS:

***Module I*: Resources** (9 hours)

The multidisciplinary nature of environmental science: definition scope and importance, need for public awareness.

Natural resources: renewable and non-renewable resources; natural-associated problems.

Forest resources: use and over-exploitation; deforestation: case studies- timber extraction, mining, dams and their effects on forests and tribal people.

Water resources: use and over utilization of surface and ground water; floods, drought, and conflicts over water; dams (benefits and problems).

Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources- case studies.

Food resources: world food problems, changes caused by agriculture over grazing-, effects of modern agriculture fertilizer, pesticide problems, water logging, and salinity- case studies.

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

Land resources: land as a resource, land degradation, man-induced landslides (soil erosion and desertification).

***Module II*: Ecosystems** (8 hours)

Concept of an ecosystem: structure and function of an ecosystem; producers, consumers and decomposers; Energy flow in the ecosystem: food chains and food webs, ecological pyramids, ecological succession.

Different Ecosystems: introduction, types, characteristics, features, structure; Function of the ecosystems: forest ecosystem, grassland ecosystem, desert ecosystem, aquatic ecosystem (ponds, streams, lakes, rivers, ocean , and estuaries).

***Module III*: Biodiversity** (8 hours)

Introduction: definition, genetic, species and ecosystem diversity; Biogeographical classification of India.

Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values; Biodiversity at global, national, and local level; India as mega-diversity nation; Hot spot of biodiversity.

Threats to biodiversity: habitat loss, poaching of wild life, and man-wild life conflicts; Endangered and endemic species of India; Conservation of biodiversity (In-situ and Ex- situ conservation of biodiversity).

***Module IV*: Environmental Pollution.** (7 hours)

Definition, causes, effects and control measures of air pollution; Water pollution; Soil pollution; Marine pollution; Noise pollution; Thermal pollution; Nuclear hazards.

Solid waste management: causes, effects and control measures of urban and industrial wastes.

Waste management: role of an individual in prevention of pollution, pollution case studies.

Disaster management: floods, earth-quake, cyclone and landslides.

***Module V*: Environment and Sustainable Development.** (7 hours)

Sustainable use of natural resources; Conversion of renewable energy resources into other forms; Problems related to energy and energy auditing- case studies.

Water conservation: rain water harvesting and watershed management- case studies.

Climate change: global warming, acid rain and ozone layer depletion- case studies.

Nuclear accidents and holocaust- case studies.

Waste land reclamation: consumerism and waste products: reduce, reuse and recycle concept of products; Value education.

COURSE OUTCOMES:

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

- Develop concepts and methods from surroundings and their application in environmental problem solving.
- Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
- Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
- Identify and value the effect of the pollutants on the environment: atmosphere, water and soil.
- Analyse an industrial activity and identify the environmental problems

TEXT BOOKS:

1. Daniels and Krishnaswamy, Environmental studies, Wiley India Pvt Ltd, 2009.
2. Raman Sivakumar, Introduction to environmental science and engineering, 2nd edn, . Tata McGraw Hill, 2010.
3. AninditaBasak, Environmental Studies, Pearson Education, 2009.
4. Suresh K.D, Environmental Engineering and Management, Katson Books, 2007.
5. Benny Joseph, Environmental studies, 2nd edn, McGraw Hill, 2009.

REFERENCE BOOKS:

1. Raghavan Nambiar, K Text book of Environmental Studies, Scitech Publishers(India) Pvt. Ltd.
2. S.P Misra, S.N Pandey, Essential Environmental studies, Ane books, Pvt Ltd, 2009.
3. P N Palanisamy, P Manikandan, A Geetha, Manjula Rani, Environmental Science, Pearson Education, 2012.
4. D.L. Manjunath, Environmental Studies, Pearson Education, 2011.

Internal Continuous Assessment *(Maximum Marks-100).*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

DE19 200	CONCEPT BASED ENGINEERING	2-0-1-0 (L-T-P-C)

COURSE OBJECTIVES:

- To excite the student on creative design and its significance.
- To make student aware of the processes involved in the design.
- To make the student understand the interesting interaction of various segments of humanities, science and engineering in the evolution of a design.
- To get an exposure as how to engineer a design.

SYLLABUS:

Module I: (8 hours)

Introduction: example of different kinds of designs and designers, design problems; Definition of design; engineering design and research: importance, role of science, engineering and technology in design, design constraints, design functions, design means and design form, functional and strength designs. design form, function and strength; initiation of creative designs; initiating the thinking process for designing a product of daily use. need identification; problem statement; market survey- customer requirements; design attributes and objectives; ideation; brain storming approaches; arriving at solutions; Closing on to the Design needs.

Module II: (8 hours)

Product life cycle: morphology of design, introduction to system design process, stage models, design process- different stages in design and their significance; define problem, concept generation and evaluation, detailed design process, defining the design space; analogies, quality function deployment: meeting what the customer wants; evaluation and choosing of a design.

Module III: (8 hours)

Design for X; covering quality, reliability, safety, manufacturing/construction, assembly, maintenance, logistics, handling; disassembly; recycling; re-engineering etc. design communication; realization of the concept into a configuration, drawing and model. design for function and strength. design detailing- material selection, design visualization- solid modeling; detailed 2D drawings.

Module IV: (8 hours)

Prototyping- rapid prototyping; testing and evaluation of design; design modifications; freezing the design; cost analysis. engineering the design from prototype to product. planning; scheduling; supply chains; inventory; handling; manufacturing/construction operations; storage; packaging; shipping; marketing; feed-back on design. list out the standards organizations. Prepare a list of standard items used in any engineering specialization.

Module V: (7 hours)

Product centred and user centred design. product centred attributes and user centred attributes. bringing the two closer. example: smart phone. aesthetics and ergonomics. value engineering, concurrent engineering, reverse engineering in design; culture based design; architectural designs; motifs and cultural background; tradition and design; design as a marketing tool; intellectual property rights, trade secret; patent; copy-right; trademarks; product liability.

COURSE OUTCOMES:

The student will be able to:

- Initiate process and component elements in good and optimal design.
- Design process stages and evaluation of the different steps involved.
- Visualize models by combining all interdisciplinary fields.
- Testing and evaluate the models while considering non engineering attributes.
- Improve product quality by design survey and obtaining the patent for the product.

TEXT BOOKS/ REFERENCE BOOKS:

1. Pahl G, and Beitz, W. Engineering Design: A Systematic Approach, 3rd Ed., Springer, 2007.
2. Cross N. Engineering Design Methods: Strategies for Product Design (4th edition), John Wiley and Sons Ltd., Chichester, 2008.
3. Roozenburg N.F.M., Eekels J. Product Design, Fundamentals and Methods, Wiley, Chichester, 1995.
4. James A Senn, Analysis and Design of Information system, McGraw Hill 2003.

Internal Continuous Assessment *(Maximum Marks-100).*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

GROUP G

CH19 100 (P)	ENGINEERING CHEMISTRY LAB	0-0-2-1 (L-T-P-C)

COURSE OBJECTIVES:

- To equip the students with the working knowledge of chemical principles, nature and transformation of materials and their applications.
- To develop analytical capabilities of students so that they can understand the role of chemistry in the field of Engineering and Environmental Sciences.

SYLLABUS:

List of Experiments

(Minimum 9 experiments out of 10)

1. Preparation of urea–formaldehyde and phenol–formaldehyde resin.
2. Estimation of total hardness in a given sample of water using EDTA.
3. Estimation of chloride ions in domestic water.
4. Determination of dissolved oxygen present in a given sample of water.
5. Determination of available chlorine in a sample of bleaching powder.
6. Estimation of copper in a given sample of brass.
7. Estimation of iron in a sample of iron ore.
8. Estimation of iron in Mohr's salt using standard $K_2Cr_2O_7$.
9. Determination of flash point and fire point of an oil.
10. Preparation of buffers and standardization of pH meter.

COURSE OUTCOMES:

The student will be able to

- Apply and demonstrate the theoretical concepts of Engineering Chemistry.
- Synthesize of polymers like Bakelite and UF resins
- Estimate the amount of hardness, chloride ion and dissolved oxygen in water
- Measure the available chlorine present in bleaching powder
- Determine the amount of metals like iron or copper present in their ores

TEXT BOOKS:

1. Dr.Sunita Rattan, Experiments in Applied Chemistry, S.K. Kataria and Sons, New Delhi.

REFERENCE BOOKS:

1. Vogel, A Text Book of Quantitative Analysis, ELBS, London.

Internal Continuous Assessment *(Maximum Marks-100).*

60% - Laboratory practical, record and Viva voce.
30% - Tests.
10% - Regularity in the lab.

PH19 100 (P)	ENGINEERING PHYSICS LAB	0-0-2-1 (L-T-P-C)

COURSE OBJECTIVES:

This course is designed

- To impart practical knowledge about some of the phenomena they have studied in the Engineering Physics course.
- To develop the experimental skills of the students.

SYLLABUS:

List of experiments

(Minimum 10 experiments out of 20)

1. Characteristics of Zener diode.
2. Determination of band gap energy in a semi-conductor.
3. Voltage regulation using Zener diode.
4. Static characteristics of a transistor in common emitter configuration.
5. Characteristics of photodiode.
6. Characteristics of a LED and wavelength of emitted radiation.
7. Draw the aerial and illumination characteristics of a solar cell.
8. Draw the power load and current-voltage characteristics of a solar cell.
9. Wavelength of mercury spectral lines using diffraction grating and spectrometer.
10. Dispersive power using diffraction grating and spectrometer.
11. Diameter of a thin wire or thickness of a thin wire by Air-wedge method.
12. Wavelength of sodium light by Newtons Ring method.
13. Refractive index of given liquid by Newtons Ring method.
14. Specific rotation of cane sugar solution using polarimeter.
15. Wavelength of laser using Grating. Standardise the Grating using sodium light.
16. Resolving power using diffraction grating and spectrometer.
17. To determine the angular divergence of a laser beam.
18. To measure the numerical aperture of an optical fibre.
19. Melde's string apparatus. Measurement of frequency in the transverse and longitudinal mode.
20. Wavelength and velocity of ultrasonic waves using ultrasonic diffractometer.

COURSE OUTCOME

- Demonstrate the understanding of the fundamental concepts in physics by setting up laboratory equipment safely and efficiently and planning and carrying out experimental procedures.
- Demonstrate the ability to apply knowledge/skills to real world settings by identifying possible sources of error and implementing techniques that enhance precision.
- Demonstrate critical thinking ability through analyzing and interpreting experimental data.
- Demonstrate effective communication skills by reporting verbally and in written language the experimental data, results, and assessment of reliability.
- Demonstrate teamwork skills by working in groups on a laboratory experiment.
- Demonstrate ability to innovate and be creative in a laboratory experiment.

REFERENCE BOOKS:

1. Avadhanulu M. N., Dani A. A. and Pokley P. M., Experiments in Engineering Physics, S. Chand & Co.
2. Gupta S. K., Engineering Physics Practicals, Krishna Prakashan Pvt Ltd.
3. Koser A. A., Practical Engineering Physics, Nakoda Publishers and Printers India Ltd.
4. Rao, B. S. and Krishna, K. V., Engineering Physics Practicals, Laxmi Publications Sasikumar, P. R. Practical Physics, PHI.

Internal Continuous Assessment *(Maximum Marks-100).*

60% - Laboratory practical, record and Viva voce.

30% - Tests.

10% - Regularity in the lab.

GROUP H

EE19 100 (P)	ELECTRICAL ENGINEERING WORKSHOP	0-0-2-1 (L-T-P-C)

COURSE OBJECTIVES:

- To impart a basic knowledge of electrical circuits, machines and power systems.

SYLLABUS:

List of experiments

(Minimum 10 experiments out of 10)

1. Familiarization of various types of service mains:wiring installations, accessories and house hold electrical appliances.
2. Methods of earthing: measurement of earth resistance, testing of electrical installations, precautions against and cure from electric shock.
3. Practice of making different joints: britannia, married and T-joints on copper/aluminium.
4. Wiring practice of a circuit to control two lamps by two SPST switches.
5. Wiring practice of a circuit to control one lamp by two SPDT switches.
6. Wiring practice of a circuit to control one fluorescent lamp and one three pin plug socket.
7. Wiring practice of a main switch board consisting of ICDP switch, DB, MCB‘s and ELCB‘s.
8. Familiarization of various parts of electrical motors and wiring of three phase and single phase motor with starter.
9. Familiarization of energy meter and measurement of energy consumption by a single phase load.
10. Familiarization of various electrical and electronic components such as transformers, resistors, AF and RF chokes, capacitors, transistors, diodes, IC‘s and PCB.

COURSE OUTCOMES:

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

- Familiarize with the important electrical components and their working.
- Make use of various testing instruments and commonly used tools.
- Get an idea of electrical protective devices.
- Practice simple electrical wirings and installations.
- Familiarize with the methods of earthing.

Internal Continuous Assessment *(Maximum Marks-100)*

60% - Laboratory practical, record and Viva voce
30% - Tests
10% - Regularity in the lab.

EC19 100 (P)	ELECTRONICS ENGINEERING WORKSHOP	0-0-2-1 (L-T-P-C)

COURSE OBJECTIVES:

The objective of this course is to familiarize the students about electronic components, measuring instruments, bread board assembling, soldering tools and components etc.

SYLLABUS:

List of Exercises / Experiments

(Minimum 10 experiments out of 11)

1. Familiarization/identification of electronic components.
2. Draw electronic circuit diagram using IEEE standard symbols.
3. Familiarization/application of instruments and equipment: multimeter, power supply, CRO, function generator.
4. Assembling of electronic circuit on general purpose bread board: Fixed voltage power supply with transformer, rectifier diode, capacitor filter, zener regulator.
5. Bread board assembling: Common emitter amplifier.
6. Introduction to soldering practice: study of soldering components, solders, tools, heat sink.
7. PCB assembly and testing of full wave rectifier circuit diagram.
8. PCB assembly and testing of inverting amplifier circuit.
9. Familiarization of setting up of a PA system with different microphones, loud speakers, mixer etc.
10. Assembling and dismantling of desktop computer/laptop/mobile phones.
11. Introduction to robotics: familiarization of components (motor, sensors, battery etc.) used in robotics and assembling of simple robotic configurations.

COURSE OUTCOMES:

The student will be able to

- Identify and test various active and passive components.
- Make use of various testing instruments and commonly used tools.
- Build electronic circuits on breadboard.
- Solder electronic circuits on PCB.
- Identify various subsystems of electronic systems like PA Systems and desktop computers.

Internal Continuous Assessment *(Maximum Marks-100).*

60% - Laboratory practical, record and Viva voce.
30% - Tests.
10% - Regularity in the lab.

CE19 100 (P)	CIVIL ENGINEERING WORKSHOP	0-0-2-1 (L-T-P-C)

COURSE OBJECTIVES:

- To provide experience on plotting, measuring/determining horizontal distances, level differences between stations and horizontal angles.
- To provide experience on setting out for small buildings, masonry construction and model making.

SYLLABUS:

List of Experiments

1. Setting out of a building: the student should set out a building (single room only) as per the given building plan using tape only.
2. Setting out of a building: the student should set out a building (single room only) as per the given building plan using tape and cross staff.
3. Chain surveying : study of chain and accessories, plotting one side of a building/ five or six points in the field using chain and cross-staff.
4. Horizontal measurements: study of compass, plotting one side of a building/five or six points in the field using compass; Find the area of an irregular polygon set out on the field.
5. Levelling: study of levelling instruments, determination of reduced levels of five or six points in the field.
6. Theodolite: study of theodolite, measuring horizontal angles.
7. Theodolite: study of theodolite, measuring vertrical angles.
8. Brick Masonry.
9. Plumbing: demonstration of plumbing fixtures, exercise in joints
10. Model making of simple solids.

COURSE OUTCOMES:

After the completion of the course, student will be able

- Understand the procedures for construction of several structures.
- Interpret survey data and compute areas and volumes.
- Familiarize with different components, equipment's and technical standards.
- Get an overview of surveying, building planning, plumbing, leveling.
- Understand the basics of civil engineering works.

Internal Continuous Assessment *(Maximum Marks-100).*

60% - Laboratory practical, record and Viva voce.
30% - Tests.
10% - Regularity in the lab.

IT19 100 (P)	INTRODUCTION TO COMPUTING AND PROBLEM SOLVING LAB	0-0-2-1 (L-T-P-C)

COURSE OBJECTIVES:

- To familiarize students with basic computer hardware and software components.
- To learn implementation of various structures and algorithms using Python.

SYLLABUS:

List of Experiments

*(A maximum of **25** programs have to be practiced)*

1. Familiarization of hardware components of a desktop computer and its assembling.
2. Familiarization of operating systems and various open source tools.
3. Python programs to implement the following concepts:

- Programs like factorial of a number, power of a number, minimum and maximum elements in a set etc. to understand the concepts of decision making, iteration and control structures.
- Functions: user defined functions, built-in functions, function calls, math functions, parameter passing, recursion.
- Strings: traversal, searching, comparisons.
- Creation and maintenance of List, Tuples, Dictionaries.
- Creating, opening, reading, copying, writing and closing Files.

COURSE OUTCOMES:

The student will be able to

- familiarized with hardware components and softwares of Computer.
- Test and Debug Python Programs.
- Conditionals and Loops for Python Programs.
- Use functions and represent Compound data using Lists, Tuples and Dictionaries.
- Read and write data from and to files in Python.

Internal Continuous Assessment *(Maximum Marks-100).*

60% - Laboratory practical, record and Viva voce.
30% - Tests.
10% - Regularity in the lab.

GROUP I

CM19 100	COMMUNICATIVE ENGLISH	2-0-0-0 (L-T-P-C)

COURSE OBJECTIVES:

- To adapt the employability and career requirements of the industry.
- To adapt students with ease to the Industry environment by equipping with communication skills.
- To focus on overall capability in communicating ideas in an effective manner, apart from gaining academic competence.

SYLLABUS:

Module I: (4 hours)

Communication: definition, communication process; types of communication: formal and informal. Relevance of body language; verbal and non-verbal effective communication; communication breakdown: how to overcome communication barriers.

Module II: (7 hours)

Listening skills: listening and typing, focused listening, listening and sequencing of sentences, fill in the blanks, listening and answering questions. Reading comprehension: questions and answers, close exercises; Vocabulary building tasks: vocabulary trees, learning words through situations, word formation, roots, prefixes and suffixes, derivatives, synonyms and antonyms, phrasal verbs, homonyms.

Module III: (8 hours)

Parts of speech with special focuses on nouns & pronouns, verbs, adverbs, adjectives. subject- verb agreement. Speaking skills: linguistic and phonetics; vowels and Consonants; 44 phonetic symbols, Diphthongs, syllables, phonemes; stress and rhythm in connected speech: intonations and voice modulations, weak forms and strong forms, production of speech sounds in connected speech, shifting the stress for emphasis, relevance of correct pronunciation, face to face conversation of telephonic conversation.

Module IV: (3 hours)

Writing skills: C.V, effective resume, report, memo, business letters, structuring a report and e-mail communication.

Module V: (4 hours)

Developing self-esteem: presentation skills, facing the interview board, group discussions and debating skills; soft skills and time management; Psychometrics and stress management; emotional quotient.

COURSE OUTCOMES:

The student will able to:

- Not only understand the process and nature of communication but also recognize the barriers to effective communication and learn to eradicate them.
- Attain and enhance competence in the four modes of learning: writing, speaking, reading and listening, and are able to recognize the meaning of new words based on contextual comprehension.
- Heighten their awareness of correct usage of English grammar in writing and sounds in speaking.
- To write official correspondences i.e., is reports, memos, letters, and e-mails and also prepare impressive curriculum vitae and resumes.
- Improve their self-esteem and also captivate to give effective presentations in a professional and facing interview boards confidently.

REFERENCE BOOKS*:*

1. Meenakshi Raman and Sangeeta Sharma., Technical Communication- Principles and Practice, Oxford University press.
2. R C Bhatia, Business Communication, Ane Books Pvt. Ltd, 2009.
3. Sunita Mishra and C Muralikrishna, Communication Skills for Engineers, Pearson Education.
4. Jovan van Emden and Lucinda Becker, Effective Communication for Arts and Humanities Students, Palgrave macmillam, 2009.
5. Sanjay Kumar and Pushpalata , Communication skills, Oxford University Press, 2011.
6. Practical English Usage. Michael Swan. OUP. 1995.
7. Remedial English Grammar. F.T. Wood. Macmillan, 2007.
8. On Writing Well. William Zinsser. Harper Resource Book. 2001.
9. Study Writing. Liz Hamp- Lyons and Ben Heasly. Cambridge University Press. 2006.
10. Communication Skills. Sanjay Kumar and PushpLata. Oxford.
11. T M Farhathullah, Communication Skills for Technical Students, Orient Longman, Hyderabad.

Internal Continuous Assessment *(Maximum Marks-100).*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

LL19 200	LANGUAGE LAB	0-0-2-0 (L-T-P-C)

COURSE OBJECTIVES:

- To enhance the linguistic skill of the students, keeping in view of the necessity of imparting employability skills of engineering graduates
- To Provide with a software platform which has functions like Listen- Respond- Intercommunicate-Monitor- Teacher call etc.
- To focus on the students overall ability in using English as a tool for communication.
- To overcome the inhibition factor while using English and equip them to adapt themselves to the industry environment with ease and confidence, bringing about a sort of transformation in each student.

LAB SESSIONS

1. Sessions on introduction to Linguistics and Phonetics: speech sounds and phonetic symbols; Syllables and phonemes.
2. Training to develop sharp listening skills: focused listening with emotional content; Relevance of correct pronunciation.
3. Sessions beginning with two minutes Oral Presentation on topics of their choice;
   Role plays: students take on roles and engage in dialogues/ conversations.
4. The art of effective communication: effective presentation skills; presentation tools, voice modulations, word accent, rhythm and intonation; audience analysis.
5. Vocabulary building tasks: fun games in English.
6. Relevance of body language, how to face an interview board; mock interviews; group discussions with special focus on a candidate's etiquette; debates and the art of exhibiting the interpersonal skills; public speaking.
7. Soft-skills; Emotional quotient; Training sessions; Stress Management.

COURSE OUTCOMES:

- It brings about a consistent accent and articulacy in the pronunciation through the familiarity of phonetics.
- advance the capability to listening English conversations
- enhance their verbal communication skills through free speeches, role plays, activities, and interactions.
- Better understanding of nuances of English language through audio- visual experience and speaking skills with clarity and confidence which in turn enhances their employability skills. It brings about a consistent accent and intelligibility in the

pronunciation of English by providing an opportunity for practice in speaking for all the students.

- capable of identify the meaning of novel words based on contextual comprehension.
- Equip the students to face the interview board with confidence, making them aware of the nuisances and methodology involved in this area; help them to actively participate in debates and group discussions and face the interview confidently.
- Prepared for creating effective presentations in front of different clusters.

***SUGGESTED SOFTWARES**:*

1. Cambridge Advanced Learners' English Dictionary with CD.
2. The Rosetta Stone English Library.
3. Clarity Pronunciation Power.
4. Mastering English in Vocabulary, Grammar, Spellings, Composition.
5. Dorling Kindersley series of Grammar, Punctuation, Composition etc.
6. Language in Use, Foundation Books Pvt Ltd with CD.
7. Learning to Speak English - 4 CDs.
8. Microsoft Encarta with CD.
9. Murphy's English Grammar, Cambridge with CD.

REFERENCE BOOKS:

1. Spoken English (CIEFL) in 3 volumes with 6 cassettes, OUP.
2. English Pronouncing Dictionary Daniel Jones Current Edition with CD.
3. Spoken English- R. K. Bansal and J. B. Harrison, Orient Longman 2006 Edn.
4. A Practical course in English Pronunciation, (with two Audio cassettes) by J. Sethi, Kamlesh Sadanand & D.V. Jindal, Prentice-Hall of India Pvt. Ltd., New Delhi.

Internal Continuous Assessment *(Maximum Marks-100).*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

EN19 301	ENGINEERING MATHEMATICS III	3-1-0-4

***PRE-REQUISITES**:* CALCULUS AND LINEAR ALGEBRA

COURSE OBJECTIVES:

- To provide a quick overview of the concepts and results in partial differential equations that may be useful in engineering.
- To introduce the concepts of linear algebra, laplace transform and Fourier transform which are wealth of ideas and results with wide area of application.

SYLLABUS:

Module I: **Linear Algebra** (Proofs not required) (11 hours)

Vector spaces – Definition, Examples – Subspaces – Linear Span – Linear Independence – Linear Dependence – Basis – Dimension– Orthogonal and Orthonormal Sets – Orthogonal Basis – Orthonormal Basis – Gram-Schmidt orthogonalisation process – Inner product spaces – Definition – Examples – Inequalities; Schwartz, Triangle (No proof).

Module II: **Fourier Transforms** (11 hours)

Fourier Integral theorem (Proof not required) – Fourier Sine and Cosine integral representations – Fourier transforms – transforms of some elementary functions – Elementary properties of Fourier transforms – Convolution theorem (No proof) – Fourier Sine and Cosine transforms – transforms of some elementary functions – Properties of Fourier Sine and Cosine transforms.

Module III: **Laplace – Transforms** (10 hours)

Laplace Transform-Elementary Properties-Inverse Laplace transform- Solution of ordinary differential Equations using Laplace transform.

Module IV: **Series Solutions of Differential Equations** (10 hours)

Power series method for solving ordinary differential equations – Frobenius method for solving ordinary differential equations – Bessel ‘s equation – Bessel functions – Relation between Bessel functions.

Module V: **Partial Differential Equations** (10 hours)

Introduction – Solutions of equations of the form F (p, q) =0; F(x,p,q) =0; F(z,p,q) =0 ; F1(x,p) = F2(y,q) ; Clairaut‘s form, z = px + qy + F(p,q) ; Lagrange’s form, Pp + Qq =R-Classification of Linear PDE‘s – Derivation of one dimensional wave equation and one dimensional heat equation – Solution of these equation by the method of separation of variables.

COURSE OUTCOME:

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

- Develop the essential tool of linear algebra in a comprehensive manner.

- Use tools for Fourier Transforms.
- Use tools for Laplace transforms and apply it in solution of differential equations.
- Acquire the knowledge of power series for learning advanced Engineering Mathematics.
- Use mathematical tools for the solution of Partial differential equations that models physical processes.

TEXT BOOKS:

1. Bernaed Kolman, David R Hill, Introductory Linear Algebra, 6th edition, An Applied First Course, Pearson Education.
2. Erwin Kreysig, Advanced Engineering Mathematics ,9th Edition, John Wiley & Sons,2006.
3. P.Ramesh Babu, R. Anandanatarajan ,Signals and Systems, Scitech Publications(India) Pvt.ltd, 4th Edition.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers,35th Edition.

REFERENCE BOOKS:

1. N.P. Bali, Manish Goyal, Textbook of Engineering Mathematics,7th edition Laxmi Publications, Reprint 2010.
2. Wylie C.R and L.C. Barrett, Advanced Engineering Mathematics ,6th edition, McGraw Hill.
3. S.J. Farlow, Partial Differential Equations for Scientists and Engineers, Dover Publications,1993.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

EN19 302	DISCRETE COMPUTATIONAL STRUCTURES	3-1-0-3

***PRE-REQUISITES**:* NIL

COURSE OBJECTIVES:

- To introduce the idea of Logic that is fundamental to the application of valid arguments in propositional and predicate Calculus problems.
- To familiarize with Relations, types of relations and Functions that is essential in most branches of Engineering.
- To develop the idea of group theory for applying it in coding theory.

SYLLABUS:

Module I**: **Logic (10 hours)

Logical connectives and Truth tables, Logical equivalence and laws of logic, Logical implication and rules of inference, Normal forms, Quantifiers, proofs of theorems using rules of Universal specification and Universal generalization.

Module II: **Relational Structures** (10 hours)

Cartesian products, Relations, Relation matrices, properties of relations, Composition of relations, Equivalence relations and partitions, Functions-One –to one, onto functions, Composition of functions and inverse functions, Partial orders - Hasse diagram.

Module III: **Group Theory** (12 hours)

Definition and elementary properties, Cyclic groups, Homomorphisms and Isomorphisms, Subgroups, Cosets and Lagrange's theorem, Elements of coding theory, Hamming metric, Generator matrices, Group codes, Hamming matrices.

Module IV: **Rings and modular arithmetic** (10 hours)

Rings and Fields - Definition and examples of rings, Integral domains and fields - Elementary properties and substructures -The integers modulo n.

***Module V**:* **Finite fields** (10

hours)

Ring homomorphisms and isomorphisms - Polynomial rings - Irreducible polgnomials and finite fields - The ring Zn.

COURSE OUTCOMES:

On successful completion of the course, the student will be able to:

- Develops skill to develop the algorithms needed for a program or system of programs.
- Acquire the concept of function complexity and its role in the study of the analysis of algorithms.
- Develops skills in the algorithmic approach to the solution of problems in discrete mathematics.
- Develops skills on those aspects of the structures that are needed for the application in coding theory.
- Develop skills of group theory for applying it in coding theory.

TEXT BOOKS:

1. Ralph P Grimaldi, Discrete and Combinatorial Mathematics ,5thedition, Pearson publishers.

REFERENCE BOOKS:

1. Thomas Koshy, Discrete Mathematics with applications,7th edition, Elsevier India.
2. C L Liu, Elements of Discrete Mathematics ,4th edition, McGraw Hill Education
3. Kolman B & Busby R C, Discrete and Mathematical Structures for Computer Science,6th edition, Pearson publishers.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 303	PROGRAMMING IN C	3-1-0-3

***PRE-REQUISITES**:* NIL

COURSE OBJECTIVES:

- To impart the basic concepts of computer and information technology.
- To develop skill in problem solving concepts through learning C programming in practical approach

SYLLABUS:

Module I: (12 hours)

Introduction to C language - Basic elements of C- Flowchart and algorithm – Development of algorithms for simple problems. Structure of C program – Preprocessor directives- Header files- Library functions -Operators and expressions – Procedure and order of evaluation – Input and Output functions. While, do-while and for statements, if, if-else, switch, break, continue, goto and labels. Programming examples.

Module II: (10 hours)

Arrays and functions- Introduction to Arrays-Declaration, Initialization – One dimensional array – Defining and processing arrays - two dimensional and multidimensional arrays –application of arrays.
Functions- Declaring, defining, and accessing functions – parameter passing methods – passing arrays to functions -Recursion – Storage classes – extern, auto, register and static- Programming examples.

Module III: (10 hours)

String operations- Basics- operations-length, compare, concatenate, copy – Selection sort, linear and binary search. Structures- Declaration, definition and initialization of structures-nested structures- union.

Module IV: (10 hours)

Pointers - Concepts, declaration- array of pointers- structures and pointers-initialization of pointer variables-simple examples.

Module V: (10 hours)

File-Concept of a file – File Operations-File pointer
Dynamic Memory Allocation, Allocating Memory with malloc, Allocating memory with calloc, Reallocating memory, freeing memory.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to:

- Develop simple applications in C using basic constructs.
- Analyze problems, identify subtasks and implement them as functions.
- Design and implement applications using arrays, strings and structures.
- Develop and implement applications in c using pointers.
- Able to understand the basic concept of file system and dynamic memory management.

TEXT BOOKS:

1. P. Norton, Peter Norton's Introduction to Computers, 6th edition, Tata McGraw Hill, New Delhi.
2. E. Balaguruswamy, Programming in ANSI C, 3rded., Tata McGraw Hill, New Delhi, 2004
3. Raja RamanV, Computer basics programming in C,6th edition, PHI Learning.
4. Thomas H Cormen, Charles E. Leiserson, Ronald L. Rivest, Introduction to Algorithms, 3rd ed. MIT press.

REFERENCE BOOKS:

1. B. Gottfried, Programming with C, 2nd edition, Tata McGraw Hill, New Delhi, 2006.
2. B. W. Kernighan, and D. M. Ritchie, The C Programming Language, 2nd edition Prentice Hall of India, New Delhi, 1988.
3. K. N. King. C Programming: A Modern Approach, 2nd edition, W. W. Norton & Company,2008.
4. Stephen G. Kochan, Programming in C, 3rd edition, CBS publishers & distributors.
5. M. Meyer, R. Baber, B. Pfaffenberger, Computers in Your Future, 3rd edition., Pearson Education India.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 304	COMPUTER ORGANIZATION AND DESIGN	3-1-0-4

***PRE-REQUISITES**:* NIL

COURSE OBJECTIVES:

- To impart a basic understanding of the parallel architecture and its operations
- To introduce the key features of high-performance computers
- Fair idea about the functional aspects of each building block in computer design.
- To lay the foundation for the study of hardware organization of digital computers.

SYLLABUS:

Module I: (10 hours)

Evolution of Computer Architecture-Basic Structure of computers – functional units – Basic operational concepts – bus structures. Memory locations and addresses –memory operations – instructions and instruction sequencing, Addressing modes-System Attributes to performance, Amdahl‘s law for a fixed workload.

Module II: (10 hours)

Processors-Design Space of processors, Instruction Set Architectures, CISC Scalar Processors, RISC Scalar Processors- Memory hierarchy technology. Computer arithmetic – Signed and unsigned numbers – Addition and subtraction –Logical operations – Multiplication and division-Booths algorithm.

Module III: (10 hours)

Floating point representation and arithmetic-Memory organization-Semiconductor RAM memories- static memories, Synchronous and asynchronous DRAM, ROM – PROM-EPROM-EEPROM- Flash memory, Cache memories- mapping functions.

Module IV: (10 hours)

Processor Organization- Design of arithmetic unit, logic unit and shift register, status register, Processor unit- design of accumulator-Virtual memories-address translation, Secondary storage-magnetic hard disk, optical disks, tapes.

Module V: (12 hours)

Input-output organizations - interrupts – Enabling & Disabling interrupts - handling multiple Device-Introduction to pipelining-pipeline Hazards-DMA- Bus arbitration, Buses- Synchronous and asynchronous I/O- Interrupts and polling.

COURSE OUTCOMES:

On successful completion of the course, the student will be able to:

- To understand about the evolution of computer architecture.
- Analyze the advanced processor technologies and computer arithmetic.
- Interpret memory hierarchy.
- Analyze different pipelining techniques.
- Study about computer arithmetic.

TEXT BOOKS*:*

1. D.A. Patterson, J.L. Hennessy, Computer Organization and Design, 4th Edition., Morgan Kaufmann, Burlington, MA, 2008
2. Hamacher C. V., "Computer Organization – International Edition -5th Edition, McGraw Hill, New York.

REFERENCE BOOKS:

1. William Stallings, "Computer Organization and Architecture Designing for Performance",8th Edition, Pearson Education ,2003
2. Hayes J P, "Computer Organization and Architecture - 2nd Edition ", McGraw Hill

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 305	SWITCHING THEORY & LOGIC DESIGN	3-1-0-4

***PRE-REQUISITES**:* NIL

COURSE OBJECTIVES:

- To impart an understanding of the basic concepts of Boolean algebra and digital systems.
- To impart familiarity with the design and implementation of different types of practically used sequential circuits.
- To provide an introduction to use Hardware Description Language.

SYLLABUS:

Module I: (12 hours)

Number systems – Decimal, Binary, Octal and Hexadecimal – conversion from one system to another – representation of negative numbers – representation of BCD numbers -character representation – character coding schemes – ASCII – EBCDIC etc.
Addition, subtraction, multiplication and division of binary numbers - Addition and subtraction of BCD, Octal and Hexadecimal numbers - Introduction to floating point numbers.

Module II: (9 hours)

Boolean functions – Canonical and Standard forms – Logic operations – Logic gates – Physical properties of logic gates (technology, fan-in, fan-out, propagation delay) – Universal gates, realization of basic gates using universal gates, Karnaugh Map up to 5-McClusky method –Don't Care Condition – Sum of Products and Products of sum simplification – Tabulation Method.

Module III: (10 hours)

Combinational Logic: combinational Circuits and design Procedure — binary adder and subtractor — multi—level NAND and NOR circuits — Exclusive-OR and Equivalence Functions. Implementation of combination logic: parallel adder, carry look ahead adder, BCD adder, code converter, magnitude comparator, Encoder, Decoder, multiplexer, Demultiplexer, parity generator.

Module IV: (11 hours)

Sequential logic circuits: latches and flip-flops – edge triggering and level-triggering — RS, JK, D and T flipflops — race condition — master slave flip-flop. Clocked sequential circuits: state diagram — state reduction and assignment — design with state equations.
Registers: registers with parallel load - shift registers, universal shift registers – application - serial adder. Counters: asynchronous counters — binary and BCD ripple counters — timing sequences — synchronous counters — up-down counter, BCD counter, Johnson counter, Ring counter -timing sequences and state diagrams.

Module V: (10 hours)

Memory and Programmable Logic: Random-Access Memory (RAM)—Memory Decoding—Error Detection and Correction — Read only Memory (ROM), Programmable Logic Array (PLA).

COURSE OUTCOMES:

At the end of the Course, the Student will be able to

- Apply concepts of various number systems and logic circuits
- Analyze and minimize Boolean expressions using Karnaugh maps
- Analyze and use multiplexers and de-multiplexers in designing logic circuits.
- Compare and contrast different types of flip flops and its applications.
- Design various logic circuits using complex programmable logic devices.

TEXT BOOKS:

1. Mano M. M., *Digital Logic & Computer Design*, 4/e, Pearson Education, 2013.
2. Floyd T. L., *Digital Fundamentals*, 10/e, Pearson Education, 2009.
3. M. Morris Mano, *Computer System Architecture*, 3/e, Pearson Education, 2007.
4. Harris D. M. and, S. L. Harris, Digital *Design and Computer Architecture*, 2/e, Morgan Kaufmann Publishers, 2013.

REFERENCE BOOKS:

1. Tokheim R. L., *Digital Electronics Principles and Applications*, 7/e, Tata McGraw Hill, 2007.
2. Mano M. M. and M. D Ciletti, *Digital Design*, 4/e, Pearson Education, 2008.
3. Rajaraman V. and T. Radhakrishnan, *An Introduction to Digital Computer Design*, 5/e, Prentice Hall India Private Limited, 2012.
4. Leach D, Malvino A P, Saha G, *Digital Principles and Applications, 8/e, McGraw Hill Education, 2015.*
5. Charles H Roth,Jr, Lizy Kurian John, *Digital System Design using VHDL,*2/e, Cengage Learning

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

EN19 306	LIFE SKILLS AND ETHICS FOR ENGINEERS	2-0-2-0

***PRE-REQUISITES**:* NIL

LIFE SKILLS

Life skills are those competencies that provide the means for an individual to be resourceful and positive while taking on life's vicissitudes. Development of one's personality by being aware of the self, connecting with others, reflecting on the abstract and the concrete, leading and generating change, and staying rooted in time tested values and principles is being aimed at. This course is designed to enhance the employability and maximize the potential of the students by introducing them to the principles that underlie personal and professional success, and help them acquire the skills needed to apply these principles in their lives and careers.

COURSE OBJECTIVES:

- To develop communication competence in prospective engineers.
- To enable them to convey thoughts and ideas with clarity and focus.
- To equip them to face Group Discussion.
- To inculcate critical thinking process.
- To prepare them on problem solving skills.
- To provide symbolic, verbal, and graphical interpretations of statements in a problem description.
- To understand team dynamics & effectiveness.
- To create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values, Loyalty and also to learn to appreciate the rights of others.
- To learn leadership qualities and practice them.

SYLLABUS:

Module 1: **(14 hours)**

Overview of Life Skills: Meaning and significance of life skills, Life skills identified by WHO: Self- awareness, Empathy, Critical thinking, Creative thinking, Decision making, problem solving, Effective communication, interpersonal relationship, coping with stress, coping with emotion.

Life skills for professionals: positive thinking, right attitude, attention to detail, having the big picture, learning skills, research skills, perseverance, setting goals and achieving them, helping others, leadership, motivation, self-motivation, and motivating others, personality development, IQ, EQ, and SQ

Group Discussion: Differences between group discussion and debate; Ensuring success in group discussions, **Presentation Skills:** Oral presentation and public speaking skills; business presentations, Technology-based Communication: Netiquettes: effective e-mail messages; power-point presentation; enhancing editing skills using computer software.

Module II: **(8 hours)**

Need for Creativity in the 21st century, Imagination, Intuition, Experience, Sources of Creativity, Lateral Thinking, Myths of creativity

Critical thinking Vs Creative thinking, Functions of Left Brain & Right brain, Convergent & Divergent Thinking, Critical reading & Multiple Intelligence.

Steps in problem solving, Problem Solving Techniques, Problem Solving through Six Thinking Hats, Mind Mapping, Forced Connections.
Problem Solving strategies, Analytical Thinking and quantitative reasoning expressed in written form, Numeric, symbolic, and graphic reasoning, Solving application problems.

Module III: **(10 hours)**

Introduction to Groups and Teams, Team Composition, Managing Team Performance, Importance of Group, Stages of Group, Group Cycle, Group thinking, getting acquainted, Clarifying expectations.
Group Problem Solving, Achieving Group Consensus.
Group Dynamics techniques, Group vs Team, Team Dynamics, Teams for enhancing productivity, Building & Managing Successful Virtual Teams. Managing Team Performance & Managing Conflict in Teams.
Working Together in Teams, Team Decision-Making, Team Culture & Power, Team Leader Development.

Module IV: **(10 hours)**

Morals, Values and Ethics, Integrity, Work Ethic, Service Learning, Civic Virtue, Respect for Others, Living Peacefully.
Caring, Sharing, Honesty, Courage, Valuing Time, Cooperation, Commitment, Empathy, Self-Confidence, Character Spirituality, Senses of 'Engineering Ethics', variety of moral issued, Types of inquiry, moral dilemmas, moral autonomy, Kohlberg's theory, Gilligan's theory, Consensus and controversy, Models of Professional Roles, Theories about right action, Self-interest, customs and religion, application of ethical theories. Engineering as experimentation, engineers as responsible experimenters, Codes of ethics, Balanced outlook on.
The challenger case study, Multinational corporations, Environmental ethics, computer ethics, Weapons development, engineers as managers, consulting engineers, engineers as expert witnesses and advisors, moral leadership, sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers(India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers(IETE), India, etc.

Module V: **(10 hours)**

Introduction, a framework for considering leadership, entrepreneurial and moral leadership, vision, people selection and development, cultural dimensions of leadership, style, followers, crises.
Growing as a leader, turnaround leadership, gaining control, trust, managing diverse stakeholders, crisis management
Implications of national culture and multicultural leadership Types of Leadership, Leadership Traits.
Leadership Styles, VUCA Leadership, DART Leadership, Transactional vs Transformational Leaders, Leadership Grid, Effective Leaders, making of a Leader, Formulate Leadership.

COURSE OUTCOMES:

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

- Define and Identify different life skills required in personal and professional life, which will enable them to make effective presentations and Face group discussion.
- Critically think on a particular problem and Solve problems.
- Work in Group & Teams.
- Handle Engineering Ethics and Human Values.
- Become an effective leader.

TEXT BOOKS:

1. Life Skills for Engineers, Complied by ICT Academy of Kerala, McGraw Hill Education (India) Private Ltd., 2016

REFERENCE BOOKS:

1. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.
2. Barun K. Mitra; (2011), "Personality Development & Soft Skills", First Edition; Oxford Publishers.
3. Kalyana; (2015) "Soft Skill for Managers"; First Edition; Wiley Publishing Ltd.
4. Larry James (2016); "The First Book of Life Skills"; First Edition; Embassy Books.
5. Shalini Verma (2014); "Development of Life Skills and Professional Practice"; First Edition; Sultan Chand (G/L) & Company
6. John C. Maxwell (2014); "The 5 Levels of Leadership", Centre Street, A division of Hachette Book Group Inc.
7. Remesh S., Vishnu R.G., "Life Skills for Engineers", Ridhima Publications, First Edition, 2016.

EVALUATION SCHEME

Internal Evaluation

(Conducted by the College)

Total Marks: 100

Part – A

1. Group Discussion – Create groups of about 10 students each and engage them on a GD on a suitable topic for about 20 minutes. Parameters to be used for evaluation is as follows;

(i) Communication Skills – 20 marks (ii) Subject Clarity – 10 marks (iii) Group Dynamics - 10 marks (iv) Behaviors & Mannerisms - 10 marks **(Marks: 50)**

Part – B

2. Presentation Skills – Identify a suitable topic and ask the students to prepare a presentation (preferably a power point presentation) for about 10 minutes. Parameters to be used for evaluation is as follows;

(i) Communication Skills* - 20 marks (ii) Platform Skills** - 20 marks (iii) Subject Clarity/Knowledge - 10 marks **(Marks: 50)**

* Language fluency, auditability, voice modulation, rate of speech, listening, summarizes key learnings etc.

** Postures/Gestures, Smiles/Expressions, Movements, usage of floor area etc.

IT19 307(P)	PROGRAMMING IN C LAB	0-0-3-1

***PRE-REQUISITES**:* PROGRAMMING IN C

COURSE OBJECTIVES:

- To give a strong foundation for developing the art of programming to the students.

SYLLABUS:

List of Exercises / Experiments

(Minimum 8 are mandatory)

Set 1

HCF (Euclid's algorithm) and LCM of given numbers – Find mean, median and mode of a given set of numbers – Conversion of numbers from binary to decimal, hexadecimal, octal and back – Evaluation of functions like ex, sin(x) and cos(x) for a given numerical precision using Taylor's series – Testing whether a given number is prime.

Set 2

String manipulation programs: sub-string search, deletion – Lexicographic sorting of a given set of strings – Generation of all permutations of the letters of a given string using recursion.

Set 3

Matrix operations: Programs to find the product of two matrices – Inverse and determinant (using recursion) of a given matrix – Solution to simultaneous linear equations using Jordan elimination

Set 4

Files: Use of files for storing records with provision for insertion – Deletion, search, sort and update of a record.

COURSE OUTCOMES:

On successful completion of the course, the student will be able to:

- Familiarize the algorithms and computing.
- Design, develop, compile, execute and debug programs in C language.
- Choose and apply appropriate data types, decision structures while writing programs in C.
- Apply different data-structures like arrays, pointers, structures and files.
- Understand the use of user defined functions.

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Laboratory practical, record and Viva voce.
30% - Tests.
10% - Regularity in the lab.

End Semester Practical Examinations *(Maximum Marks-100)*

10% - Record of works done
20% - Viva voce
70% - Algorithm, coding, compiling and executing, result and inference

IT19 308(P)	DIGITAL ELECTRONICS LAB	0-0-3-1

***PRE-REQUISITES**:* SWITCHING THEORY & LOGIC DESIGN

COURSE OBJECTIVES:

Familiarize and experience on digital electronics components and systems, which are fundamental building blocks of the Computer systems. Experiments are structured to cover extensively the characteristics and features of indispensable digital electronic circuits and systems

SYLLABUS:

List of Exercises / Experiments

(Minimum 8 are mandatory)

1. Realization using logic gates.
2. Combinational circuits: Adder, Subtractor, Magnitude comparator, Parity generator.
3. Multiplexer, Demultiplexer, Encoders and Decoders
4. Study of Flip Flops using gates and Flip Flop.
5. Asynchronous counters – Design of different sequences.
6. Ring and Johnson counter.
7. Synchronous counters – Design.
8. Shift Registers – Right, Left, Serial, Parallel.
9. 7 – Segment display systems (With Counters and Decoders).
10. Basic op-amp circuits: - Zero crossing detector- voltage follower- inverting- non inverting - integrator- differentiator.
11. Astable MV and Schmitt Trigger using op-amp.
12. Applications of 555 as AMV, MMV and Frequency divider.

COURSE OUTCOMES:

On successful completion of the course, the student will be able to:

- Understand the operation of various logic gates and digital ICs.
- Understand the operation of digital displays,flip flops and counters.
- Design and understand different combinational logic circuits.
- Design and understand different sequential logic circuits.
- Design and setup different circuits using IC 741 and IC 555.

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Laboratory practical, record and Viva voce.
30% - Tests.
10% - Regularity in the lab.

Semester-end Practical Examinations *(Maximum Marks-100)*

10% - Record of works done
20% - Viva voce
70% - Procedure and tabulation form, Conducting experiment, results and inference

EN19 401	ENGINEERING MATHEMATICS IV	3-1-0-4

PRE-REQUISITES*: NIL*

COURSE OBJECTIVES:

- To deal with the methods for collection, classification and analysis of numerical data.
- To describe the characteristics and compute probabilities using both discrete and continuous probability distributions.
- To develop hypothesis testing methodology using test statistics.
- To introduce the tools of differentiation and integration of functions of complex variable that are used in various techniques dealing engineering problems.

SYLLABUS:

Module I: **Bivariate Probability Distributions.** (10 hours)

Two random variables-Joint probability mass function- Joint probability density function-Marginal probability distributions-Conditional probability distributions-Independence of random variables - Joint distribution function- Bivariate moments -Conditional expectation- Conditional variance.

Module Il: **Probability Distributions** **(**10 hours)

Random variables - Mean and Variance of probability distributions - Binomial Distribution - Poisson Distribution - Poisson approximation to Binomial distribution - Hypergeometric Distribution – Geometric Distribution - Probability densities - Normal Distribution - Uniform Distribution - Gamma Distribution.

Module III: **Sampling Distributions and Testing of Hypothesis** (12 hours)

Population and Samples - Sampling Distribution - Sampling distribution of Mean (s known) - Sampling Mean (s known) – Sampling distribution of Mean (σ unknown) - Sampling distribution of Variance - Interval Distribution – Confidence interval for Mean - Null Hypothesis and Test of Hypothesis - Hypothesis concerning one mean – Hypothesis concerning two means - Estimation of Variances - Hypothesis concerning one variance - Hypothesis concerning Two variances - Test of Goodness of fit.

Module IV: **Functions of a Complex Variable I** (10 hours)

Functions of a Complex Variable – Limit – Continuity – Derivative of a Complex function – Analytic functions – Cauchy-Riemann Equations – Laplace equation – Harmonic Functions – Conformal Mapping – Examples: e^Z, sin z, cosh z, (z+1/z) – Mobius Transformation.

Module V: **Functions of a Complex Variable II** (10 hours)

Definition of Line integral in the complex plane – Cauchy's integral theorem (Proof of existence of indefinite integral to be omitted) – Independence of path – Cauchy's integral formula – Derivatives of analytic functions (No proof) – Taylor series (No proof) – Laurent series (No proof) – Singularities – Zeros – Poles – Residues – Evaluation of residues – Cauchy's residue theorem – Evaluation of real definite integrals.

COURSE OUTCOME:

At the end of the course the student will be able to:

- Acquire the knowledge of basic ideas of joint probability distributions.
- Acquire the knowledge to describe the characteristics and compute probabilities using both discrete and continuous probability distributions.
- Develops the skills of hypothesis testing methodology using test statistics.
- Distinguish to compute the differentials of various complex function in various engineering problems.
- Acquire the mathematical tools of integration of functions of complex variable that are used in various techniques dealing engineering problems.

TEXT BOOKS:

1. Richard A Johnson, CB Gupta, Miller and Freund's Probability and statistics for Engineers.
2. Wylie C.R and L.C. Barret, Advanced Engineering Mathematics, McGraw Hill.
3. B.S.Grewal, Higher Engineering Mathematics ,Khanna Publishers,35th Edition

REFERENCE BOOKS:

1. Erwin Kreysig, Advanced Engineering Mathematics, 8e, John Wiley and Sons, Inc.
2. N Bali, M Goyal, C Watkins, Advanced Engineering Mathematics, A Computer Approach, 7e, Infinity Science Press, Fire Wall Media.
3. William Hines, Douglas Montgomery, avid Goldman, Connie Borror,Probability and Statistics in Engineering, 4e, John Wiley and Sons, Inc.
4. Sheldon M Ross, Introduction to Probability and Statistics for Engineers and Scientists, 3e, Elsevier, Academic Press.
5. H Parthasarathy, Engineering Mathematics, A Project & Problem base approach, Ane Books India.
6. B V Ramana, Higher Engineering Mathematics, McGrawHill.
7. J K Sharma, Business Mathematics, Theory and Applications, Ane Books India.
8. Babu Ram, Engineering Mathematics Vol. II, 2nd edition, Pearson Education.
9. Sastry S.S., Advanced Engineering Mathematics-Vol. I and II., Prentice Hall of India.
10. T. Veerarajan, Probability, Statistics and Random Processes, Tata McGraw- Hill, 2nd edition.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quizzes, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 402	DIGITAL DATA COMMUNICATION	3-1-0-3

***PRE-REQUISITES**:* NIL

COURSE OBJECTIVES:

- To introduce the basic concepts in communication of digital data by looking at the various aspects of generation, transmission and reception.
- To introduce the various transmission methods in both digital and analog communication.
- To give an overview of the various error detection methods.
- To introduce the concepts of encoding, multiplexing and spread spectrum.

SYLLABUS:

Module I: (10 hours)

Data Communications- Protocols and Standards- Network Models- OSI model, Layers in OSI model, Addressing- **Data and Signals**– Analog and Digital – Periodic analog signals- Digital signals-**Transmission Impairments-** Attenuation, Delay distortion, Noise - **Channel capacity**-Nyquist Bandwidth, Shannon's Capacity formula.

Module II: (11 hours)

Transmission Media- Guided media & Unguided media -**Digital Transmission-Digital to digital** -Line coding schemes, block coding, scrambling, **Analog to digital** – Pulse Code Modulation, delta modulation, **Transmission modes**- Serial transmission, Parallel transmission-**Analog transmission**-**Digital to analog**-Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying-**analog to analog**-Amplitude Modulation, Frequency Modulation, Phase Modulation

Module III: (12 hours)

Error detection and correction-Types of errors-Error detection-CRC, checksum, Linear block code, Cyclic code-**Error correction**- Forward Error Correction and Hamming Distance.
Multiplexing-FDM**,** WDM, TDM, **Spread spectrum**- Direct Sequence Spread Spectrum (DSSS), Frequency Hopping Spread Spectrum (FHSS)

***Module IV**:* (12 hours)

Switching- circuit-switched networks, Structure of Circuit Switch, datagram networks, virtual-circuit networks-**Data link control** – framing – flow control – error control –**Protocol for noiseless channels** –stop and wait protocol– **noisy channels**-stop and wait ARQ, Go-back N ARQ, Selective Repeat ARQ –HDLC – point to point protocol

Module V: (7 hours)

Multiple access-Random-access-ALOHA, CSMA, CSMA/CD, CSMA/CA- **Controlled access**-Reservation, Polling, Token Passing – **Channelization** - FDMA, TDMA, CDMA

COURSE OUTCOMES:

At the end of the course the student will be able to:

- Understand the basics of data communication, OSI model and about analog and digital signals
- Discuss about various methods involved in analog and digital transmission
- Identify and summarize about different error detection techniques and multiplexing techniques for a given scenario.
- Analyze various protocols for noiseless and noisy channels and understanding the basic idea about different types of switched networks
- Analyze various techniques for multiple access and controlled access

TEXT BOOKS:

1. Behrouz A Forouzan, Data Communications and Networking, 8th Edition, Tata McGraw Hill.

REFERENCE BOOKS:

1. William Stallings, Data and Computer Communications, 8th Ed, Pearson Education.
2. Irvine, Data Communications and Networks: An Engineering Approach, 1st edition, Wiley.
3. Fred Halsall, Data Communication, Computer Networks and Open Systems, Pearson Education.
4. Tomasi, Introduction To Data Communication And Networking, 1st edition, Pearson Education

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.
Maximum Total Marks: 100

IT19 403	DATA STRUCTURES AND ALGORITHMS	3-1-0-3

***PRE-REQUISITES**:* NIL

COURSE OBJECTIVES:

- To learn efficient data storage mechanisms for easy access.
- To understand the concepts of ADTs.
- To get a clear understanding of linear and non-linear data structures.
- To study various searching and sorting techniques.

SYLLABUS:

Module I: (9 hours)

Algorithms-Introduction and overview of data structures- Arrays- sparse matrices – representation – Records

Complexity of Algorithms – Time & Space Complexity of Algorithms -Asymptotic Notation, Analysis of simple algorithms – Recursion: Recursive algorithms – Analysis of Recursive algorithms

Module II: (12 hours)

Linear Data Structures – Arrays – representation - Lists — Linked List – singly, doubly and circular lists – Application of linked lists – Polynomial Manipulation –Generalized Linked List (GLL) concept, representation of polynomial using GLL- Stacks – Queues- Stack & Queue implementation using Array & Linked List – Application of stack – Conversion of infix to postfix, Evaluation of postfix expression – Dequeue - priority queues.

Module III: (12 hours)

Non Linear Structures –Trees – Binary trees – representation - Binary tree traversals – pre-order, in-order & postorder – Threaded binary trees – Binary Search trees.

Graphs – representation - Graph traversals – DFS, BFS – shortest path – Dijkstra's and Floyd's algorithm, Minimum spanning tree – Kruskal Algorithm, Prims algorithm.

Module IV: (9 hours)

Searching – Sequential Search – Searching Arrays and Linked Lists – Binary Search –Hashing – Hash functions - Open & Closed Hashing -– Collision Resolution.

Module V: (10 hours)

Sorting – (**n^2**) **Sorts** – Bubble Sort – Insertion Sort – Selection Sort – (**n log n**) **Sorts** – Quick Sort – Heap Sort – Merge Sort – External Sort – Merge Files.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Analyze the performance of algorithms and express those using asymptotic notations.
- Identify and apply suitable data structures like arrays, linked list, stacks and queues to solve real world problems.
- Represent and manipulate data using nonlinear data structures like trees and graphs and use them to design algorithms for various applications.
- Illustrate and compare various techniques for searching and sorting.
- To choose appropriate data structure as applied to specified problem definition.

TEXT BOOKS:

1. Aho A. V., J. E. Hopcroft and J. D. Ullman, Data Structures and Algorithms, Pearson Publication.
2. Samanta D, Classic Data Structures, 2nd Edition , Prentice Hall.

REFERENCE BOOKS:

1. A. M. Tanenbaum, Y. Langsam, M. J. Augenstein, "Data Structures Using C", Pearson Education, 2nd Edition.
2. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, Universities Press, Fundamentals of Data Structures in C,2nd Editon.
3. Anany Levitin, Introduction to the Design and Analysis of Algorithms, Pearson,3rd edition.
4. E. Balagurusamy, "Data Structures Using C", Tata McGraw Hill, 2013.
5. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
6. R.L. Kruse, "Data Structure and Program Design", Prentice Hall, Second Edition.
7. Deshpande P.S, Kakde O.G, C and Data Structures, Dream- tech India Pvt. Ltd.
8. G.S Baluja.,Data Structures through C,Dhanpat Rai & Co.
9. Ashok N Kamthane, Programming and Data Structures, Pearson.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2)
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quizzes, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.
Maximum Total Marks: 100

IT19 404	OPERATING SYSTEMS	3-1-0-4

PRE-REQUISITES*:* NIL

COURSE OBJECTIVES:

- To teach the features of operating systems and the fundamental theory associated with process, memory and file management components of operating systems.
- To impart the key issues in the design of an operating system

.

SYLLABUS:

Module I: (10 hours)

Introduction-Definition– Operating System Structure- Operating System Operations-Process Management- Memory Management- Storage Management- Protection and Security- Distributed Systems- Open Source Operating Systems- Operating-System Services- User Operating-System Interface- System Calls- Types of System Calls-System Boot- System Debugging

Module II: (12 hours)

Process Management-Process Concept- Operations on Processes-Threads-Overview-Multithreading Models-Threading Issues – **CPU Scheduling**- Basic Concepts- Scheduling Criteria-Scheduling Algorithms-**Process Synchronization**- Critical section problem-semaphores- classical problems of synchronization.

Module III: (10hours)

Inter-process Communication- Shared Memory, Message Passing, Pipes -**Deadlocks**- Conditions, Modeling using graphs-Prevention- Avoidance- Recovery.
Memory Management-Swapping- Contiguous Memory Allocation- Paging- Segmentation-Demand Paging

Module IV: (10 hours)

File management -File Concept- Access Methods – Directory and disk structure-file system mounting-file system implementation-File System Structure- File System Implementation-Directory Implementation-Allocation Methods Free-Space Management

Storage Management-Mass Storage Structure- Disk Scheduling- Disk Management- RAID Structure

Module V: (10 hours)

Protection and Security- Protection- Goals of Protection- Principles of Protection- Domain of Protection- Access Matrix-Implementation of Access Matrix-Security- The Security Problem – Program Threats- Firewalling to Protect Systems and Networks – Case Study of Linux and Windows Operating Systems

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Identify the significance of operating system in computing devices.
- Compare and illustrate various process scheduling algorithms.
- Understand solutions to process synchronization problems.
- Apply appropriate memory and file management schemes.
- Illustrate various disk scheduling algorithms.

TEXT BOOKS:

1. Abraham Silberschatz, Peter B Galvin, Greg Gagne, Operating System Concepts, 9/e, Wiley India, 2015.

REFERENCE BOOKS:

1. Garry Nutt, Operating Systems: 3/e, Pearson Education, 2004
2. William Stallings, Operating Systems: Internals and Design Principles, Pearson, Global Edition, 2015.
3. Andrew S Tanenbaum, Herbert Bos, Modern Operating Systems, Pearson, 4/e, 2015

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quizzes, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 405	OBJECT ORIENTED PROGRAMMING USING JAVA	3-1-0-4

PRE-REQUISITES: NIL

OBJECTIVES:

- To familiarize the concept of Object Oriented Programming.
- To give a fair idea about Programming In Java and its use as an Application development tool.

SYLLABUS:

Module I: (10 hours)

Fundamentals of Procedural Languages-Why Do We Need Object-Oriented Programming? - Procedural Languages - The Object-Oriented Approach - Characteristics of Object-Oriented Languages.
Introduction to Java: Basics of Java programming, Data types, Variables, Operators, Arrays in java, Control structures including selection, looping.

Module II: (10 hours)

Review of Object Oriented Concepts – Objects and classes in Java –defining classes – methods – access specifiers – static methods– constructors –overloading - finalize method – packages- Strings–Java Doc comments, Dealing with Errors, Catching Exceptions, Debugging Techniques, Using a Debugger.

Module III: (10 hours)

Inheritance – class hierarchy – polymorphism – dynamic binding – final keyword – abstract classes – the Object class – Reflection – interfaces –object cloning – inner classes-Streams and Files –Use of Streams, Object Streams, File Management.

Module IV: (10 hours)

Multi-threaded programming– Thread properties – Creating a thread –Interrupting threads –Thread priority- thread synchronization – Synchronized method –Inter thread communication.

Applet Basics-The Applet HTML Tags and Attributes, Multimedia, The Applet Context, JAR Files.

Module V: (12 hours)

Database Programming –The Design of JDBC, The Structured Query Language, JDBC Installation, Basic JDBC Programming Concepts, Query Execution, Metadata, Scrollable and Updatable Result Sets, Row Sets, Transactions, Advanced Connection Management.

Remote Objects-Remote Method Invocation, setting up RMI, Parameter passing in Remote Methods.

COURSE OUTCOMES:

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

- Demonstrate the basic principles of object-oriented programming and get a concise understanding of basics of Java.

- Study the concepts of objects and classes, strings, packages and several debugging techniques to solve various computing problems using Java.
- Understand and apply various object oriented features like Inheritance, polymorphism, dynamic binding and file management.
- Get a deep knowledge of multithreaded programming, object streams, Inter thread communication and applet basics.
- Demonstrate an introductory understanding of database programming, design and basic JDBC programming concepts and principles of remote method invocation.

TEXT BOOKS:

1. Barbara Liskov and John Guttag, Program Development in Java, Addison-Wesley Professional, 1st edition.
2. Grady Booch, Robert Maksimchuk, Michael Engle and Jim Conallen, object-Oriented Analysis and Design with Applications, 3rd Ed, Kindle Edition**.**
3. Cay S. Horstmann and Gary Cornell, Core Java: Volume I & II– Fundamentals, 8th Ed, Pearson Education.
4. Herbert Schildt , The Complete Reference Java2, 8th Edition, Tata McGraw Hill

REFERENCE BOOKS :

1. Bruce Eckel, Thinking in java, 4th Ed, Pearson.
2. K. Arnold and J. Gosling, The JAVA programming language, 4th Ed,Pearson Education.
3. Timothy Budd, "Understanding Object-oriented programming with Java", 1st Ed,Pearson Education.
4. Doug Lea, Concurrent programming in Java Design Principles and Patterns,2nd Ed,Pearson Education.
5. George Reese, " Database programming, with JDBC and Java",, 2nd Ed, O'Reilly Media Inc.
6. Bruce Eckel,"Thinking in java", Pearson- 4th Edition.
7. Mahesh P. Matha-Core Java, A Comprehensive Study, 1st Ed,PHI Learning-2011.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

EN19 406	CONSTITUTION OF INDIA	2-0-2-0

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To help the students to concentrate on their day-to-day discipline.
- To give the knowledge and strength to face the society and people.

SYLLABUS:

Module I: (8 hours)

Definition of constitution, historical back ground, salient features of the constitution - Preamble of the constitution, union and its territory - Meaning of citizenship, types, termination of citizenship.

Module II: (12 hours)

Definition of state, fundamental rights, general nature, classification, right to equality, right to freedom, right against exploitation - Right to freedom of religion, cultural and educational rights, right to constitutional remedies. Protection in respect of conviction for offences - Directive principles of state policy, classification of directives, fundamental duties.

Module III: (10 hours)

The Union executive, the President, the vice President, the council of ministers, the Prime minister, Attorney-General, functions - The parliament, composition, Rajya sabha, Lok sabha, qualification and disqualification of membership, functions of parliament - Union judiciary, the supreme court, jurisdiction, appeal by special leave.

Module IV: (9 hours)

The State executive, the Governor, the council of ministers, the Chief minister, advocate general, union Territories - The State Legislature, composition, qualification and disqualification of membership, functions - The state judiciary, the high court, jurisdiction, writs jurisdiction.

Module V: (9 hours)

Relations between the Union and the States, legislative relation, administrative relation, financial Relations, Inter State council, finance commission - Emergency provision, freedom of trade commerce and inter course, comptroller and auditor general of India, public Services, public service commission, administrative Tribunals - Official language, elections, special provisions relating to certain classes, amendment of the Constitution.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to:

- Explain the background of the present constitution of India and features.
- Utilize the fundamental rights and duties.
- Understand the working of the union executive, parliament and judiciary.
- Understand the working of the state executive, legislature and judiciary.
- Utilize the special provisions and statutory institutions.

TEXT BOOKS:

1. D D Basu, Introduction to the constitution of India, Lexis Nexis, New Delhi, 24e, 2019
2. P M Bhakshi, The constitution of India, Universal Law, 14e, 2017

***REFERENCE BOOKS*:**

1. Ministry of law and justice, the constitution of India, Govt of India, New Delhi, 2019.
2. J N Pandey, The constitutional law of India, Central Law agency, Allahabad, 51e, 2019
3. M V Pylee, India's Constitution, S Chand and company, New Delhi, 16e, 2016

Internal Continuous Assessment *(Maximum Marks-100)*

70% - Tests (minimum 2)

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class

IT19 407(P)	DATA STRUCTURES LAB	0-0-3-1

***PRE-REQUISITES**:* DATA STRUCTURES AND ALGORITHMS

COURSE OBJECTIVES:

- To implement linear and non-linear data structures
- To understand the different operations of search trees
- To implement graph traversal algorithms
- To get familiarized with various sorting and searching algorithms

SYLLABUS:

List of Exercises / Experiments

(Minimum of 8 mandatory)

1. Linked list operations: Insertion and Deletion operation at the beginning, at the end and after a given node and traversal
2. Stack and Queue: Implementation using arrays and Linked lists
3. Searching Methods: Binary search and Hashing
4. Binary Search Tree. Implementation with insertion, deletion and traversal
5. Sorting: Recursive implementation of Quick Sort and Merge Sort
6. Graph Search Algorithms: DFS and BFS on a connected directed graph
7. Minimal Spanning Tree. Implementation of Kruskal's and Prim's Algorithms
8. Shortest Path Algorithm. Dijkstra and Floyd Warshall Algorithsm
9. Conversion of infix to postfix
10. Infix Expression Evaluation: Using expression tree
11. Applications of Heap: Priority Queue and Heap Sort.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to:

- Implement basic data structures such as arrays, linked lists, stacks and queues.
- Apply programming techniques using pointers, dynamic memory allocation and structures to implement data structures: stack, queue, tree and graph
- Develop programs for implementing trees and their traversal operations.
- Implement graph traversal algorithms.
- Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.

Internal Continuous Assessment (*Maximum Marks-50*)

60% - Laboratory practical, record and viva voce.
30% - Tests.
10% - Regularity in the lab.

End Semester Practical Examination *(Maximum Marks-100)*

70% - Algorithm, coding, compiling and executing, result and inference
20% - Viva voce
10% - Fair record

IT19 408(P)	OBJECT ORIENTED PROGRAMMING LAB USING JAVA	0-0-3-1

***PRE-REQUISITES**:* OBJECT ORIENTED PROGRAMMING USING JAVA

COURSE OBJECTIVES:

- Provide hands-on experience to students in implementing object-oriented programming concepts

SYLLABUS:

List of Exercises / Experiments

(Minimum of 8 mandatory)

1. Introduction to objects, classes, compiling and execution of a java programs.
2. Data types, variables, Loop control structures.
3. Polymorphism, Inheritance, Abstract class, Interface, Inner classes, wrapper classes, cloning, Reflection.
4. Packages.
5. Exception Handling and Java Threads.
6. Files Handling
7. Java Applets.
8. awt & swing.
9. Database connectivity using JDBC-ODBC drivers.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to:

- Design, develop and troubleshoot software based on object-oriented programming methodologies.
- Develop and implement java programs for simple applications that make use of classes, packages, interfaces and polymorphism.
- Develop and implement java programs with array list, exception handling and threads.
- Implement file handling, java applets, awt & swing.
- Implement database connectivity using JDBC-ODBC drivers.

Internal Continuous Assessment *(Maximum Marks-50)*

60% - Laboratory practical, record and Viva voce.
30% - Tests.
10% - Regularity in the lab.

End Semester Practical Examination *(Maximum Marks-100)*

70% - Algorithm, coding, compiling and executing, result and inference
20% - Viva voce
10% - Fair record

EN19 501	ENGINEERING ECONOMICS AND PRINCIPLES OF MANAGEMENT	3-1-0-3

SECTION 1: ENGINEERING ECONOMICS

***PRE-REQUISITES**:* NIL

COURSE OBJECTIVES:

- To make fundamentally strong base for decision making skills by applying the concepts of economics.
- Educate the students on how to systematically evaluate the various cost elements of a typical manufactured product, an engineering project or service, with a view to determining the price offer.
- Prepare engineering students to analyse profit/revenue data and carry out make economic analysis in the decision making process to justify or reject alternatives/projects.

SYLLABUS:

Module I: (11 hours)

Introduction to Engineering Economics – Technical efficiency, Economic efficiency.

Supply and Demand: Determinants of demand, Law of demand, Determinants of supply, Law of supply, Market equilibrium. Elasticity of demand – Types of elasticity, Factors affecting the price elasticity of demand - Utility analysis, indifference curves, Law of equimarginal utility, marginal utility theory, Law of diminishing marginal utility -production possibility curve Production concepts-average product-marginal product-law of variable proportions, Isoquant.

Module II: (10 hours)

Value Analysis - Time value of money - Interest formulae and their applications: Single-payment compound amount factor, Single-payment present worth factor, Equal-payment series compound amount factor, Equal-payment series sinking fund factor, Equal-payment series present worth factor, Equal-payment series capital recovery factor, Effective interest rate.
Investment criteria: Pay Back Period, Net Present Value, Internal Rate of Return, Benefit-cost ratio.

COURSE OUTCOMES:

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

- Understand the basic concepts used in engineering economics and apply the basics of economics and cost analysis to take economically sound decisions.
- Understand Time Value of Money and apply suitable cash flow methods for different situations.

TEXT BOOKS:

1. Panneer Selvam, R, ―Engineering Economics, Prentice Hall of India Ltd, New Delhi, 2001.
2. Dwivedi, D.N., "Managerial Economics, 7/E", Vikas Publishing House, 2009.
3. Salvatore D. Managerial Economics: Principles and Worldwide Application:(adapted version), OUP Catalogue, 2012.

REFERENCE BOOKS:

1. Sullivan, W.G, Wicks, M.W., and Koelling. C.P., ―Engineering Economy 15/E, Prentice Hall, New York, 2011.
2. Chan S. Park, ―Contemporary Engineering Economics, Prentice Hall of India, 2002.
3. Prasanna Chandra, ―Financial Management: Theory & Practice, 8/E, Tata-McGraw Hill, 2011.
4. Rangarajan C. Indian economy: essays on money and finance. UBS Publishers' Distributors; 1999.

Internal Continuous Assessment *(Maximum Marks-20)*

70% - Tests (minimum 2)
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class

University Examination Pattern *(Maximum Marks-40)*

PART A*: Analytical/problem solving SHORT questions* ***4 x 5 marks= 20 marks***
Candidates have to answer FOUR questions out of SIX. There shall be THREE questions from each module with total SIX questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***2 x 10 marks= 20 marks***
Two questions from each module with choice to answer one question.

SECTION 2:

PRINCIPLES OF MANAGEMENT

PRE-REQUISITE: NIL

COURSE OBJECTIVES:

- To develop ability to analyse and evaluate a management process and variety of management practices in the contemporary context;
- To understand and apply the basic concepts of functional areas of management like Human resources, Marketing and Finance;
- To be able to evaluate managerial decision making process, project management techniques, developing innovative products and social responsibility ideologies to create sustainable organisations;
- To be able to understand existing managerial practices to create their own innovative management competencies, required for complex global workplace.

SYLLABUS:

Module III: (10 hours)

The management process: managerial skills and roles, evolution of management theory; principles of planning: types of plans, steps in planning; principles of organizing: organizational structures; directing; motivation; controlling; sustainability in management.

Module IV: (11 hours)

Human resource management: human resource planning, performance metrics.
Marketing management: fundamentals of marketing, market segmentation, consumer and industrial markets.
Financial management: Basic principles of: double entry book keeping, financial statements, sources of finance, classification of costs, break-even analysis (Basic concepts only).

Module V: (10 hours)

Managerial decision making process: decision making under certainty, risk and uncertainty; network techniques for project management: critical path method (CPM); Programme Evaluation and Review Technique (PERT): time/cost trade-off in critical path networks (simple problems only).
Entrepreneurial processes: analysis of new ventures/start-ups, creating innovative products/services and business plans, importance of corporate social responsibility

COURSE OUTCOMES:

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

- Understand the roles, skills and functions of management.
- Understand the basic concept of human resources, marketing and financial management in the organizations and integrate the learning in handling these complexities.
- Apply the concept of decision making, network techniques, analysis of new venturers as a part of project management / an organization.

TEXT BOOKS:

1. H. Koontz, and H. Weihrich, *Essentials of Management: An International Perspective*, 10th Edition. McGraw-Hill, 2015.
2. Ramesh Unnikrishnan, Principles of Management, Educational Publishers and Distributers, 2021.
3. O. P. Khanna, Industrial Engineering and Management, 17th Edition, Dhanpat Rai Publications, 2018.

REFERENCE BOOKS:

1. R. W. Griffin, *Management: Principles and Applications*. 10th Edition, Cengage Learning, 2008.
2. P. Kotler, K. L. Keller, A. Koshy, and M. Jha, *Marketing Management: A South Asian Perspective,* 15th ed. Pearson, 2014.
3. M. Y. Khan, and P. K. Jain, *Financial Management*. 8th Edition Tata-McGraw Hill, 2018.
4. Heinz Weirich, Mark V Cannice and Harold Koontz, Management: a Global, Innovative and Entrepreneurial Perspective, 14th Edition, McGraw Hill Education,2013.

Internal Continuous Assessment *(Maximum Marks-30)*

70% - Tests (minimum 2)
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class

University Examination Pattern *(Maximum Marks-60)*

PART A*: Analytical/problem solving SHORT questions* ***6 x 5 marks= 30 marks***
Candidates have to answer SIX questions out of NINE. There shall be THREE questions from each module with total NINE questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions **3 x 10 marks= 30 marks
Two questions from each module with choice to answer one question.

Note: Section 1 and Section 2 are to be answered in separate answer books.
Maximum 40 marks and 60 marks for Section 1 and Section 2 respectively.

IT19 502	SIGNALS AND SYSTEMS	3-1-0-3

PRE-REQUISITES*:* NIL

COURSE OBJECTIVES:

- To introduce the student to the idea of signals, system analysis and its characterization.
- To study and analyze continuous and discrete-time signals and systems and their properties.
- To represent the signals using various analysis tools and apply transfer function to compute LTI response of system.
- To apply the sampling process for discretization of signals and reconstruction from its samples.

SYLLABUS:

Module I: (14 hours)

Signals – classification – continuous-time/discrete-time, deterministic/nondeterministic, periodic/ aperiodic, even/odd, energy/power signals – elementary signals -Basic operations on signals System – classification – continuous-time/discrete-time, static/dynamic, linear/non-linear, time-invariant/variant, deterministic/stochastic, causal/noncausal, stable/unstable. Linear Time Invariant (LTI) systems – properties - Linear Constant-Coefficient Differential equations for continuous LTI systems-Linear Constant Coefficient Difference Equations (LCCDE) -impulse response – convolution integral – convolution-sum – condition for BIBO stability for CT and DT signals in terms of impulse response.

Module II: (9 hours)

Frequency domain representation of continuous time signals – Periodic signals – continuous-time Fourier series (CTFS) – Trigonometric and exponential – symmetry conditions – amplitude & phase spectrum – properties of CTFS – Parserval's theorem for power signals – power spectral density. Non-periodic signals – continuous-time Fourier transform (CTFT) – amplitude & phase spectra – gate function – sampling function – properties – convolution – Parseval's theorem for energy signals – energy-spectral density – Frequency response.

Module III: (9 hours)

Laplace transform analysis of systems- Unilateral and Bilateral Laplace Transforms- ROC-Properties, relation between Laplace transform and Fourier transform– poles and zeros – pole-zero plots- Causality and Stability- Inverse system- Determining the frequency response from poles and zeros.

Module IV: (9 hours)

Frequency domain representation of continuous time signals -Periodic signals – Discrete-time Fourier series (DTFS) – properties of DTFS – aperiodic signals – discrete-time Fourier transform (DTFT) – properties of DTFT – Parseval's theorem – energy spectral density – frequency response – sampling – sampling theorem – impulse train – Nyquist rate – aliasing.

Module V: (11 hours)

Z-transform – Region of Convergence (ROC) – properties – inverse Z-transform – convolution – Long division method, partial fraction expansion method, residue method – one-sided Z Transform – properties – initial value & final value theorem - solution of LCCDE with initial conditions – zero input response and zero state response – system function – poles and zeros – basic concept of BIBO stability-Relation between DTFT and Z-Transform

COURSE OUTCOMES:

On successful completion of the course, the student will be able to:

- Define and represent basic properties of continuous and discrete time signals and systems.
- Represent the continuous time signals in Fourier series and explain the properties of Fourier transform and Laplace transform.
- Represent continuous and discrete systems in time and frequency domain using different transforms.
- Investigate the stability of LTI systems using transforms.
- Describe sampling theorem techniques for sampling and reconstruction.

TEXT BOOKS:

1. A.V. Oppenheim, A.S. Willsky and I.T. Young, "Signals and Systems", Prentice Hall,1983.
2. Simon Haykin, Barry van Veen, "Signals and Systems", John Wiley and Sons (Asia) Private Limited, 1998
3. B.P. Lathi, "Signal Processing and Linear Systems", Oxford University Press, 1998.

REFERENCE BOOKS:

1. P Ramesh Babu, R Anandanatarajan, "Signals and Systems", Fourth edition, Sci Tech Publications.
2. A Anand Kumar, "Signals and Systems", Third edition, PHI Learning Publications.
3. J. Nagrath, S. N. Sharan, R. Ranjan, S. Kumar, "Signals and Systems", TMH New Delhi, 2001.

4. Ashok Ambardar,"Analog and Digital Signal Processing", 2nd Edition, Brooks/ Cole Publishing Company (An international Thomson Publishing Company), 1999.
5. D Ganesh Rao, Satish Tunga, “Signals and Systems”, Sanguine Technical Publishers.
6. Robert A. Gabel, Richard A. Roberts, "Signals and Linear Systems", John Wiley and Sons, 1995.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, simulation assignments etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 503	DATABASE MANAGEMENT SYSTEMS	3-1-0-4

***PRE-REQUISITES**:* NIL

***COURSE OBJECTIVES*:**

- To learn the modeling and design of databases.
- Emphasis on how to organize, maintain and retrieve efficiently, and effectively - information from a DBMS.

SYLLABUS:

Module I: (13 hours)

Introduction: Characteristics of database approach –Database Users- Advantages of using DBMS – Categories of Data Models – schemas, instances and Database State –Three Schema Architecture and Data Independence – database languages and interfaces – Database modeling using entity-relationship (ER) – entity sets, attributes and keys. Relationship Types, Relationship Sets, Roles and structural constraints – weak entity types – enhanced entity-relationship (EER) and object modeling – subclasses – super classes and inheritance – specialization and generalization.

Module II: (11 hours)

Relational model concepts – Relational model constraints and Relational Database Schemas-Relational algebra – Tuple Relational Calculus-Domain Relational Calculus –Relational Database Design using ER– ER-to-Relational mapping -queries in SQL –DDL and DML-SQL views.

Module III: (11 hours)

Database design: functional dependencies – Inference Rules for Functional Dependencies – Closure – Minimal Cover –Normal forms –First, second and third normal forms – Boyce-Codd normal form – Properties of Relational Decompositions –Algorithms for Relational database design- Multi-valued dependencies and fourth normal form (general definitions) – join dependencies and fifth normal form (general definitions) – inclusion Dependencies (general definitions).

Module IV: (11 hours)

Transaction processing: desirable properties of transactions, Characterizing Schedules Based on Recoverability and Serializability – concurrency control Techniques –Two-Phase Locking – Timestamp ordering- Multi-version concurrency control – Validation (Optimistic) concurrency control- Granularity of Data Items and Multiple Granularity Locking – Database recovery techniques –based on deferred update and immediate update – shadow paging – ARIES recovery algorithm.

Module V: (6 hours)

Introduction to Database security –issues- access control based on granting/revoking of privileges- Advanced topics: Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.

COURSE OUTCOMES:

On successful completion of the course, the student will be able to:

- Explain the differences between database design and conventional programming.
- Develop an in-depth understanding of relational databases and skills to optimize database performance in practice.
- Design ER-models to represent simple database application scenarios.
- Apply normalization to improve the database design.
- Understand the issues in database security.

TEXT BOOKS:

1. Elmasri & Navathe, Fundamentals of Database Systems, Pearson Education, 2016, 7^{th} Edition.
2. Avi Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, 2016, 6^{th} Edition.

REFERENCE BOOKS:

1. Christopher J. Date, An Introduction to Database Systems 8^{th} Ed.
2. Héctor García-Molina, Jeffrey Ullman, and Jennifer Widom, Database Systems: The Complete Book 2^{nd} Ed.
3. An Introduction to Database Systems – Bibin C. Desai, Galgotia Publications.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 504	THEORY OF COMPUTATION	3-1-0-4

***PRE-REQUISITES**:* NIL

COURSE OBJECTIVES:

- To teach the fundamentals on computational models and computability.
- To introduce the introductory concepts of languages and their classification.
- To familiarize the students on recognizers and automata.
- To impart knowledge on classifying algorithms into the various computability classes and proofs of some standard algorithms.

SYLLABUS:

Module I: (9 hours)

Introduction to formal proof- Deductive proofs, Reductions to definitions, Inductive proof – Introduction to Automata Theory and its significance – Deterministic finite automata – Nondeterministic finite Automata-Definition, Extended transition function, Language of an NFA, Equivalence of deterministic and nondeterministic finite automata –Finite automata with ε transitions.

Module II: (9 hours)

Regular expressions – Finite automata and regular expressions – Algebraic laws for Regular expressions –Pumping lemma for regular languages – closure properties of regular languages – Decision properties of regular languages –Equivalence and minimization of automata.

Module III: (12 hours)

Context free Grammars – Definition, Derivations, The language of grammar, Sentential forms. Parse trees – Constructing parse tree, The yield of a parse tree, Inference, Derivations, and Parse tree. Ambiguity in grammar and languages. Pushdown automata – Formal definition, Graphical notation. The language of a PDA – Equivalence of PDA and CFG – Deterministic PDAs – Chomsky Normal Form –Greibach Normal form – Pumping lemma for CFLs.

Module IV: (12 hours)

Context-sensitive Grammar-Linear Bounded Automata (Design not required) Turing Machines – Notation – Instantaneous Description –Transition Diagram – The language of a Turing Machine – Halting of TMs –Programming techniques for Turing Machines – Extension to basic TMs – Nondeterministic TMs – Restricted TMs –Universal Turing Machine- Recursive and Recursively Enumerable Languages –Properties of Recursively Enumerable Languages.

Module V: (10 hours)

Halting problem of TMs – Undecidable problem about TMs –Rice's Theorem – Post Correspondence problem – Undecidability of Post Correspondence Problem – Undecidable problems on Languages. Intractable problems – The classes P and NP – Polynomial time reducibility –NP Complete problems.

COURSE OUTCOMES:

On successful completion of the course, the student will be able to:

- Classify formal languages into regular, context-free, context sensitive and unrestricted languages.
- Design finite state automata, regular grammar and regular expression.
- Design push-down automata and context-free grammar representations for context-free languages.
- Design Turing Machines for accepting recursively enumerable languages.
- Understand the notions of decidability and undecidability of problems, Halting problems.

TEXT BOOKS:

1. Hopcroft J.E, Motwani R & Ullman J. D., Introduction to Automata Theory, Languages and Computation, 3rd edition, Pearson Education, 2008.

REFERENCE BOOKS:

1. Misra & Chandrasekhar, Theory of computer science: Automata, Language and Computation, 3rd Edition, Prentice Hall India Learning Private Limited,2006.
2. Linz: P., An Introduction to Formal Languages & Automata, Narosa, 6th Edition, Jones & Bartlett learning, 2016.
3. Martin I C, Introduction to Languages and the Theory of Computation, 3rd edition, Tata McGraw Hill, 2002.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 505	SOFTWARE ENGINEERING	3-1-0-3

***PRE-REQUISITES**:* NIL

COURSE OBJECTIVES:

- To introduce the fundamental concepts of software engineering.
- To build an understanding on various phases of software development.
- To introduce various software process models.

SYLLABUS:

Module I: (12 hours)

Introduction to Software Engineering-Definition & Principles of Software Engineering, Software Characteristics- Causes & Solution of Software Crisis, **Software Life Cycles**- Methods and Description of Classical Water fall Model - Iterative water fall life cycle Model, Prototyping/Rapid Prototyping Model and Spiral Model -**Requirements analysis and specification**- Requirement gathering and analysis – Software Requirement Specification- Agile Software Development Methods-Case Study -DevOPS and continuous integration.

Module II: (10 hours)

Software Design – Overview of design process– Cohesion and Coupling -**Function oriented software design**- Structured analysis, Structured Design- **Object Oriented Design** – Object oriented concepts, UML Diagram, Use case Diagram- Class Diagram- Interaction Diagram- Activity diagram – State chart diagram – Each with examples – Design Patterns.

Module III: (10 hours)

Coding - Coding standards and Guidelines- **Code Review** – Software Documentation- **Testing** – Unit testing – Blackbox testing – Whitebox testing – Integration testing – System testing – **Debugging** – Debugging approaches, Debugging guidelines.

Module IV: (8 hours)

Software Maintenance – Characteristics of software maintenance, Software reverse engineering, Estimation of maintenance cost – **Software Quality** – Software quality models – Software Quality Management System – ISO 9000 – Capability Maturity Model.

Module V: (10 hours)

Software Project Management – Responsibilities of software project manager – Metrics for project estimation – Project estimation techniques – COCOMO Model – Basic COCOMO, Intermediate COCOMO, Complete COCOMO, COCOMO2 – **Scheduling** – Activity networks, Critical Path Method, Pert chart, Gantt Chart – **Computer Aided Software Engineering** - Scope,

Environment, CASE support in software lifecycle, Characteristics of CASE tools.

COURSE OUTCOMES:

On successful completion of the course, the student will be able to:

- Identify suitable life cycle models to be used.
- Analyze a problem and identify and define the computing requirements to the problem.
- Translate a requirement specification to a design using an appropriate software engineering methodology.
- Formulate appropriate testing strategy for the given software system.
- Develop software projects based on current technology, by managing resources economically and keeping ethical values.

TEXT BOOKS:

1. Rajib Mall, Fundamentals of Software Engineering, 5th Edition.
2. Roger S Pressman, Software Engineering: A Practitioner's Approach, 6th edition, McGraw Hill, 2008.

REFERENCE BOOKS:

1. Pankaj Jalote, Software Engineering: A Precise Approach, 7th Edition, Narosa Publications.
2. Ian Sommerville, Software Engineering, 9th Edition, Addison-Wesley.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 506(A)	WEB AND INTERNET TECHNOLOGY	3-1-0-3

***PRE-REQUISITES**:* NIL

COURSE OBJECTIVES:

- To impart the design, development and implementation of Dynamic Web Pages.
- To develop programs for the Web using Scripting Languages.
- To introduce the algorithms and protocols implemented to have human interaction with the internet.
- To introduce multimedia networking.

SYLLABUS:

Module I: (10 hours)

Introduction to Web programming: Origins and Evolution of HTML and XHTML, Basic Syntax of HTML, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, HTML5, HTML Vs XHTML – XML – HTML Vs XML – Creating XML documents– Introduction to CSS Frameworks.

Module II: (9 hours)

Introduction to JavaScript: Overview of JavaScript – Introduction to scripting, Control Statements, Object Creation and Modification, Arrays, Functions.

Module III: (9 hours)

PHP: PHP - Defining PHP variables, variable types, operators, arrays, strings, and control flow constructs in PHP.

Module IV: (10 hours)

Network Applications - Client-Server interaction - Socket Interface - Connection Oriented Service - Simple Client and Server example - Domain Name System - Electronic Mail Representation and Transfer - VoIP - File Transfer and Remote File Access - RPC and Middleware - Initialization.

Module V: (10 hours)

Multimedia networking - applications - streaming stored audio and video – internet telephony – RTP – scheduling and policing mechanisms – integrated services – RSVP –differentiated services – network management – the internet network management framework – network security – integrity, Access control attacks & control measures.

COURSE OUTCOMES:

On successful completion of the course, the student will be able to:

- Develop interactive Web pages using HTML/XHTML.
- Present a professional document using Cascaded Style Sheets.
- Construct websites for user interactions using JavaScript.
- Develop Web applications using PHP.
- Get a basic idea of Multimedia Networking.

TEXT BOOKS:

1. P. J. Deitel, H.M. Deitel, Internet &World Wide Web How To Program, 4/e, Pearson International Edition 2010.
2. Douglas E. Comer, Computer Networks and Internets with Internet Applications – Pearson Education.

REFERENCE BOOKS:

1. Robert W. Sebesta, Programming with World Wide Web, 4th edition, Pearson Education, 2009.
2. Greenlaw R. &HeppE.,In-line / On-line: Fundamentals of the Internet and the World Wide WebTata McGraw Hill.
3. Kurose J.F. & Ross K.W, Computer Networking: A Top -Down Approach Featuring the Internet Pearson Education.
4. Nalin K. Sharda, Multimedia Information Networking – Prentice Hall of India.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 506(B)	ADVANCED DATA STRUCTURES	3-1-0-3

PRE-REQUISITES: DATA STRUCTURES AND ALGORITHMS

COURSE OBJECTIVES:

- To learn advanced concepts in data structures.
- Be exposed to searching, sorting and hashing algorithms.

SYLLABUS:

Module I: (8 hours)

Review of Basic Concepts: Abstract data types –List ADT- Doubly Linked Lists – Circularly Linked List - Application of linked lists - Debugging pointers - dangling pointers- memory leaks- Recursion-Algorithm Analysis-Big Oh, Omega and Theta notations- Solving recurrence equations- Masters Theorem.

Module II: (13 hours)

Trees: Binary Search Trees - Threaded binary trees -Splay trees - Amortized analysis - 2-3 trees- 2-3-4 trees - Red-black trees - B Tree - B+ Tree- AVL Trees - Randomized structures - Skip lists – Treaps.

Module III: (8 hours)

Hashing: Collision Resolution: Separate Chaining: Open Addressing- Linear Probing- Quadratic Probing- Double Hashing- Rehashing- Universal Hash Functions.
Pattern matching: Pattern matching algorithms- the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm.

Module IV: (10 hours)

Graph Algorithms: DFS- BFS- Topological Sort- Bi-connected components- Cut vertices- Matching-Network flow- Advanced Structures for Priority Queues and Their Extensions- Binomial heaps- Leftist heaps -Skewed heaps- Fibonacci heaps and its application on dijkstra's algorithm.

Module V: (11 hours)

External and internal sorting algorithms - Insertion Sort-Shell sort- Heap Sort-Merge Sort- Quick Sort- Radix Sort- Algorithm Analysis-Sorting Large Structures – Decision Trees- Memory Management -Managing Equal Sized Blocks – Garbage Collection Algorithms for Equal Sized Blocks – Storage Allocation for Objects with Mixed Sizes – Buddy Systems – Storage Compaction

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- extend the student's knowledge of algorithms and data structures.
- learn a variety of useful algorithms and techniques.
- understand the differences types of tree structures.
- analyze data structure impact on algorithms, program design and program performance.
- select appropriate design techniques to solve real world problems.

TEXT BOOKS:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, Pearson Education, 2nd edition.

REFERENCE BOOKS:

1. Robert Kruse, C L Tondo, Bruce Leung, Shashi Mogalla, Data Structures And Program Design In C, Pearson Education.
2. Debasis Samanta, Classic Data Structures,2nd Edition, Prentice Hall.
3. Yedidyah Lansam, Moshe J. Augenstein, Aaron M. Tenenbaum, Data Structures Using C and C++, PHI.
4. Ellis Horowitz, Sartaj Sahni, Fundamentals of Data Structures.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks*** Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 506(C)	INFORMATION THEORY AND CODING	3-1-0-3

***PRE-REQUISITES**:* DIGITAL DATA COMMUNICATION

COURSE OBJECTIVES:

- To provide basic concepts of Information theory
- To enable the students to propose, design and analyse suitable coding/decoding scheme for a particular digital communication application

SYLLABUS:

Module I: (11 hours)

Coding for Reliable Digital Transmission and storage

Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies.

Source Codes: Shannon-fano coding, Huffman coding, Lempel Ziv Coding

Module II: (10 hours)

Introduction to algebra - groups - fields - binary field arithmetic –***Galois Fields- Properties- Polynomials over GF (2)***-Extension Field of Galois- Construction of Galois field - basic properties - Computations - vector spaces and matrices - Dual/ Null matrices-Concept of G and H matrices.

Module III: (11 hours)

Linear Block Codes:

Introduction to Linear Block Codes- Generation of (n, k) linear block codes, Encoding Method- Encoder diagram- Decoding of LBC- Syndrome Decoding, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities, Standard array - Probability of an undetected error over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system.

Module IV: (10 hours)

Cyclic Codes:

Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding, Cyclic Hamming Codes, shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes, BCH and RS codes.

Module V: (10 hours)

Convolutional Codes:

Encoding of Convolutional Codes- ***Time and frequency domain approaches***-Structural and Distance Properties, state, tree, trellis diagrams, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes. Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in the ARQ system.

COURSE OUTCOMES:

On completion of the course, student will be able to:

- Learn the measurement of information and different source coding methods.
- Understand mathematical concepts related to coding.
- Gain knowledge about encoding and decoding of linear block codes and their error correcting capabilities.
- Understand channel coding using cyclic codes and BCH codes.
- Understand the encoding and decoding of convolutional codes with its applications.

TEXT BOOKS:

1. Information Theory and Coding, Norman Abramson, McGraw-Hill, 1963.
2. Error Control Coding- Fundamentals and Applications –Shu Lin, Daniel J.Costello,Jr, Prentice Hall, Inc 2014.
3. Error Correcting Coding Theory-Man Young Rhee, McGraw – Hill Publishing 1989.

REFERENCE BOOKS:

1. Digital Communications- John G. Proakis, 5^{th} ed., TMH 2008.
2. Introduction to Error Control Codes-Salvatore Gravano- Oxford University Press, 2001.
3. Error Correction Coding – Mathematical Methods and Algorithms – Todd K.Moon, 2006, Wiley India.
4. Information Theory, Coding and Cryptography – Ranjan Bose, 2nd Edition, 2009, TMH.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 506(D)	QUEUING THEORY & MODELLING	3-1-0-3

***PRE-REQUISITES**:* NIL

COURSE OBJECTIVES:

- To understand the basic concepts of queuing theory principles.
- To define and characterize a Queuing process.
- To define and identify Queuing models.
- To apply Queuing models in various fields.

SYLLABUS:

Module I: (12 hours)

Queuing Processes

Introduction-Queuing processes-Notation-Transient and steady-state behaviour-limitations of the steady-state distributions-some general relationship in Queuing theory-Poisson arrival processes and its characteristics.

Module II: (10 hours)

Queuing theory

Queuing theory: The simple M/M/1 Queue- steady state solutions of M/M/1-waiting-time distributions-the output process-semi Markov process analysis – system with limited waiting space: The M/M/1/K model-steady state solutions -expected number in the system Lk -equivalence of an M/M/1/K model with a two -stage cyclic model.

Module III: (10 hours)

Queuing Model I

The birth and death processes: Exponential models-the M/M/∞ model: Exponential model with an Infinite number of Servers- The model M/M/c- The M/M/c/c system: Erlang Loss model- Model with Finite input source- Transient behaviour- Transient -state distributions of the M/M/c Model.

Module IV: (10 hours)

Queuing Model II

Symbolic Representation of a queueing model-Difference equations related to Poisson Queue systems-Values of Po and Pn for Poisson Queue systems-Relation among E(Ns), E(Nq), E(Ws) and E(Wq).

Module V: (10 hours)

Queuing Model III

Characteristics of Infinite capacity- Single Server Poisson Queue model I(M/M/1): (∞/FIFO) model-Characteristics of Infinite capacity-Mutiple Server Poisson Queue model II(M/M/s) : (∞/FIFO) model-Characteristics of Finite capacity- Single Server Poisson Queue model III(M/M/1) : (k/FIFO) model- Characteristics of Finite capacity- Mutiple Server Poisson Queue model III(M/M/1): (k/FIFO) model.

COURSE OUTCOMES:

On completion of the course, student will be able to:

- Use the tools of Queuing theory.
- Characterizes the various Queuing processes.
- Develops the idea of Queuing models.
- Develops the skills of Queuing models in various fields.
- Acquires the skills to apply Queuing models in various fields.

TEXT BOOKS:

1. T. Veerarajan, "Probability, Statistics and Random Processes", Tata McGraw Hill Publishing Company Ltd., 2003.
2. Medhi J., "Stochastic Processes", New Age International, 2012.

REFERENCE BOOKS:

1. Samuel Karlin and Howard M. Taylor, "A Second Course in Stochastic Processes", Academic Press, 1981.
2. Narayan Bhat U and Gregory K Miller "Elements of applied stochastic processes" Wiley - Inter science, 3rd edition, 2002.
3. Basu, A.K., "Elements of Stochastic Processes", Narosa Publications, 2002.
4. Ross S.M., "Stochastic Processes", John Wiley & Sons, 3rd Edition, 2010.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 506(E)	LOGIC FOR COMPUTER SCIENCE	3-1-0-3

***PRE-REQUISITES**:* DISCRETE COMPUTATIONAL STRUCTURES

COURSE OBJECTIVES:

- To introduce the concept of mathematical logic and its importance
- To discuss propositional, predicate, temporal and modal logic and their applications

SYLLABUS:

Module I: (12 hours)

Introductory concept: Mathematical Logic, Propositional logic, First order logic, Modal and Temporal Logic

Module II: (13 hours)

Propositional logic: Formulae and interpretations, Equivalence, Satisfiability and Validity, semantic Tableau-soundness-completeness

Module III: (13 hours)

Hilbert Deductive system, Derived rules, Theorems and operators, Soundness and completeness, consistency Hilbert Deductive system for predicate logic functions, PCNF and clausal form, Herbrand model.

Module IV: (7 hours)

Resolution in predicate logic: Ground resolution, substitution, unification general resolution. Temporal Logic: Syntax and Semantics, models of time, linear time temporal logic, semantic tableaux, Deduction system of temporal logic

Module V: (7 hours)

Program Verification, Need for verification, Framework for verification, verification of sequential programs, deductive systems, verification, synthesis

COURSE OUTCOMES:

On completion of the course, student will be able to:

- Develop an idea for Mathematical Logic
- Develop the idea for Propositional Logic
- Understand the basic idea of Hibert Deductive System
- Get a basic idea of Predicate Logic
- Get a basic idea of Program Verification

TEXT BOOKS:

1. Mark de Berg, Otfried Cheong, Marc van Kreveld, Mark Overmars, Computational Geometry: Algorithms and Applications, Springer Science & Business Media, 2008.
2. Franco P. Preparata, Michael I. Shamos, Computational Geometry: An Introduction, Springer,1985.
3. Herbert Edelsbrunner, Algorithms in Combinatorial Geometry, EATCS Monographs in Computer Science, SpringerVerlag, 1987

REFERENCE BOOKS:

1. Satyan L. Devadoss, Joseph O ;Rourke, Discrete and Computational Geometry, Princeton University Press, 2011

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 506(F)	DISTRIBUTED SYSTEMS	3-1-0-3

***PRE-REQUISITES**:* OPERATING SYSTEMS

COURSE OBJECTIVES:

- To introduce the fundamental principles of distributed systems, technical challenges and key design issues.
- To impart knowledge of the distributed computing models, algorithms and the design of distributed system.

SYLLABUS:

Module I: (10 hours)

Characterization of Distributed Systems-Introduction-Examples-Resource Sharing and the Web-Challenges. System Models-Architectural-Fundamental. Inter process Communication-Introduction-API for Internet protocols-External data representation and marshaling-Client-server communication-Group communication- Case study: Inter process Communication in UNIX.

Module II: (10 hours)

Distributed Objects and Remote Invocation-Introduction-Communication between distributed objects-Remote procedure calls-Events and notifications-Case study: Java RMI. Operating System Support-Introduction-OS layer-Protection-Processes and threads- Communication and invocation OS architecture.

Module III: (9 hours)

Distributed File Systems-Introduction-File service architecture-Case Study: Sun Network File System-Enhancements and further developments. Name Services-Introduction-Name Services and the Domain Name System-Directory Services-Case Study: Global Name Service

Module IV: (9 hours)

Time and Global States-Introduction-Clocks, events and process states-Synchronizing physical clocks-Logical time and logical clocks-Global states-Distributed debugging.

Module V: (14 hours)

Coordination and Agreement-Introduction-Distributed mutual exclusion – Elections ¬ Multicast communication-Consensus and related problems. Distributed Shared Memory-Introduction-Design and implementation issues-Sequential consistency.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Identify the core concepts of distributed systems
- Gain a clear understanding of the concepts that underlie distributed computing systems along with design and implementation issues.
- Illustrate the mechanisms of inter process communication in distributed system
- Use key mechanisms and models for distributed systems including logical clocks, causality, vector timestamps.
- Outline the need for mutual exclusion and election algorithms in distributed systems

TEXT BOOKS:

1. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems: Concepts and Design", Pearson 2009, 4th Edition.
2. Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall of India, New Delhi, 2004.

REFERENCE BOOKS:

1. Andrew S Tanenbaum and Marteen Van Steen, "Distributed Systems Principles and Paradigms", Pearson Education / Prentice Hall of India , New Delhi, 2002.
2. Mukesh Singhal, Niranjan G Shivarathri, "Advanced Concepts in Operating systems", Tata Mc Graw Hill Ltd.
3. Tanenbaum A S, "Modern Operating System", 3/e, PHI.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 507(P)	DATABASE MANAGEMENT SYSTEMS LAB	0-0-3-1

***PRE-REQUISITES**:* DATABASE MANAGEMENT SYSTEMS

COURSE OBJECTIVES:

- To familiarize issues related to database design through hands-on practice.
- To understand data definitions and data manipulation commands
- To learn the use of database stored procedures.
- To be familiar with the use of a front end tool

SYLLABUS:

List of Exercises / Experiments

1. Database Design using ER modeling, normalization.
2. Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating and retrieving Tables
3. Database Querying – Simple queries, Nested queries, Sub queries and Joins
4. Views and indexes
5. Creation of database stored procedures using cursor.
6. Creation of database triggers.
7. Database Connectivity with Front End Tools.
8. Case Study using real life database applications

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Understand the use of data definitions and manipulation commands.
- Implement Views and indexes
- Design database applications using stored procedures
- Understand Database Connectivity with Front End Tools
- Implement case study using real life database applications.

Internal Continuous Assessment (*Maximum Marks-50***)**

60% - Laboratory practical, record and Viva voce.
30% - Tests.
10% - Regularity in the lab.

Semester-end Practical Examinations (*Maximum Marks-100***)**

10% - Fair record
20% - Vivavoce
70% - Algorithm, coding, compiling and executing, result and inference

IT19 508(P)	OPERATING SYSTEMS LAB	0-0-3-1

***PRE-REQUISITES**:* OPERATING SYSTEMS

COURSE OBJECTIVES:

- To build an understanding on design and implementation of different types of system software.
- To make the learners understand the operating system structures and the implementation aspects of various OS functions and schedulers.

SYLLABUS:

List of Exercises / Experiments

1. Simulate the following non-preemptive **CPU scheduling algorithms** to find turnaround time and waiting time.
   a) First Come First Serve (FCFS)
   b) Shortest Job First (SJF)
   c) Priority
   d) Round Robin
2. **Memory management Techniques** –
   a) Multiprogramming with fixed number of tasks (MFT)
   b) Multiprogramming with variable number of tasks (MVT)
3. **Contiguous Memory Allocation** –
   a) Worst fit
   b) Best fit
   c) First fit
4. Simulate the following **page replacement algorithms**
   a) First In First Out(FIFO)
   b) Least Recently Used(LRU)
   c) Optimal
5. Simulate the following classical problems of synchronization **using semaphores:**
   a) Producer-Consumer Problem
   b) Dining philosopher's problem
   c) Readers writer's problem
6. Deadlock avoidance – **Banker's algorithm**
7. Simulate the following **disk scheduling algorithms-**
   a) FCFS
   b) SCAN
   c) C-SCAN

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Compare and analyze CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority.
- Implement basic memory management schemes.
- Implement basic page replacement algorithms
- Implement synchronization techniques using semaphores etc.
- Implement banker's algorithm for deadlock avoidance.

Internal Continuous Assessment (*Maximum Marks-50***)**

60% - Laboratory practical, record and Viva voce.
30% - Tests.
10% - Regularity in the lab.

Semester-end Practical Examinations (*Maximum Marks-100***)**

10% - Fair record
20% - Vivavoce
70% - Algorithm, coding, compiling and executing, result and inference

IT19 601	COMPILER DESIGN	3-1-0-4

***PRE-REQUISITES**:* THEORY OF COMPUTATION

COURSE OBJECTIVES:

- To introduce the various techniques involved in the translation of source programs into object programs by a compiler
- To provide a thorough understanding of the internals of Compiler Design.

SYLLABUS:

Module I: (10 hours)

Introduction to compilers and lexical analysis
Analysis of the source program, Phases of a compiler, Grouping of phases, compiler writing tools – bootstrapping -**Lexical Analysis**: The role of Lexical Analyzer, Input Buffering, Specification of Tokens using Regular Expressions, Review of Finite Automata, Recognition of Tokens.

Module II: (10 hours)

Syntax Analysis:
Review of Context-Free Grammars – Derivation trees and Parse Trees, Eliminating Ambiguity. Top-Down Parsing: Recursive Descent parsing, Predictive parsing, LL(1) Grammars - Error recovery routines.

Module III: (10 hours)

Bottom-Up Parsing:
Shift Reduce parsing – Operator precedence parsing (Concepts only) LR parsing – Constructing SLR parsing tables, Constructing, Canonical LR parsing tables and Constructing LALR parsing tables.

Module IV: (13 hours)

Syntax directed translation and Intermediate Code Generation:
Syntax directed definitions, Bottom- up evaluation of S-attributed definitions, L- attributed definitions, Top-down translation, Bottom-up evaluation of inherited attributes. Type Checking : Type systems, Specification of a simple type checker. Run-Time Environments: Source Language issues, Storage organization, Storage allocation- strategies -Intermediate languages – Graphical representations, Three Address code, Quadruples, Triples. Assignment statements, Boolean expressions.

Module V: (9 hours)

Code Optimization and Generation:
Code Optimization **-**Principal sources of optimization, Optimization of Basic blocks Code generation: Issues in the design of a code generator. The target machine, A simple code generator.

COURSE OUTCOMES:

On successful completion of the course, the student will be able to:

- Explain the concepts and different phases of compilation with compile time error handling.
- Represent language tokens using regular expressions, context free grammar and finite automata and design lexical analyzer for a language.
- Compare top down with bottom up parsers, and develop appropriate parser to produce parse tree representation of the input.
- Generate intermediate code for statements in high level language and design syntax directed translation schemes for a given context free grammar.
- Apply optimization techniques to intermediate code and generate machine code for high level language program

TEXT BOOKS:

1. Aho A. Ravi Sethi and D Ullman. Compilers – Principles Techniques and Tools, Addison Wesley, 2nd edition 2006.
2. D. M. Dhamdhere, System Programming and Operating Systems, Tata McGraw Hill & Company, 2nd edition 1996.

REFERENCE BOOKS:

1. Kenneth C. Louden, Compiler Construction – Principles and Practice, Cengage Learning Indian Edition, 2006.
2. Tremblay and Sorenson, The Theory and Practice of Compiler Writing, Tata McGraw Hill & Company,1984.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 602	COMPUTER NETWORKS	3-1-0-4

***PRE-REQUISITES**:* DIGITAL DATA COMMUNICATION

COURSE OBJECTIVES:

- To familiarize with the basic taxonomy and terminology of computer networking.
- To introduce the major concepts involved in WAN, LAN and Wireless LAN
- Understand layers and its network functionalities.
- Familiarization with the protocols used in the layered architecture.

SYLLABUS:

Module I:

(13 hours)

Introduction-Uses of Computer Networks, Network Hardware, Network Software, Reference Models, Example Networks, Network Standardization. The Medium Access Control Sub layer-The Channel Allocation Problem, Multiple Access Protocols, Ethernet, Wireless LANs, Broadband Wireless, Bluetooth.

Module II: (7 hours)

The Network Layer- Network Layer Design Issues, Routing Algorithms- shortest path routing, flooding, distance vector routing, link state routing, routing for mobile

Module III: (10 hours)

Internet Control Protocols – ICMP, ARP, RARP, BOOTP, Interior gateway routing protocol-OSPF, Internet Multicasting – IGMP, Exterior Routing Protocols – BGP. IPv6 –Addressing – Issues, ICMPv6.

Module IV: (13 hours)

The Transport Layer- The Transport Service- Services provided to upper layers, transport service primitives, Berkely sockets, Elements of Transport Protocols-Addressing, connection establishment, connection release, flow control and buffering, The Internet Transport Protocols: TCP- Service models, protocols, segment header, Connection establishment, release and management, transmission policy and congestion control, The Internet Transport Protocols: UDP.

Module V: (9 hours)

The Application Layer- DNS-The Domain Name System, Electronic Mail, The World Wide Web, VoIP

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

- conceptualize all the OSI Layers
- familiarize with wireless networking concepts
- understand different routing algorithms
- differentiate between connection oriented and connection less services of transport layer.
- understand the protocols and devices used in different layers

TEXT BOOKS:

1. A. S. Tanenbaum, Computer Networks, 4th Edition, Pearson Education, 2002.
2. Behrouz A Forouzan, Data Communication and Networking, 4/e, Tata McGraw Hill.

REFERENCE BOOKS:

1. Kevin R. Fall, W. Richard Stevens, TCP/IP Illustrated, Volume 1, 2011
2. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, UNIX Network Programming: The Sockets Networking API, Volume 1
3. William Stallings, Data and Computer Communications, Prentice Hall, Sixth Edition, 2007
4. Douglas Comer, Internetworking with TCP/IP: Principles, protocols, and architecture, Prentice Hall,Vol. I, 2006
5. Martin W. Murhammer, TCP/IP Tutorial and Technical Overview, 6th Edition, Prentice Hall PTR, 1998

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 603	MICROPROCESSORS	3-1-0-3

PRE-REQUISITES*:* NIL

COURSE OBJECTIVES:

- To familiarize students in the architecture and instruction set of 8086 microprocessor
- To develop assembly language programs
- To provide basic idea about different interfacing methods and devices

SYLLABUS:

Module I: (10 hours)

Introduction: Evolution of microprocessors and microcontrollers, memory devices **Introduction to 8086** - 8086 Architecture-Addressing Modes-Instruction set, Assembler Directives. Assembly Language Programming with Subroutines, Macros, Passing Parameters, Use of stack

Module II: (10 hours)

8086 Hardware Design: Minimum mode and maximum mode configurations, Bus structure, system bus timing with Diagram, Interrupts of 8086 Microprocessor

Module III: (10 hours)

Interfacing with 8086: Interfacing with RAMs, ROMs along with the explanation of timing diagrams.

Module IV: (10 hours)

Interfacing with peripherals: ICs like 8255 Programmable Peripheral Interface, 8254 Programmable Interval Timer, 8279 Programmable Keyboard, 8259 Programmable Interrupt Controller

Module V: (12 hours)

Reduced Instruction Set Computer (RISC) Architectures: Introduction to the ARM Microprocessors, ARM7TDMI Organization, Instruction Set, Addressing Modes. Main characteristics of RISC and CISC architectures, RISC-CISC trade-offs.

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

- Identify the basic elements and functions of microprocessor 8086
- Explain the architecture and operations of microprocessors
- Learn the design aspects of Memory Interfacing circuits
- Learn the design aspects of Interfacing with Peripherals
- Give basic idea about RISC architecture

TEXT BOOKS:

1. Nilesh B. Bahadure, MICROPROCESSORS, The 8086/8088, 80186/80286,80386/80486 and the Pentium Family, ISBN: 978 –81–203–3942–2, PHI Learning
2. Embedded Systems: Introduction to the Arm? Cortex(TM)-M3 (Volume 1); Jonathan Valvano; 1st; 2012.
3. Brey B.B., The Intel Microprocessors 8086 to Pentium: Architecture, Programming and Interface, Prentice Hall of India
4. Ramesh S. Gaonkar , Microprocessor Architecture Programming and Applications with the 8085, Atilim University Library, Prentice Hall Pearson Education, 2002

REFERENCE BOOKS:

1. Hall D.V., Microprocessors & Interfacing: Programming & Hardware, Tata McGraw Hill
2. Kenneth Ayala, Kenneth J. Ayala, The 8086 Microprocessor: Programming and Interfacing the PC, West Pub., 1995.
3. Lance A. Leventhal, 8080A/8085 assembly language programming.
4. Bob Neveln, LINUX Assembly Language Programming, Prentice Hall Professional, 2000

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 604	DATA MINING	3-1-0-3

***PRE-REQUISITES**:* DATABASE MANAGEMENT SYSTEM

COURSE OBJECTIVES:

Students undergoing this course are expected to:

- Differentiate OnLine Transaction Processing and OnLine Analytical processing
- Understand various data mining functionalities
- Know in detail about data mining algorithms

SYLLABUS:

Module I: (10 hours)

Introduction to Data Mining – Related technologies – Machine Learning, DBMS, OLAP, Statistics –Data Mining Goals – Stages of the Data Mining Process –Data Mining Techniques – Knowledge Representation Methods –Applications –Example: weather data – Data Warehouse and OLAP –Data Warehouse and DBMS – Multidimensional data model –OLAP operations

Module II: (10 hours)

Data preprocessing – Data cleaning – Data transformation – Data reduction – Discretization and generating concept hierarchies – Data mining knowledge representation – Task relevant data – Background knowledge – Interestingness measures – Representing input data and output knowledge – Visualization techniques – Attribute-oriented analysis – Attribute generalization – Attribute relevance – Class comparison – Statistical measures

Module III: (12 hours)

Data mining algorithms: Association rules –Motivation and terminology –Example: mining weather data – Basic idea: item sets –Generating item sets and rules efficiently –Correlation analysis – Classification –Basic learning/mining tasks –Inferring rudimentary rules: 1R algorithm –Decision trees –Covering rules- Prediction –The prediction task –Statistical (Bayesian) classification – Bayesian networks – Instance-based methods (nearest neighbor) – Linear models

Module IV: (10 hours)

Clustering – Basic issues in clustering –First conceptual clustering system: Cluster/2 – Partitioning methods: k-means, expectation maximization (EM) – Hierarchical methods: distance-based agglomerative and divisible clustering –Conceptual clustering: Cobweb

Module V: (10 hours)

Advanced techniques, Data Mining software and applications – Text mining: extracting attributes (keywords), structural approaches (parsing, soft parsing). – Bayesian approach to classifying text – Web mining: classifying web pages, extracting knowledge from the web –Data Mining software and applications

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

- Understand the fundamentals of data mining.
- Understand basic concepts and techniques of Data Mining.
- Familiarize with different Data mining algorithms.
- Understand clustering and basic issues in clustering.
- Familiarize with Data Mining software and applications.

TEXT BOOKS:

1. Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques (Third Edition), Morgan Kaufmann ,2011.
2. Jiwei Han and Michelin Kamber, Data Mining Concepts and Techniques, 2nd Edition, Morgan Kaufmann, 2011.

REFERENCE BOOKS:

1. Trevor Hastie Robert Tibshirani Jerome Friedman, Data Mining, Inference, and Prediction Second, Edition, Springer Series in Statistics, 2009

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 605(A)	HUMAN COMPUTER INTERACTION	3-1-0-3

***PRE-REQUISITES**:* NIL

COURSE OBJECTIVES:

- The course aims at how to take into account the human and contextual part of a system, which is important in creating popular applications
- After completing the course students should be able to explain the difference between good and bad design and know how to take into account user's needs in interaction design
- Objective of the course is to introduce the well-developed models based on the cognitive and social constraints for a new IT application.

SYLLABUS:

Module I : (10 hours)

The human: Introduction- Input-output channel – Human Memory- Thinking – Emotion- Psychology and the design of interactive systems. **The Computer** – Text entry devices – Positioning, pointing and drawing – Display devices – Devices for virtual reality and 3D interaction – Physical controls, Sensors and Special devices – Printing &scanning – Memory. **Introduction to interaction** – Models- frameworks &HCI –Ergonomics – interaction styles, Elements of WIMP interface – Paradigms for interaction.

Module II : (10 hours)

Design Process: Introduction to interaction design – Process of design – User focus – Scenarios – Navigation design – Screen design & layout – Iteration and prototyping. **HCI in software process** – Usability engineering, Software prototyping & techniques, Principles to support usability, Golden rules sample.

Module III : (10 hours)

Implementation – Elements of windowing systems – Using toolkits, User interface management systems. **Evaluation** - Expert analysis– evaluation through user participation – choosing an evaluation method. **Universal design** - principles, Multi-modal interaction – Design for diversity.

Module IV : (10 hours)

Models & theories: Cognitive models – Linguistic model, Physical & device model, **Socio-organizational issues** – Organizational issues, capturing requirements- **Communication and Collaboration model** – face to face communication, conversation, text-based communication **Dialog notation & design** – dialog design notations, Diagrammatic notation, Textual dialog notation, Dialog analysis and design.

Module V: (12 hours)

Group Ware systems – computer mediated communication – Meeting & Discussion support systems – shared applications and artifacts. Framework for Group Ware. **Ubiquitous computing & realities** – Ubiquitous computing applications research – virtual and augmented reality – Information and data visualization.

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

- Understand the difference between human and computer system.
- Describe and use HCI design principles.
- Implement and evaluate various interaction systems
- Understand the different models used for interaction
- Describe various features about groupware systems

TEXT BOOKS:

1. Alan Dix Janet Finlay, Gregory D Abowd, Russell Beale, Human Computer Interaction; 3rd edition, Pearson Education Asia.

REFERENCE BOOKS:

1. John M Carroll Hutran, Computer Interaction in the New Millennium, Illustrated Edition, Pearson Education Asia
2. Ben Shneinderman, Designing the User Interface: Strategies for Effective Human Computer Interaction, 3rd Edition, Pearson Education Asia.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 605(B)	SOFT COMPUTING	3-1-0-3

***PRE-REQUISITES**:* NIL

COURSE OBJECTIVES:

- To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.
- To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems.
- To provide the mathematical background for carrying out the optimization associated with neural network learning.
- To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.
- To introduce case studies utilizing the above and illustrate the intelligent behavior of programs based on soft computing.

SYLLABUS:

Module I: (12 hours)

Introduction:
What is Soft Computing? Difference between Hard and Soft computing, Requirement of Soft computing, Major Areas of Soft Computing, Applications of Soft Computing.
Neural Networks: What is Neural Network, Learning Neural Model and Network Architectures, Perceptron Learning, Supervised Hebbian Learning, Back propagation, Associative Learning, Competitive Networks, Hopfield Network, Computing with Neural Nets and applications of Neural Network.

Module II: (8 hours)

Fuzzy logic - fuzzy sets - properties - operations on fuzzy sets, fuzzy relations - operations on fuzzy relations. Fuzzy membership functions, fuzzification, Methods of membership value assignments – intuition – inference – rank ordering, Lambda –cuts for fuzzy sets, Defuzzification methods.

Module III: (8 hours)

Truth values and Tables in Fuzzy Logic, Fuzzy propositions, Formation of fuzzy rules - Decomposition of rules – Aggregation of rules, Fuzzy Inference Systems - Mamdani and Sugeno types, Neuro-fuzzy hybrid systems – characteristics - classification

Module IV: (10 hours)

Introduction to genetic algorithm, operators in genetic algorithm - coding - selection - cross over – mutation, stopping condition for genetic algorithm flow, Genetic-neuro hybrid systems, Genetic-Fuzzy rule based system

Module V: (12 hours)

Advanced Topics: Support Vector Machines, Evolutionary computation (EC)-Evolutionary algorithms, Harmony search, Swarm intelligence

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

- learn soft computing techniques and their applications.
- analyze various neural network architectures.
- define the fuzzy systems.
- understand the genetic algorithm concepts and their applications.
- identify and select a suitable Soft Computing technology to solve the problem; construct a solution and implement a Soft Computing solution.

TEXT BOOKS:

1. S. N. Sivanandam and S. N. Deepa, Principles of soft computing – John Wiley & Sons, 2007.
2. Timothy J. Ross, Fuzzy Logic with engineering applications, John Wiley & Sons, 2016.
3. J.S.R.Jang, C.T.Sun and E.Mizutani, Neuro-Fuzzy and Soft Computing, Pearson Education.

REFERENCE BOOKS:

1. M. Mitchell, An Introduction to Genetic Algorithms, Prentice-Hall, 1998.
2. D. E. Goldberg, Genetic Algorithms in Search, Optimization, and Machine Learning, Addison- Wesley.
3. S. V. Kartalopoulos, Understanding Neural Networks and Fuzzy Logic: Basic Concepts and Applications, IEEE Press – PHI.
4. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications", Prentice Hall.
5. N. K. Sinha and M. M. Gupta, Soft Computing & Intelligent Systems: Theory & Applications- Academic Press /Elsevier. 2009.

6. Simon Haykin, Neural Network- A Comprehensive Foundation- Prentice Hall International, Inc.1998
7. R. Eberhart and Y. Shi, Computational Intelligence: Concepts to Implementation, Morgan Kaufman/Elsevier, 2007.
8. Driankov D., Hellendoorn H. and Reinfrank M., An Introduction to Fuzzy Control-Narosa Pub., 2001.
9. Bart Kosko, Neural Network and Fuzzy Systems- Prentice Hall, Inc., Englewood Cliffs, 1992.
10. Goldberg D.E., Genetic Algorithms in Search, Optimization, and Machine Learning-Addison Wesley, 1989.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks
Two questions from each module with choice to answer one question.

IT19 605(C)	EMBEDDED SYSTEMS	3-1-0-3

PRE-REQUISITES*:* NIL

COURSE OBJECTIVES:

- To learn the architecture and programming of ARM processors.
- To become familiar with the embedded computing platform design and analysis.
- To get thorough knowledge in interfacing concepts
- To design an embedded system and to develop programs

SYLLABUS:

Module I:

(12 hours)

Introduction to Embedded Computing and Arm Processors:

Complex systems and microprocessors– Embedded system design process –Design example: Model train controller- Instruction sets preliminaries – ARM Processor – CPU: programming input and output- supervisor mode, exceptions and traps – Co-processors- Memory system mechanisms – CPU performance- CPU power consumption.

Module II: (10 hours)

Embedded Computing Platform Design:

The CPU Bus-Memory devices and systems–Designing with computing platforms – consumer electronics architecture – platform-level performance analysis – Components for embedded programs- Models of programs- Assembly, linking and loading – compilation techniques- Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size- Program validation and testing.

Module III: (10 hours)

Sensor Interfacing With Arduino:

Basics of hardware design and functions of basic passive components-sensors and actuators Arduino code – library file for sensor interfacing-construction of basic applications

Module IV: (10 hours)

Embedded Firmware:

Reset Circuit, Brown-out Protection Circuit-Oscillator Unit – Real Time Clock-Watchdog Timer -Embedded Firmware Design Approaches and Development Languages.

Module V: (10 hours)

Embedded C Programming:

Introduction-Creating hardware delays ‘using Timer 0 and Timer 1-Reading switches-Adding Structure to the code-Generating a minimum and maximum delay-Example: Creating a portable hardware delay- Timeout mechanisms-Creating loop timeouts-Testing loop timeouts- hardware timeouts-Testing a hardware timeout.

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

- Describe the architecture and programming of ARM processor.
- Explain the concepts of embedded systems.
- Understand the Concepts of peripherals and demonstrate interfacing of sensors.
- Capable of using the system design techniques to develop firmware.
- Design code for developing Embedded system.

TEXT BOOKS:

1. Marilyn Wolf, ―Computers as Components – Principles of Embedded Computing System Design‖, Third Edition ―Morgan Kaufmann Publisher (An imprint from Elsevier), 2012.
2. Michael J. Pont, ―Embedded C‖, 2nd Edition, Pearson Education, 2008
3. Rajesh Singh, Anita Gehlot, Bhupendra Sing, Sushabhan Choudhury, Arduino-Based Embedded Systems: Interfacing, Simulation, and LabVIEW GUI, CRC Press,
4. https://www.coursera.org/learn/interface-with-arduino#syllabus

REFERENCE BOOKS:

1. Shibu K.V, ―Introduction to Embedded Systems‖, McGraw Hill.2014
2. Jonathan W. Valvano, ―Embedded Microcomputer Systems Real Time Interfacing‖, Third Edition Cengage Learning, 2012
3. Raj Kamal, ―Embedded Systems-Architecture, programming and design‖, 3rd edition, TMH.2015
4. Lyla, ―Embedded Systems‖, Pearson, 2013
5. David E. Simon, ―An Embedded Software Primer‖, Pearson Education,2000

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 605(D)	GRAPH THEORY	3-1-0-3

***PRE-REQUISITES**:* DATA STRUCTURES AND ALGORITHMS

COURSE OBJECTIVES:

- To understand the basics of graph theory as a modeling and analysis tool in computer science and engineering.
- To understand the structures such as graphs and trees and several combinatorial techniques, which are needed in number theory-based computing and network security studies in computer science.
- To understand and describe Optimization problems.
- To state and illustrate the fundamental rules of counting along with their application to the topic of permutations and combinations.
- To acquire the knowledge of functions whose power series expansion give rise to sequence of combinatorial interest and use of these functions in various types of counting.

SYLLABUS:

Module I: (11 hours)

Introduction to graphs - definitions - sub graphs - vertex degree: euler trails and circuits-planar graphs - Hamilton paths and cycles - graph coloring and chromatic polynomials.

Module II: (10 hours)

Trees - definitions and properties - rooted trees - trees and sorting -weighted trees and prefix codes

- biconnected components and articulation points.

Module III: (10 hours)

Optimization and matching- Dijkstra's shortest path algorithm - minimal spanning trees- Kruskal's and Prim's algorithms for minimal spanning trees -the max-flow min-cut theorem- matching theory

Module IV: (10 hours)

Fundamental principles of counting- permutations and combinations –binomial theorem- combinations with repetition- combinatorial numbers-principle of inclusion and exclusion- derangements- arrangements with forbidden positions

Module V: (11 hours)

Generating functions- partitions of integers-the exponential generating function –the summation operator-recurrence relations- first order and second order –non homogeneous recurrence relations- method of generating functions.

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

- Acquire the knowledge of basics of graph theory.
- Apply the idea of graphs and trees in several combinatorial techniques.
- Describe various optimization problems.
- Develop the skills of applying fundamentals of counting in topics related to permutation and combinations.
- Acquire the knowledge of generating functions.
- Understand the fundamental principles of counting and generating functions.

TEXT BOOKS:

1. Ralph P Grimaldi, Discrete and Combinatorial Mathematics: An applied Introduction; Pearson Publishers

REFERENCE BOOKS:

1. Harary, Graph Theory; Narosa Publishing House New Delhi.
2. Dr. D. S. Chandrasekharaiah; Graph Theory And Combinations, Prisam Books Pvt Ltd, 3rd Ed.
3. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science, PHI
4. Thomas Koshy, Discrete Mathematics with applications; Elsevier Academic Press, first edn
5. Kolman B& Busby R C, Discrete and Mathematical Structures for Computer Science; Prentice Hall Delhi, 3rd Ed.
6. C.L. Liu, Elements of Discrete Mathematics; McGraw hill, 4th edition.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions **5 x 10 marks= 50 marks
Two questions from each module with choice to answer one question.

IT19 605(E)	WEB PROGRAMMING	3-1-0-3

PRE-REQUISITES*:* NIL

COURSE OBJECTIVES:

- To impart the design, development and implementation of Dynamic Web Pages.
- To develop programs for Web using Scripting Languages.
- To give an introduction to Data Interchange formats in Web.

SYLLABUS:

Module I: (10 hours)

Fundamentals of Web - Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, The Web Programmers Toolbox. XHTML - Basic syntax, Standard structure, Basic text markup, Images, Hypertext Links, Lists, Tables, Forms.

Module II: (10 hours)

CSS - Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The and tags, Conflict resolution.

Module III: (10 hours)

JavaScript – Overview of JavaScript, Object orientation and JavaScript, Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts, Examples

Module IV: (10 hours)

XML - Introduction, Syntax, Document structure, Document type definitions, Namespaces, XML schemas, Displaying raw XML documents, Displaying XML documents with CSS, XSLT style sheets, XML processors, Web services.

Module V: (12 hours)

PHP - Origins and uses of PHP, Overview of PHP, General syntactic characteristics, Primitives, operations and expressions, Output, Control statements, Arrays, Functions, Pattern matching, Form handling, Files, Cookies, Session tracking, Database access with PHP and MySQL. AJAX - Overview of Ajax, the Basics of Ajax. Java Web Software - Introduction to Servlets, Java Server Pages, JavaBeans.

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

- Acquire the fundamental concepts of web systems and applications.
- Present a professional document using Cascaded Style Sheets.
- Construct websites for user interactions using JavaScript.
- Know the different information interchange formats like XML
- Develop Web applications using PHP

TEXT BOOKS:

1. Robert W.Sebesta: Programming the World Wide Web, 6th Edition, Pearson education, 2010

REFERENCE BOOKS:

1. M. Deitel, P.J. Deitel, A. B. Goldberg: Internet & World Wide Web How to Program, 4th Edition, Pearson International Edition 2010.
2. Chris Bates: Web Programming Building Internet Applications, 3rd Edition, Wiley India, 2009.
3. Jeffrey C Jackson: Web Technologies A Computer Science Perspective, Pearson Education Inc. 2009.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern (*Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks*** Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 605(F)	ADVANCED DATABASE MANAGEMENT SYSTEMS	3-1-0-3

PRE-REQUISITES: DATABASE MANAGEMENT SYSTEMS

COURSE OBJECTIVES:

- To enable design of high-quality relational databases and database applications.
- To develop skills in advanced visual & conceptual modeling and database design.
- To make aware of emerging database trends as they apply to semi-structured data, the internet, and object-oriented databases.

SYLLABUS:

Module I: (11 hours)

Database Design Issues

ER Model - Normalization - Security - Integrity - Consistency - Database Tuning- Optimization and Research Issues – Design of Temporal Databases – Spatial Databases.

Module II: (11 hours)

Distributed Databases

Distributed Databases Vs Conventional Databases –Architecture – Fragmentation– Query Processing –Transaction Processing – Concurrency Control – Recovery.

Module III: (13 hours)

Object Oriented Databases

Introduction to Object Oriented Data Bases - Approaches - Modeling and Design- Persistence – Query Languages -Transaction - Concurrency – Multi Version Locks - Recovery.

Module IV: (11 hours)

Big data storage

Enhanced Data Models - Client/Server Model-Introduction to Big data and it's storage systems-NOSQL data stores- Data Warehousing-introduction-warehouse operations-simple queries - architecture-characteristics- modeling and building data warehouse.

Module V: (6 hours)

Emerging Technologies

Rules - Knowledge Bases - Active And Deductive Databases -Parallel Databases– Multimedia Databases – Image Databases– Text Database - Web Databases – Mobile Databases.

COURSE OUTCOMES:

On successful completion of the course, the student will be able to:

- develop skills in advanced visual & conceptual modeling and database design.
- develop an appreciation of emerging database trends as they apply to semi-structured data, the internet, and object-oriented databases
- understand Database design issues and current issues.
- get in depth knowledge about data mining and data warehousing.
- get a clear insight about emerging systems.

TEXT BOOKS:

1. R. Elmasri, S.B. Navathe, "Fundamentals Of Database Systems", Pearson Education, 2004
2. Sliberschatz A, Henry F. Korth, S. Sudarshan, Database System Concepts, 6^{th} Ed

REFERENCE BOOKS:

1. Abdullah Uz Tansel Et Al, "Temporal Databases: Theory, Design and Principles", Benjamin Cummings Publishers, 1993.
2. C.S.R Prabhu, "Object-Oriented Database Systems", Prentice Hall Of India, 1998.
3. Carlo Zaniolo, Stefano Ceri, Christos Faloustsos, R.T.Snodgrass, V.S.Subrahmanian, "Advanced Database Systems", Morgan Kaufman, 1997.
4. Elisa Bertino, Barbara Catania, Gian Piero Zarri, "Intelligent Database Systems", Addison-Wesley, 2001.
5. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", Fourth Edition, McGraw Hill, 2002.
6. N. Tamer Ozsu, Patrick Valduriez, "Principles Of Distributed Database Systems", Prentice Hall International Inc., 1999.
7. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", McGraw Hill, Third Edition 2004.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 606(A)	CYBER LAW & ETHICS	3-1-0-3

***PRE-REQUISITES**:* NIL

COURSE OBJECTIVES:

- To provide a thorough understanding of the concepts of cyber law and ethics.
- To gain knowledge about computer contracts, crime and data protection.

SYLLABUS:

Module I: (10 hours)

Computers and intellectual property- Introduction to Computer Security: Definition, Threats to security, Government requirements, Information Protection and Access Controls, Computer security efforts, Standards, Computer Security mandates and legislation, Privacy considerations, International security activity

Module II: (10 hours)

Computer contracts- Contracts for writing software- License agreements for "off-the-shelf" software- Contract between software author and publisher- Hardware contracts- Information security policies and procedures: Corporate policies- Tier 1, Tier 2 and Tier3 policies.

Module III: (10 hours)

Computers and crime- Introduction- Computer fraud- Hacking - Unauthorized access to computer material- Unauthorized modification of computer programs or data- Miscellaneous offences-information security: fundamentals - Employee Responsibilities-information classification- Information handling- Tools of information security

Module IV: (10 hours)

Data Protection- Outline of the Data Protection Act 1984- Exemptions from and enforcement of the Data Protection Act 1984- Summary of Data Protection Law - Overview of intellectual property rights- Copyright basics- Computer-generated works- The law of confidence-Patent law.

Module V: (10 hours)

Professional and social issues of information and communications technology-Information Processing-secure program administration. Information and communication technology crime-The computer professional- Privacy, freedom and the impact of ICT on the society.

COURSE OUTCOMES:

On successful completion of the course, the student will be able to:

- get a clear insight into the different cyber laws and ethics.
- understand the importance of professional practice, Law and Ethics in their personal lives and professional careers.
- learn the rights and responsibilities as an employee, team member and a global citizen.
- develop in-depth understanding Data Protection, Professional and social issues of information and communications technology.
- get in depth knowledge about Computers and crime & contracts.

TEXT BOOKS:

1. D. Bainbridge, Introduction to Computer Law, 5/e, Pearson Education, 2004.
2. Debby Russell and Sr. G. T Gangemi, "Computer Security Basics (Paperback), 2nd Edition, O Reilly Media, 2006.
3. Thomas R. Peltier, Information Security policies and procedures: A Practitioners Reference, 2nd Edition Prentice Hall, 2004.

REFERENCE BOOKS:

1. Harish Chander, Cyber Laws and IT Protection, PHI Learning Private Limited, 2012.
2. P. Duggal, Cyber law: The Indian Perspective, Saakshar Law Publications, Delhi, 2005.
3. C. P. Fleeger and S. L. Fleeger, Security in Computing, 3/e, Pearson Education, 2003.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks*** Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 606(B)	DATA VISUALIZATION	3-1-0-3

PRE-REQUISITES*: NIL*

COURSE OBJECTIVES:

- Enabling students and to enhance knowledge about the concepts of Data visualization.
- Understand why visualization is an important part of data analysis.
- Understand the components involved in visualization design.

SYLLABUS:

Module I : (10 hours)

The Context of Data Visualization-Visualization as a discovery tool - The bedrock of visualization knowledge - Defining data visualization - Visualization skills for the masses -The data visualization methodology -Visualization design objectives

Module II : (11 hours)

Setting the Purpose and Identifying Key Factors-Establishing intent – the visualization's function - When the function is to explain-When the function is to explore-When the function is to exhibit data-Establishing intent – the visualization's tone-Pragmatic and analytical-Emotive and abstract -Key factors surrounding a visualization project-The "eight hats" of data visualization design

Module III : (10 hours)

Demonstrating Editorial Focus and Learning About Your Data-The importance of editorial focus -Preparing and familiarizing yourself with your data -Refining your editorial focus - Using visual analysis to find stories -An example of finding and telling stories

Module IV : (11 hours)

Conceiving and Reasoning Visualization Design Options-The visualization anatomy – data representation -Choosing the correct visualization method - Considering the physical properties of our data -Determining the degree of accuracy in interpretation.

Module V: (10 hours)

Creating an appropriate design metaphor -Choosing the final solution -The visualization anatomy – data presentation -The use of color - Creating interactivity -Data visualization methods - Choosing the appropriate chart type.

COURSE OUTCOMES:

On successful completion of the course, the student will be able to:

- understand the concepts of data visualization.
- understand visualization function.
- understand visualization design.
- Apply methods to choose correct visualization.
- understand how to create an appropriate design metaphor.

TEXT BOOKS:

1. Andy Kirk, Data Visualization: A Handbook for Data Driven Design, 2nd Edition, SAGE Publication Ltd, 2019.

REFERENCE BOOKS:

1. Thomas Rahlf, Data Visualization with R, 2nd edition, Springer Publications, 2014.
2. Matthew O. Ward, Georges Grinstein, Daniel Keim, Interactive Data Visualization: Foundations, Techniques and Applications, 2nd edition, CRC PRESS, 2015.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 606(C)	INTERNET OF THINGS	3-1-0-3

***PRE-REQUISITES**:* NIL

COURSE OBJECTIVES:

- Assess the genesis and impact of IoT applications, architectures in real world.
- Illustrate diverse methods of deploying smart objects and connect them to network.
- Compare different Application protocols for IoT.
- Infer the role of Data Analytics and Security in IoT.
- Identify sensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry.

SYLLABUS:

Module I: (10 hours)

What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.

Module II: (10 hours)

Smart Objects: The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.

Module III: (10 hours)

IP as the IoT Network Layer, The Business Case for IP, the need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods.
Protocol Standardization for IoT, Overview on M2M and WSN SCADA and RFID Protocols – Issues with IoT Standardization – IEEE802.15.4– Modbus – KNX – Zigbee– Security

Module IV: (10 hours)

Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment

Module V: (10 hours)

IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples.

COURSE OUTCOMES:

After studying this course, students will be able to:

- interpret the impact and challenges posed by IoT networks leading to new architectural models.
- compare and contrast the deployment of smart objects and the technologies to connect them to network.
- appraise the role of IoT protocols for efficient network communication.
- elaborate the need for Data Analytics and Security in IoT.
- illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

TEXT BOOKS:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry,"IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1st Edition, Pearson Education (Cisco Press Indian Reprint). (ISBN: 978-9386873743)
2. Srinivasa K G, "Internet of Things", CENGAGE Learning India, 2017.

REFERENCE BOOKS:

1. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on Approach)", 1st Edition, VPT, 2014. (ISBN: 978-8173719547)
2. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017. (ISBN: 978-9352605224)

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 606(D)	OPERATIONAL RESEARCH	3-1-0-3

***PRE-REQUISITES**:* NIL

COURSE OBJECTIVES:

- To understand the role of operation research in decision making
- Understand the characteristics of different types of decision-making environments to formulate and solve a real-world problem as a mathematical programming model.

SYLLABUS:

Module I: (8 hours)

Brief history, Development of OR, Phases of OR, Scope of OR, Advantages and limitations of OR. fundamental theorem of linear programming. Formulation and application of linear programming to production, marketing, finance and other areas Concepts of Solution space, convex region, basic feasible solution, optimal solution, Graphical solutions of two decision variable problems

Module II: (12 hours)

Solving LPP by Simplex method, Slack and surplus variables, Basic feasible solutions, Reduction of a feasible solution to a basic feasible solution, Artificial variables, Optimality conditions, Unbounded solutions, Big M method, Two phase method, Degeneracy, Duality.

Module III: (12 hours)

Sequencing problem, Terminology and notations, Assumptions – Problems with n jobs through two machines, Problems with n jobs through three machines, Problems with n jobs through m machines. Network analysis, Basic terms, Network construction, Time analysis, Critical path method (CPM), Programme evaluation and review technique (PERT), Cost considerations in network analysis – crashing.

Module IV: (10 hours)

Decision theory, Steps in decision theory approach, Decision making conditions, Decisions under conditions of risk, Decisions under uncertainty conditions, Decision tree analysis, Game theory, games with saddle points, Games without saddle points – 2 x 2 games, Graphical method for m x 2 & 2 x n games.

Module V: (10 hours)

Simulation, Types of simulation, –Phases of simulation, Applications, Advantages and disadvantages Design of simulation, models & experiments, model validation, Generation of random numbers, Monte Carlo simulation, Queuing simulation model, Inventory simulation model, Simulation languages

COURSE OUTCOMES:

On successful completion of the course, the student will be able to:

- understand operations research techniques and apply them in solving practical problems in industry.
- solve Linear Programming Problems.
- use CPM and PERT techniques, to plan, schedule, and control project activities.
- solve Transportation and Assignment Problems.
- understand the usage of game theory and Simulation for Solving Business Problems.

TEXT BOOKS:

1. Miller, D. M. and Schmidt, J. W., Industrial Engineering and Operations Research, John Wiley & Sons, Singapore, 1990.
2. Paneer Selvam, R., Operations Research, Prentice Hall of India, New Delhi, 2008.
3. Pannerselvam, R., Design and Analysis of Algorithms, Prentice Hall of India, New Delhi, 2007.
4. Srinivasan, G. "Operations Research-Principles and Applications", Latest edition, PHI Pvt. Ltd., 2010

REFERENCE BOOKS:

1. Banks, J., Carson, J. S., Nelson, B. L., and Nicol, D. M., Discrete-Event System Simulation, Third Edition, Pearson Education, Inc.
2. Goel, B. S. and Mittal, S. K., Operations Research, Pragati Prakashan, Meerut.
3. Ravindran, Phillips and Solberg, Operations Research Principles and Practice, Willey & Sons, 1987.
4. Srinivasan, G. "Operations Research-Principles and Applications", Latest edition, PHI Pvt. Ltd., 2010.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 606(E)	MANAGEMENT INFORMATION SYSTEMS	3-1-0-3

***PRE-REQUISITES**:* NIL

COURSE OBJECTIVES:

- To introduce the methods and the influence of the information systems in management milieu.
- To enable the students to use MIS as an effective tool in management and decision making.

SYLLABUS:

Module I: (12 hours)

Information Systems - functions of management - levels of management - framework for information systems - systems approach - systems concepts - systems and their environment - effects of systems approach in information systems design - using systems approach in problem solving - strategic uses of information technology.

Module II: (7 hours)

Computer Hardware, Computer Software, File and Database Management Systems, Telecommunication and Networks - Communication, Media, Modems & Channels - LAN, MAN & WAN - Network Topologies, Internet, Intranet and Extranet. Wireless technologies like Wi-Fi, Bluetooth and Wi- Max.

Module III: (10 hours)

Kinds of Information Systems - Transaction Processing System (TPS) – Office Automation System (OAS) - Management Information System (MIS) – Decision Support System (DSS) and Group Decision Support System (GDSS) - Expert System(ES) - Executive Support System (EIS or ESS).

Module IV: (8 hours)

Applications of Information systems to functional business areas - Manager's view - Operational accounting and financial information systems -Operational marketing information systems - Operational production information systems - Operational human resource information systems.

Module V: (13 hours)

Information systems planning - critical success factor - business system planning - ends/means analysis - organizing the information systems plan - system analysis and design - alternative application development approaches - organization of data processing - security and ethical issues of information systems

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:

- learn managerial challenges and opportunities for organizational advancement that may be resolved by the application of current new technologies.
- learn the methods and the influence of the information systems in management milieu.
- understand the kinds of information system and information system planning.
- identify the different applications of Operational Information systems to Business.
- discuss security and ethical issues of information systems.

TEXT BOOKS:

1. Schultheis R. & Mary Summer, Management Information Systems-The Manager's View, Tata McGraw Hill, 2006, fourth edition.

REFERENCE BOOKS:

1. Kenneth J Laudon, Jane P.Laudon, Management Information Systems-Organization and Technology, Pearson/PHI,10/e, 2007.
2. W. S. Jawadekar, Management Information Systems, Tata McGraw Hill Edition, 3/e, 2004.
3. Alter S., Information Systems: A Management Perspective, Pearson Education.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as homework, problem solving, case study, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks*** Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B*: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks***
Two questions from each module with choice to answer one question.

IT19 606(F)	OBJECT ORIENTED MODELING AND DESIGN	3-1-0-3

PRE-REQUISITES*: NIL*

COURSE OBJECTIVES:

- Describe the concepts involved in Object-Oriented modeling and their benefits.
- Demonstrate concept of use-case model, sequence model and state chart model for a given problem.
- Explain the facets of the unified process approach to design and build a Software system.
- Translate the requirements into implementation for Object Oriented design.
- Choose an appropriate design pattern to facilitate development procedure.

SYLLABUS:

Module I: (12 hours)

What is Object orientation? What is OO development? Evidence for usefulness of OO development; OO modeling history. Modeling as Design technique: Modeling; abstraction; The Three models. Class Modeling: Object and Class Concept; Link and associations concepts; Generalization and Inheritance; A sample class model; Navigation of class models; Advanced Class Modeling, Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived Data; Packages.

Module II: (10 hours)

Use Case Modeling and Detailed Requirements: Overview; Detailed object- oriented Requirements definitions; System Processes-A use case/Scenario view; Identifying Input and outputs-The System sequence diagram; Identifying Object Behavior-The state chart Diagram; Integrated Object-oriented Models.

Module III: (10 hours)

Process Overview, System Conception and Domain Analysis: Process Overview: Development stages; Development life Cycle; System Conception: Devising a system concept; elaborating a concept; preparing a problem statement. Domain Analysis: Overview of analysis; Domain Class model: Domain state model; Domain interaction model; Iterating the analysis

Module IV: (10 hours)

Use case Realization: The Design Discipline within up iterations: Object Oriented Design-The Bridge between Requirements and Implementation; Design Classes and Design within Class Diagrams; Interaction Diagrams-Realizing Use Case and defining methods; Designing with Communication Diagrams; Updating the Design Class Diagram; Package Diagrams-Structuring the Major Components; Implementation Issues for Three-Layer Design.

Module V: (10 hours)

Design Patterns: Introduction; what is a design pattern? Describing design patterns, the catalog of design patterns, Organizing the catalog, how design patterns solve design problems, how to select a design patterns, how to use a design pattern; Creational patterns: prototype and singleton(only); structural patterns adaptor and proxy(only).

COURSE OUTCOMES:

On successful completion of the course, the student will be able to:

- impart ideas on building systems through the object-oriented modeling approach using the Unified Modeling Language.
- describe the concepts of object-oriented and basic class modeling.
- get an overview of process, development life cycle, domain analysis
- draw class diagrams, sequence diagrams and interaction diagrams to solve problems.
- choose and apply a befitting design pattern for the given problem.

TEXT BOOKS:

1. Michael Blaha, James Rumbaugh: Object Oriented Modeling and Design with UML,2nd Edition, Pearson Education,2005.
2. Satzinger, Jackson and Burd: Object-Oriented Analysis & Design with the Unified Process, 1st edition, Cengage Learning,2005.
3. Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides: Design Patterns – Elements of Reusable Object-Oriented Software, 1st edition, Pearson Education, 2007.

REFERENCE BOOKS:

1. Grady Booch et.al.: Object-Oriented Analysis and Design with Applications,3rd Edition, Pearson Education,2007.
2. Frank Buschmann, ReginеMeunier, Hans Rohnert, Peter Sommerlad, Michel Stal: Pattern –Oriented Software Architecture. A system of Patterns, Volume 1, John Wiley and Sons.2007.

3. Booch, Jacobson, Rambaugh : Object-Oriented Analysis and Design with Applications, 3rd edition, Pearson, Reprint 2013.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).
20% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.
10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions **10x 5 marks= 50 marks
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions **5 x 10 marks= 50 marks
Two questions from each module with choice to answer one question.

IT19 607(P)	MICROPROCESSORS LAB	0-0-3-1

PRE-REQUISITES*:* MICROPROCESSORS

COURSE OBJECTIVES:

1. To implement the different Arithmetic and Logical operations.
2. To implement the String operations.

SYLLABUS:

List of Exercises / Experiments

1. Serial Interface PC to PC Serial Interface using Modem.
2. *Assembly language programs for implementing arithmetic operation (Minimum of 3 Experiments), logical operation (Minimum of 2 Experiments), String operation (Minimum of 2 Experiments)
3. *Implementation of code conversion between BCD, Binary, Hexadecimal and ASCII
4. *Programming exercises using stack and subroutines (Minimum of 2 Experiments).
5. *Stepper Motor Interface to Rotate Motor (Minimum of 2 Experiments).
6. Implementation of a file Manager using DOS/BIOS Interrupt.

COURSE OUTCOMES:

On successful completion of the course, the Student will be able to:

- Perform Serial Interface using Modem
- Learn 80x86 instruction sets and gains the knowledge of how assembly language works.
- Develop assembly language programs for problem solving using software interrupts and various assembler directives.
- Implement programs using stack and subroutines.
- Design and implement programs written in 80x86 assembly language.

Internal Continuous Assessment (Maximum Marks-50)

60% - Laboratory practical, record and Viva voce.
30% - Tests.
10% - Regularity in the lab.

Semester-end Practical Examinations (Maximum Marks-100)

10% - Record of works done
20% - Vivavoce
70% - Algorithm, coding, compiling and executing, result and inference

IT19 608(P)	MINI PROJECT	0-0-3-1

COURSE OBJECTIVES:

- To estimate the ability of the student in transforming the theoretical knowledge studied so far into a working model of a computer / information system.
- For enabling the students to gain experience in organisation and implementation of a small project and thus acquire the necessary confidence to carry out main project in the final year.

In this practical course, each group consisting of three/four members is expected to design and develop a moderately complex computer / information system with practical applications; this should be a working model. The basic concepts of product design may be taken into consideration while designing the project.

A committee consisting of minimum three faculty members specialized in Information Technology or computer science and engineering will perform assessment of the mini project. Students have to submit a report on the mini project and demonstrate the mini project before the evaluation committee.

Internal Continuous Assessment *(Maximum Marks-100)*

25% - Design and development
25% - Final result and Demonstration
20% - Final Report
20% - Viva voce
10% - Regularity

UNIVERSITY OF CALICUT

SYLLABUS

B.Tech. in Information Technology
(2019 SCHEME)

For

Semester VII

IT19 701	DESIGN & ANALYSIS OF ALGORITHMS	3-1-0-4

PRE-REQUISITES: DATA STRUCTURES AND ALGORITHMS

COURSE OBJECTIVES:

- To provide a solid foundation in algorithm design and analysis
- To understand and design algorithms using greedy strategy, divide and conquer approach and dynamic programming
- To analyze asymptotic runtime complexity of algorithms including formulating recurrence relations
- To have basic knowledge of computational complexity, approximation algorithms

SYLLABUS:

Module I: (10 hours)

Introduction- Algorithms, Characteristics, Need of algorithm analysis - Complexity of algorithms – Time complexity, Space complexity, Asymptotic notations- big Oh – big omega – little Oh – omega and theta notations – Best, worst and average case complexities, Solution to recurrences – Substitution method, recurrence tree, Masters Theorem

Module II: (12 hours)

Amortized analysis – aggregate, accounting and potential methods, Heapsort- Heaps, Maintaining the heap property, building a heap, heapsort algorithm, Analysis of heapsort, Quicksort- Description of quicksort- Analysis of quicksort, Binary Search Trees – definition- Querying a binary search tree - Insertion and deletion, AVL Trees – rotations.

Module III: (10 hours)

Divide and conquer – Strassen's algorithm, Merge sort – Analysis of merge sort, Dynamic Programming – Matrix chain multiplication, Greedy Algorithms –Huffman coding -Elementary Graph Algorithms-Representations of graphs-Breadth-first search-Depth-first search - Minimum Spanning Trees - The algorithms of Kruskal and Prim.

Module IV: (10 hours)

Single source shortest path problem- Dijkstra algorithm- All pair shortest path problem- Floyd Warshall algorithm- Backtracking – 8 queens problem, Sum of subset problem, Branch and bound – Travelling salesman problem

Module V: (10hours)

Complexity: Complexity classes – P, NP, Co-NP, NP Hard and NP Complete problem– Cook's theorem (Proof not expected) – NP- Completeness reductions for clique, Vertex Cover – Subset Sum-Hamiltonian Cycle – TSP - approximation algorithms –Vertex Cover – TSP-Set covering and subset sum.

COURSE OUTCOMES:

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

- Analyze the worst-case and average case running times of algorithms using asymptotic analysis.
- Understand the concept of divide and conquer technique and advanced data structures.
- Understand the dynamic-programming paradigm and its algorithmic design situations.
- Familiarize the greedy design technique and also understand the concepts backtracking and branch and bound
- Familiarize the different complexity classes, approximation algorithms and the benefit of using them.

Text Books:

1. Corman T.H, Lieserson C.E & Rivest R.L, Introduction to Algorithms, Third Edition, Prentice Hall India.

Reference Books:

1. Anany Levitin, Introduction to the Design and Analysis of Algorithms, 3rd Edition, Pearson
2. Alan Van Gelder, Sara Baase," Computer Algorithms- Introduction to design and analysis", 3rd Edition, 2004.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE

questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 702	COMPUTER GRAPHICS & MULTIMEDIA	3-1-0-4

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To discuss line and circle drawing algorithms.
- To introduce 2D and 3D transformations and projections.
- To introduce fundamentals of multimedia.
- To discuss data compression techniques

SYLLABUS:

Module I: (10 hours)

Introduction to raster scan display – pixels, frame buffer, vector and character generation, random scan display, graphics primitives, display devices, Scan conversion techniques: Line drawing algorithm- DDA, Bressenhams line drawing algorithm, Circle drawing algorithm: Midpoint circle algorithm, Midpoint ellipse drawing algorithm, Character generation methods

Module II: (12 hours)

Polygon- Representation of polygon, Seed filling algorithm – Flood fill algorithm, Boundary fill algorithm -2D transformations: Basic transformations - Matrix representation and homogeneous coordinates -Window to viewport transformations. Line clipping: - Cohen Sutherland line clipping- Polygon clipping-Sutherland Hodgeman Polygon clipping-Weiner Atherton algorithm.

Module III: (10 hours)

3D transformations: Translation, Rotation, Scaling, 3D projections: Parallel and perspective projection, Types of Parallel and perspective projection, Solid modelling: Representation of solids, Primitive instancing, sweep representation, Boundary representation, Spatial partitioning representation

Module IV: (10 hours)

Introduction to multimedia – Medium, Main Properties of a Multimedia System. Multimedia. Traditional Data Stream Characteristics. Data Streams Characteristics for Continuous Media.

Information Units. Sound/Audio: Basic Sound Concepts, Music, Speech- Video and Animation-Basic Concepts, Television, Computer-based Animation

Module V: (10 hours)

Data compression: Storage Space, Coding Requirements, Source Entropy, Hybrid Coding.

Some Basic Compression Techniques-JPEG, H.261, MPEG, DVI.

COURSE OUTCOMES:

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

- analyze and implement algorithms for line drawing, circle drawing, ellipse drawing and polygon filling.
- apply geometrical transformation on 2D and 3D objects.
- analyze and implement algorithms for clipping.
- apply various projection techniques on 3D objects.
- identify the basic components and compression techniques of a multimedia.

Text Books:

1. Foley J.D., Van Dam A., Feiner S.K., & Hughes J.F., Computer Graphics Principles and Practice, 2nd edition, Pearson Education
2. Steinmetz R. & Nahrstedt K., Multimedia: Computing, Communications and Applications, 1st edition, Pearson Education.

Reference Books:

1. Foley J.D., Van Dam A., Feiner S.K., & Hughes J.F., Computer Graphics Principles and Practice, 2nd edition, Pearson Education
2. Steinmetz R. & Nahrstedt K., Multimedia: Computing, Communications and Applications, 1st edition, Pearson Education.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 703	ARTIFICIAL INTELLIGENCE	3-1-0-3

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To introduce AI problems and Search techniques, Knowledge Representations, Neural networks, LISP, Prolog and various approaches of AI problems solving.
- To design systems of artificial Intelligence and expert systems.

SYLLABUS:

Module I: (10 hours)

Introduction - definition and basic concepts - aims - approaches - Problems in AI –AI history and applications - perception and action - representing and implementing action functions- production systems - networks - Structures and strategies for state space search. Informed and Uninformed searches

Search Methods: data driven and goal driven search. Depth first and breadth first search, DFS with iterative deepening. Heuristic search-best first search, A * algorithm.AO* algorithm, Constraint Satisfaction.

Module II: (10 hours)

Heuristics in Games, Design of good Heuristic-an example. Min-Max Search Procedure, Alpha Beta Pruning

Semantic nets, conceptual Dependency, scripts, frames, introduction to agent based problem Solving

Module III: (10 hours)

Predicate Calculus- motivation - the language and its syntax - semantics - quantification - semantics of quantifiers - resolution in predicate calculus - unification - converting arbitrary wffs to clause form - using resolution to prove theorems.

Module IV: (12 hours)

Neural networks - introduction - motivation - notation - the back propagation method - generalization and accuracy - communication and integration - interacting agents - a modal logic of knowledge - communication among agents – speech acts - understanding language strings -

efficient communication – natural language processing

Module V: (10 hours)

Programming in LISP - basic LISP primitives - Predicates – conditionals and Binding -association lists - lambda expressions - macros - I/O in LISP- Introduction to Prolog-Representing fact s- Recursive Search- Abstract Data types- Meta Predicates, Matching and Evaluation, Meta Interpreters

COURSE OUTCOMES:

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

- explain various search algorithms (uninformed, informed, and heuristic) for problem Solving.
- interpret different Heuristics in Games
- understand Predicate Calculus.
- deliver an Introduction to Neural Network.
- comprehend the fundamentals of LISP and Prolog

Text Books:

1. Stuart Russell, Peter Norvig, Artificial Intelligence: A Modern Approach, Prentice Hall,4th Edition,2020
2. Prateek Joshi, Artificial Intelligence with Python, Packt,2nd Edition, January 2020
3. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep learning, MIT Press 2016, illustrated.
4. Winston P.H., LISP, Addison Wesley, 1997, 3rd Edition
5. Carl Townsend- Turbo Prolog -BPB Publication, 2nd Edition.
6. RB Mishra, Artificial Intelligence, Prentice Hall India Learning Private Limited (1 January 2010),1st Edition

Reference Books:

1. E Rich, K Knight, Artificial Intelligence, 3/e, Tata McGraw Hill, 2009.
2. Deepak Khemeni, A First course in Artificial Intelligence, Tata McGraw Hill,2013.1st Edition
3. Patrick Henry Winston, Artificial intelligence, Addison wesley,1992.3rd Edition.

4. Stefan Edelkamp, Stefan Schroedl, Heuristic Search: Theory and Applications, Morgan Kaufman, 2011. .1st Edition

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 704	CLOUD COMPUTING	3-1-0-3

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To impart the Cloud Computing basics, benefits and limitations.
- To impart the cloud accessing and cloud storage.
- To introduce the concept of software as service and software plus services.
- To impart the clouds and thin clients and migrating to the cloud.

SYLLABUS:

Module I: (10 hours)

Cloud computing basics- Overview, Applications, Internet and the cloud, First movers in the cloud, When you can use cloud computing, Benefits, Limitations, Security concerns, Regularity issues. Hardware and Infrastructure- Client, Security, Network, Services.

Module II: (12 hours)

Accessing the cloud- Platforms, Web applications, Web APIs, Web browsers. Cloud storage- Overview, Cloud storage providers. Standards- Application, Client, Infrastructure, Service.

Module III: (10 hours)

Software as a Service-Overview, Driving forces, Company offerings, Industries. Software plus Services-Overview, Mobile device integration, Providers, Microsoft online.

Module IV: (10 hours)

Developing applications-Google, Microsoft, Intuit Quick Base Local, Cast iron cloud, Bungee connect, Development. Clouds and thin clients-Virtualization in your organization, Server solutions, Thin clients.

Module V: (10 hours)

Migrating to the cloud-Cloud services for individuals, Enterprise-class cloud offerings, Migration. Best practices and the future of cloud computing- Analyze service, Best practices,

How cloud computing might evolve.

COURSE OUTCOMES:

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

- identify the cloud computing basics.
- understand the concept of accessing the cloud.
- gain conceptual understanding of cloud service types Software as a Service
- know the key dimensions of the challenge of Cloud Computing
- compare the various public cloud platforms and software environments.

Text Books:

1. Toby Velte, Anthony Velte, Robert C. Elsenpeter, Cloud Computing: A Practical Approach, McGraw Hill Professional, 2009.

Reference Books:

1. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Cloud Computing: Principles and Paradigms, John Wiley & Sons, 2010.
2. John R. Vacca, Cloud Computing Security: Foundations and Challenges, CRC Press, 2016.
3. Michael Miller, Cloud Computing – Web based Applications, Pearson Publishing, 2011.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 705(A)	MACHINE LEARNING	3-1-0-3

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To understand the need for machine learning for various problem solving
- To study the various supervised, semi-supervised and unsupervised learning algorithms in machine learning

SYLLABUS:

Module I: (11 hours)

Introduction

Learning problems - perspectives and Issues - concept Learning - version Spaces and candidate Eliminations - Inductive bias-- Decision Tree learning - representation - Algorithm - Heuristic Space Search.

Module II: (7 hours)

Neural networks and genetic algorithms

Neural network Representation – problems-perceptron - Multi layer Networks and back propagation algorithms- Advanced Topics-Genetic algorithms basic concepts, encoding, fitness function, reproduction-Roulette wheel, Boltzmann, tournament, rank, and steady state selections, Convergence of GA, Applications of GA case studies.

Module III: (13 hours)

Bayesian and computational learning

Bayes Theorem - Concept learning- Maximum likelihood- Minimum description length principle- Bayes optimal classifier- Gibb's algorithm- naïve Bayes classifier- Bayesian belief network- EM Algorithm-Probability Learning-Sample complexity-finite and Infinite Hypothesis spaces - Mistake bound model

Module IV: (8 hours)

Instant based learning

K-nearest neighbour learning-Locally weighted regression-Radial basis functions-case based learning

Module V: (13 hours)

Advanced learning

Learning sets of rules –Sequential covering algorithm- Learning rule set – First order rules-set of first order rules- Induction on inverted Deduction - Inverting resolution-analytical learning-perfect domain theories-explanation base learning-FOCL algorithm-reinforcement learning-task-Q-learning-temporal difference learning

COURSE OUTCOMES:

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

- Understand the basics of machine learning
- Differentiate between supervised, unsupervised, semi-supervised machine learning approaches.
- Discuss and apply the back propagation algorithm and genetic algorithm to various problems.
- Apply the Bayesian concepts to machine learning.
- Analyse and suggest appropriate machine learning approaches for various types of problems.

Text Books:

1. Tom M Mitchell-Machine Learning, McGraw-Hill Education (India) private limited, 2013
2. Christopher M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006.

Reference Books:

1. EthemAlpaydin, "Introduction to Machine Learning (Adaptive computation and Machine Learning)", The MIT press 2004
2. Stephen Marsland- "machine learning": An algorithm perspective press,2009.
3. Mitchell. T, Machine Learning, McGraw Hill.1997

4. Ryszard S. Michalski, Jaime G. Carbonell, and Tom M. Mitchell, Machine Learning: An Artificial Intelligence Approach, Tioga Publishing Company.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 705(B)	STOCHASTIC PROCESSES	3-1-0-3

PRE-REQUISITES: ENGINEERING MATHEMATICS IV

COURSE OBJECTIVES:

- Define and characterize a stochastic process.
- Be exposed to renewal and branching processes.
- Identify, Define and Apply stochastic models particularly, Markov chains (discrete and continuous).

SYLLABUS:

Module I: (12 hours)

Basic concepts: definition and examples of stochastic process -classification of general stochastic processes into Discrete state spaces -classification of general stochastic processes into continuous state spaces -type of stochastic processes -Elementary problems.

Module II: (10 hours)

Introduction to Markov chains discrete in time, examples -Classification of States of a Markov chain -Recurrence – Basic limit theorem of Markov chains - Absorption probabilities – Criteria for recurrence -Problems based on Morkov chain.

Module III: (10 hours)

Continuous time Markov chain -Pure birth process and Poisson process -birth and death process - Problems based on Continuous time Markov chain - Problems based on Continuous time Markov chain.

Module IV: (10 hours)

Renewal process – definition and examples - Renewal process Problems -elementary renewal theorem -Martingales – Examples- Problems.

Module V: (10 hours)

Introduction to Branching process Introduction to Branching process - Definition and examples of discrete time branching process - probability generating function mean and variance – Probability of extinction Problems.

COURSE OUTCOMES:

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

- define, Classify and characterize a stochastic process.
- understand the concepts of renewal processes.
- apply stochastic models particularly, Markov chains (discrete and continuous).
- define and characterize a renewal process.
- identify a branching process

Text Books:

1. T.Veerarajan, "Probability, Statistics and Random Processes", Tata McGraw Hill Publishing Company Ltd., 2003.
2. Ross S.M., "Stochastic Processes", John Wiley & Sons, 3rd Edition, 2010
3. Medhi J., "Stochastic Processes", New Age International, 2012.

Reference Books:

1. Samuel Karlin and Howard M.Taylor, "A Second Course in Stochastic Processes", Academic Press, 1981.
2. Narayan Bhat U and Gregory K Miller "Elements of applied stochastic processes" Wiley - Inter science, 3rd edition, 2002.
3. Basu, A.K., "Elements of Stochastic Processes", Narosa Publications, 2002.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 705(C)	AD-HOC AND SENSOR NETWORKS	3-1-0-3

PRE-REQUISITES: COMPUTER NETWORKS

COURSE OBJECTIVES:

- To gain knowledge on routing and protocols in Ad Hoc and sensor networks.
- To get skilled in wireless networks technology platforms and standards.
- To learn real time traffic support in wireless networks with working principles of wireless LAN.
- To get familiar in standards of wireless LAN and learn hybrid networks

SYLLABUS:

Module I: (8 hours)

Ad Hoc Wireless Networks and MAC: Introduction – Issues in ad Hoc wireless networks- MAC protocols – Issues, classifications of MAC protocols, Contention based protocols - Contention based protocols with reservation mechanism- Multi channel CSMA MAC protocol.

Module II: (11 hours)

Routing Protocols and TCP over Ad Hoc: Issues in designing a routing protocol – Classifications of routing protocols – Hierarchical and power-aware routing protocols. Multicast routing protocols–Classifications- Tree based- Mesh based. Ad Hoc wireless networks-transport layer issues- TCP over Ad Hoc – Feedback based - TCP with explicit link- TCP-Bus - Ad Hoc TCP and split TCP- Ad Hoc transport protocol.

Module III: (10 hours)

Quality of Service in Ad Hoc Wireless Networks: Real-time traffic support – Issues and challenges in providing QoS – Classification of QoS solutions– MAC layer solutions – QoS routing protocols – Ticket based and predictive location based QoS routing protocols- On-Demand link state multipath QoS routing protocol- QoS frameworks.

Module IV: (11 hours)

Energy management Ad Hoc – Battery and power management schemes - Transmission power management schemes Wireless Sensor Networks: Introduction – Sensor network architecture- Data dissemination – Gathering- MAC protocols for sensor networks –Self organizing- Hybrid

TDMA/FDMA and CSMA based MAC - Location discovery and quality of sensor networks- Evolving standards - Energy efficient design.

Module V: (12 hours)

Hybrid Wireless Networks: Introduction- Next generation hybrid wireless architectures-Routing in hybrid wireless networks- Power control schemes and load balancing in hybrid wireless networks- Recent advances in wireless networks –Ultra wide band radio communication-Wireless fidelity systems-Optical wireless networks

COURSE OUTCOMES:

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

- understand the principles of Ad Hoc wireless and sensor networks.
- understand Routing Protocols and TCP over Ad Hoc
- implement protocols with location based QoS.
- illustrate sensor networks and assess performance.
- explain the hybrid wireless networks.

Text Books:

1. C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Prentice Hall Professional Technical Reference, 2008.

Reference Books:

1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2006.
2. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication – 2002.
3. Holger Karl and Andreas Willig "Protocols and Architectures for Wireless Sensor Networks", Wiley, 2005

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 705(D)	MOBILE COMMUNICATION	3-1-0-3

PRE-REQUISITES: DATA COMMUNICATION, COMPUTER NETWORKS

COURSE OBJECTIVES:

- To understand the basic concepts of mobile computing
- To understand Wireless LAN, Bluetooth and WiFi Technologies
- To be familiar with the network protocol stack
- To learn the basics of mobile telecommunication system
- To understand mobile transport and network layer

SYLLABUS:

Module I: (10 hours)

Introduction- Applications, History of wireless communication, A market for mobile communication, Simplified reference model- Wireless transmission- Frequencies for radio transmission, Signals, Antenna, Signal propagation, Spread Spectrum, Cellular system.

Module II: (12 hours)

Telecommunication System- GSM, DECT, TETRA, UMTS, IMT 2000, Satellite systems- History, Applications, Basics, Routing, Localization, Handover. Broadcast system – cyclic repetition of data, digital audio broadcasting, digital video broadcasting

Module III: (10 hours)

Wireless LAN – Infrared vs radio transmission, Infrastructure and ad hoc networks, IEEE 802.11- System architecture, Protocol architecture, Physical layer, MAC layer, MAC management, IEEE 802.11b, IEEE 802.11a, HIPERLAN- WATM, BRAN, HiperLAN2, Bluetooth – Architecture, Radio layer, Baseband layer, link manager protocol, L2CAP, Security, SDP, IEEE 802.15

Module IV: (10 hours)

Mobile network layer – Mobile IP- Goals and requirements, IP packet delivery, Registration, Tunneling and encapsulation, Optimization, reverse tunneling, Dynamic host configuration protocol – Mobile adhoc networks – Routing, Dynamic source routing, Alternative metrics

Module V: (10 hours)

Mobile transport layer – Traditional TCP, Classical TCP improvements – Indirect TCP, Snooping TCP, Mobile TCP, Fast transmit/fast recovery, selective retransmission, transaction-oriented TCP, Support for mobility- WAP: Architecture, Protocol description, IEEE 802.16e and Mobile Wimax, IEEE802.16m

COURSE OUTCOMES:

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

- explain the basics of mobile telecommunication system
- illustrate the generations of telecommunication systems, satellite systems and broadcast systems in wireless network
- describe the architecture of Wireless LAN technologies
- determine the functionality of network layer and identify a routing protocol for a given Ad hoc networks
- explain the functionality of Transport and Application layer

Text Books:

1. Jochen Schiller, —Mobile Communications‖, PHI, Second Edition, 2003.
2. Prasant Kumar Pattnaik, Rajib Mall, Fundamentals of Mobile Computing, PHI Learning Pvt. Ltd, New Delhi, 2012

Reference Books:

1. William Stallings, Computer Organization and Architecture: Designing for Performance, 8th edition, Pearson Education, 2010
2. D. A. Patterson and J. L. Hennessy, Computer Organization and Design, 5th Edition
3. John P. Hayes, Computer Architecture and Organization, 3rd Edition, McGraw Hill.
4. Heuring V.P. & Jordan H.F., Computer System Design & Architecture, 2nd Edition Prentice Hall

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 705(E)	COMPUTATIONAL COMPLEXITY	3-1-0-3

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To introduce the fundamentals of computational complexity theory.
- To discuss basic concepts such as computational models, computational complexity measures (e.g., time and space complexity measures), complexity classes, reducibility and completeness notions.
- To familiarize the concepts of randomized and approximation algorithms and discuss the related complexity classes.

SYLLABUS:

Module I: (8 hours)

Introduction: Easy and hard problems. Algorithms and complexity. **Turing machines:** Models of computation. Multi-tape deterministic and non-deterministic Turing machines. Decision problems

Module II: (11 hours)

The Halting Problem and Undecidable Languages: Counting and diagonalization- Tape reduction-Universal Turing machine. Undecidability of halting-Reductions-Rice's theorem

Module III: (10 hours)

Polynomial reducibility-Polynomial time algorithms: 2-satisfiability, 2-colourability.NP and NP-completeness: Non-deterministic Turing machines-NP. Polynomial time verification. -NP-completeness. Cook-Levin Theorem.

Module IV: (11 hours)

Polynomial transformations: 3- satisfiability, clique, colourability, Hamilton Cycle-Pseudo-polynomial time-Strong NP-completeness. Knapsack-NP-hardness. Interactive proof systems: IP = PSPACE

Module V: (12 hours)

Optimization and Approximation**:** Combinatorial optimization problems. Relative error. Bin-packing problem-Polynomial and fully polynomial approximation schemes-Vertex cover,

traveling salesman problem, minimum partition.

COURSE OUTCOMES:

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

- determine whether a problem is computable, and prove that some problems are not computable
- categorize problems into appropriate complexity classes
- classify problems based on their computational complexity using reductions
- analyse optimization problems using the concept of interactive proofs
- classify optimization problems into appropriate approximation complexity classes

Text Books:

1. Michael Sipser, Introduction to the Theory of Computation, (First edition – PWS Publishing Company, January 1997, or second edition - Thomson Course Technology,2005).
2. Sanjeev Arora and Boaz Barak, Computational Complexity: A Modern Approach, Cambridge University Press,2009.

Reference Books:

1. Christos H Papadimitriou, Computational Complexity, Addison-Wesley, 1994.
2. Oded Goldreich, Computational Complexity, Cambridge University press, 2008.
3. Vijay Vazirani, Approximation Algorithms, Springer--Verlag, 2001.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 705(F)	DIGITAL SIGNAL PROCESSING	3-1-0-3

PRE-REQUISITES: SIGNALS AND SYSTEMS

COURSE OBJECTIVES:

To impart basic ideas

- in the transforms used in digital domain.
- in the design and hardware realization of digital filters.

SYLLABUS:

Module I: (10 hours)

Periodic signals – Discrete-time Fourier series (DTFS) – properties of DTFS – aperiodic signals – discrete-time Fourier transform (DTFT) – properties of DTFT – Parseval's theorem – energy spectral density – – frequency response – sampling – sampling theorem – impulse train – Nyquist rate – aliasing.

Module II: (10 hours)

Discrete Fourier Transform-Properties-Circular Convolution-Linear convolution using DFT Linear filtering of long data sequences- Overlap add and overlap save methods- Computation of DFT Decimation in Time and Decimation in Frequency algorithms.

Module III: (10 hours)

Structures for realization of discrete time systems-Signal flow graph representation- structures for FIR and IIR systems-direct form, cascade form, parallel form-lattice and transposed structures Representation of numbers & errors due to rounding and truncation-Quantization of filter coefficients round off effects in digital filters-Limit cycle oscillations, scaling to prevent overflow

Module IV: (11 hours)

Design of Digital filters-Types of digital filters -FIR and IIR filters -specifications of digital Filters Design of FIR filters -Linear phase Characteristics-Window method, Optimal method and Frequency Sampling method-Design of IIR filters from analog filters -Impulse invariant and bilinear transformation methods- Frequency transformation in the analog and digital domains

Module V: (11 hours)

Computer Architectures for signal processing-Harvard Architecture, Pipelining, Multiplier Accumulator, Special Instructions for DSP, extended parallelism-General Purpose DSP Processors Implementation of DSP Algorithms for various operations-Special purpose DSP hardware-Hardware Digital filters and FFT processors-Case study and overview of TMS320 series processor

COURSE OUTCOMES:

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

- Summarize different fourier transforms for discrete signals.
- Compute DFT coefficients of discrete time signals
- Describe the structure realization of digital filters
- Design & analyze DSP systems like FIR and IIR Filter etc.
- Understand the DSP processor architectures

Text Books:

1. Oppenheim A. V., Schafer R. W., Discrete-Time Signal Processing, Prentice Hall/Pearson.
2. John G. Proakis, Dimitris G. Manolakis, Digital Signal Processing: Principles, Algorithms and Applications, Prentice Hall of India Pvt. Ltd., 1997.
3. Emmanuel C. Ifeacher, Barry W. Jervis, Digital Signal Processing: A Practical Approach, Pearson Education 2004
4. Li Tan,DSP-Fundamentals & Applications, Elsevier, New Delhi, 2008.

Reference Books:

1. Mitra S. K., Digital Signal Processing: A Computer Based Approach, Tata McGraw-Hill.
2. B Venkataramani & M.Bhaskar, Digital Signal Processors-Architecture,3. Programming and Applications, Tata Mcgraw Hill.
3. Ramesh Babu P., digital, Scitech Publications (India) Pvt. Ltd.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 706(P)	COMPILER DESIGN LAB	0-0-3-1

PRE-REQUISITES: COMPILER DESIGN

COURSE OBJECTIVES:

- To implement the different Phases of compiler.
- To implement and test simple optimization techniques.
- To give exposure to compiler writing tools.

SYLLABUS:

List of Exercises / Experiments

(Minimum 8 of mandatory)

1. Design and implement a lexical analyzer for given language using C and the lexical analyzer should ignore redundant spaces, tabs and new lines
2. Implementation of Lexical Analyzer using Lex Tool
3. Generate YACC specification for a few syntactic categories.
    a) Program to recognize a valid arithmetic expression that uses operator +, – , * and /.
    b) Program to recognize a valid variable which starts with a letter followed by any number of letters or digits.
    c) Implementation of Calculator using LEX and YACC – basic concepts – animation techniques –animation for the web.
4. Write program to find ε – closure of all states of any given NFA with ε transition.
5. Write program to convert NFA with ε transition to NFA without ε transition.
6. Write program to convert NFA to DFA
7. Write program to minimize any given DFA
8. Develop an operator precedence parser for a given language
9. Write program to find Simulate First and Follow of any given grammar
10. Construct a recursive descent parser for an expression.
11. Construct a Shift Reduce Parser for a given language
12. Implement Intermediate code generation for simple expressions.

13. Implement the back end of the compiler which takes the three address code and produces the 8086 assembly language instructions that can be assembled and run using an 8086 assembler. The target assembly instructions can be simple move, add, sub, jump etc.

COURSE OUTCOMES:

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

- Implement the techniques of Lexical Analysis and Syntax Analysis.
- Apply the knowledge of Lex &Yacc tools to develop programs.
- Generate intermediate code.
- Implement Optimization techniques.
- Implement the back end of the compiler and generate machine code.

Internal Continuous Assessment (Maximum Marks-50)

60% - Laboratory practical, record and Viva voce.

30% - Tests.

10% - Regularity in the lab.

Semester-end Practical Examinations (Maximum Marks-100)

10% - Record of works done

20% - Vivavoce

70% - Algorithm, coding, compiling and executing, result and inference

IT19 707(P)	NETWORKS LAB	0-0-3-1

PRE-REQUISITES: COMPUTER NETWORKS

COURSE OBJECTIVES:

The student should be made to:

- Be familiar with simulation tools.
- Have hands on experience on various networking protocols.

SYLLABUS:

List of Exercises / Experiments

(Minimum 8 mandatory)

1. Implementation of PC-to-PC file transfer using serial port and MODEM.
2. Software Simulation of IEEE 802.3, 802.4 and 802.5 protocols.
3. Software Simulation of Medium Access Control protocols
    a) Go Back N
    b) Selective Repeat
    c) stop-and wait protocol
4. Implement client-server communication using socket programming and TCP as transport layer protocol.
5. Implement client-server communication using socket programming and UDP as transport layer protocol.
6. Implementation of Simple Mail Transfer Protocol using TCP
7. Implementation of a subset of File Transfer Protocol using TCP/IP
8. Implementation of "finger" utility using Remote Procedure Call (RPC)
9. Generation and processing of HTML forms using CGI.
10. Study of Network simulator (NS)and Simulation of Congestion Control Algorithms using NS

COURSE OUTCOMES:

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

- Understand Usage of simulation tools

- Design and implement client/server programs using a variety of protocols
- Understand the implementation of SMTP using TCP.
- Understand the implementation of FTP using TCP/IP.
- Acquire the concept of network simulator.

Internal Continuous Assessment (Maximum Marks-50)

60% - Laboratory practical, record and Viva voce.

30% - Tests.

10% - Regularity in the lab.

Semester-end Practical Examinations (Maximum Marks-100)

10% - Record of works done

20% - Vivavoce

70% - Algorithm, coding, compiling and executing, result and inference

IT19 708(P)	PROJECT PHASE I	0-0-4-3

PRE-REQUISITE: NIL

COURSE OBJECTIVES:

- To enable the students to apply the engineering knowledge in practical problem solving.
- To foster innovation in design of products, processes or systems.
- To develop creative thinking in finding viable solutions to engineering problems.

SYLLABUS:

Project work is for duration of two semesters and is expected to be completed in the eighth semester. A project topic must be selected either from research literature or the students themselves may propose suitable topics in consultation with their guides. The guides may encourage socially relevant project which can be interdisciplinary in nature. Each student group consisting of not more than four members is expected to design and develop a complete system or make an investigative analysis of a technical problem in the relevant area. The project may be implemented using software, hardware, or a combination of both. Project evaluation committee consisting of the HOD or a senior faculty member, guide and three/four faculty members specialized in the above field shall perform the screening and evaluation of the projects.

Each project group should submit project synopsis within three weeks from start of seventh semester. Project evaluation committee shall study the feasibility of each project work before giving consent. Literature survey and 40% of the work has to be completed in the seventh semester.

Students should execute the project work using the facilities of the institute. However, external projects can be taken up in reputed industries, if that work solves a technical problem of the external firm. Prior sanction should be obtained from the head of department before taking up external project work and there must be an internal guide for such projects.

Each student has to submit an interim report of the project at the end of the 7^{th} semester. Members of the group will present the project details and progress of the project before the committee at the end of the 7^{th}semester.

COURSE OUTCOMES:

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

- Identify a topic of interest and use acquired knowledge within the selected area of

technology for project development.

- Discuss and justify the technical aspects and design aspects of the project with a systematic approach.
- Analyze the technical aspects and design aspects of the project and propose a work plan
- Practice team dynamics to work effectively in a team for the development of technical projects.
- Develop skills in technical presentation and report preparation.

Assessment Pattern

The Evaluation will be conducted as an internal evaluation based on the work done, the report and a viva- voce examination, conducted by a Project evaluation committee appointed by Head of the Department. The Continuous Internal Evaluation (CIE) is conducted by evaluating the progress of the project through minimum of TWO reviews. At the time of the 1st review, students are supposed to propose a new system/design/idea, after completing a thorough literature study of the existing systems under their chosen area. In the 2nd review students are expected to highlight the implementation details of the proposed solution.

A zeroth review may be conducted before the beginning of the project to give a chance for the students to present their area of interest /problem domain or conduct open brain storming sessions for developing innovative ideas. Zeroth review will not be a part of the evaluation process.

Internal Continuous Assessment *(Maximum Marks-100, Minimum required to pass-50)*

30% - Project Guide

20% - Interim evaluation by the evaluation committee

30% - Final presentation

20% - Report evaluation by the evaluation committee

IT19 709(P)	INTERNSHIP	0-0-0-1

PRE-REQUISITE: NIL

COURSE OBJECTIVES:

- To become acquainted with the future field of the mechanical engineering student
- To apply the acquired knowledge and skills in a practical situation
- To become acquainted with real life problem solving

SYLLABUS:

Students need to undergo a minimum of 10-15 days internship in an Industry/Firm associated with rural technology and agriculture/Rural village to observe, identify and give suggestions to the problems related to information technology or allied engineering sector in the society. The Internship should give exposure to the practical aspects of the relevant course/branch and allied engineering discipline. In addition, the student may also work on a specified task or project which may be assigned to him/her. The students will have an opportunity to develop observational skills, develop confidence to identify and understand the issues related with machines/systems and come up with solutions to rectify the same. This motive of the programme is ultimately focused on the mutual benefit to the students, industry and society. The outcome of the internship should be presented in the form of a report.

COURSE OUTCOMES:

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

- Identify how the internship relates to their academic courses and preferred career path.
- Communicate in a workplace environment in a clear and confident manner.
- Evaluate performance and accept feedback, in order to make changes as necessary.
- Articulate their experience and skills to potential employers.
- Identify and articulate next steps in their career trajectory.

Internal Continuous Assessment *(Maximum Marks-100, Minimum required to pass-50)*

10% - Attendance

20% - Coordinator

30% - Technical content of the report

40% - Presentation

UNIVERSITY OF CALICUT

SYLLABUS

B.Tech. in Information Technology (2019 SCHEME)

For

Semester VIII

IT19 801	CRYPTOGRAPHY AND NETWORK SECURITY	3-1-0-4

PRE-REQUISITES: Good knowledge about groups and fields.

COURSE OBJECTIVES:

- To introduce the fundamental principles and practices of cryptography and network security.
- To provide an overview of the field of security and assurance emphasizing the need to protect information being transmitted electronically.
- To introduce the fundamental concepts of authentication.

SYLLABUS:

Module I: (11 hours)

Introduction: Aspects of network security – Attacks – Different types –Security attacks – Security services and mechanisms. Cryptography: Basic Encryption & Decryption –Classical techniques – Transposition & substitution ciphers.

Module II: (9 hours)

Symmetric key algorithms – Fiestel Networks – Confusion – Diffusion – DES – AES.

Module III: (11 hours)

Public key cryptosystems – Number theory- Fundamental Theorem of arithmetic, Fermat's Theorem, Euler's Theorem, Euler's Totient Function, Extended Euclidean algorithm - Primality testing- Miller-Rabin Algorithm - The RSA Algorithm – Diffie Hellman key exchange, Elliptic Curve Cryptography.

Module IV: (11 hours)

Hash Functions - SHA-1, MD5 - Authentication Protocols - Digital signatures - Network & Application Security: Kerberos – X509 Authentication service – Electronic mail security – Pretty Good privacy –S/MIME – Secure Electronic Transactions.

Module V: (10 hours)

IP Security – architecture, Web security – Socket layer and transport layer security – System

security – Intruders, Malicious Software, Firewalls.

COURSE OUTCOMES:

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

- Understand the fundamental concepts of network security.
- Understand basic cryptographic techniques.
- Identify mathematical concepts for different cryptographic algorithms.
- Summarize different authentication and digital signature schemes
- Identify security issues in network, transport and application layers

Text Books:

1. William Stallings, Cryptography and Network Security, Pearson Education, 2014

Reference Books:

1. Behrouz A. Forouzan, Cryptography and Network Security, Tata McGraw-Hill. 2010
2. Schneier B., Applied Cryptography: Protocols, Algorithms, and Source Code in C, 2nd Ed, Wiley, 1995
3. Wenbo Mao, Modern cryptography - Theory and Practice, Pearson Education Asia
4. Niven & Zuckerman H.S, An Introduction to The Theory of Numbers, 5th Ed., John Wiley, 1991
5. Pfleeger C.P., Pfleeger S.L., Security in Computing, 4th Ed, Pearson Education
6. Michel E. Whiteman, Herbert J.Mattord, Principles of Information Security, 4th Ed, Cengage Learning.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions **10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions **5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 802	FOUNDATION OF DATA SCIENCE	3-1-0-3

PRE-REQUISITES: DATABASE MANAGEMENT SYSTEM

COURSE OBJECTIVES:

- To introduce fundamental ideas to process data.
- To introduce and discuss techniques for applying hypotheses and data into actionable predictions.

SYLLABUS:

Module I: (10 hours)

Introduction

Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.

Module II:

Data Collection and Data Pre-processing (10 hours)

Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization.

Module III: (11 hours)

Exploratory Data Analytics

Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis – Box Plots – Pivot Table – Heat Map – Correlation Statistics – ANOVA.

Module IV: (10 hours)

Model Development

Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot – Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sample Evaluation – Prediction and Decision Making.

Module V: (11 hours)

Evaluation

Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Overfitting – Under Fitting and Model Selection – Prediction by using Ridge Regression – Testing Multiple Parameters by using Grid Search.

COURSE OUTCOMES:

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

- explain and discuss the significance of data science and its key functionalities
- discuss and demonstrate various models suitable for data science.
- demonstrate knowledge and understanding of topics in data processing.
- key concepts in data science including tools and approaches.
- discuss topics in statistical analysis.

Text Books:

1. David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big data Analytics", EMC 2013
2. Jeffrey S. Saltz, Jeffrey M. Stanton, An Introduction to Data Science,2017, sage publications.

Reference Books:

1. Jojo Moolayil, "Smarter Decisions: The Intersection of IoT and Data Science", PACKT, 2016.
2. Cathy O'Neil and Rachel Schutt, "Doing Data Science", O'Reilly, 2015.
3. Raj, Pethuru, "Handbook of Research on Cloud Infrastructures for Big Data Analytics", IGI Global.
4. EMC Education Services, Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and presenting data 2015 published by Wiley.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 803(A)	IMAGE PROCESSING	3-1-0-3

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To understand the basic concepts of digital image processing and various image transforms.
- To get knowledge about the principles, techniques and algorithms for digital image processing
- To understand all the elements of image processing beginning from formation and digitization to enhancement, restoration, edge detection, segmentation, and compression

SYLLABUS:

Module I: (11 hours)

Introduction – digital image representation – fundamental steps in image processing – elements of digital image processing systems – digital image fundamentals – elements of visual perception – a simple image model – sampling and quantization – basic relationship between pixels – image geometry – image transforms

Module II: (10 hours)

Introduction to Fourier transform – discrete Fourier transform (DFT) – properties DFT- other separable image transforms – Walsh, Hadamard and Discrete Cosine transforms. Hotelling transform

Module III: (10 hours)

Image enhancement – basic grey level transformation – histogram equalization – image subtraction – Image averaging – spatial filtering – smoothing, sharpening filters – Laplacian filters.

Module IV: (10 hours)

Image restoration – model of Image degradation/restoration process – noise models – inverse filtering – least mean square filtering . Edge detection – thresholding – region based segmentation – Boundary representation.

Module V: (11 hours)

Image compression – fundamental concepts of image compression – compression models – information theoretic perspective. Lossless compression – Huffman coding – arithmetic coding – bit plane coding – run length coding. Lossy compression – transform coding – Image compression standards.

COURSE OUTCOMES:

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

- explain digital image processing systems.
- distinguish the various concepts and mathematical transforms necessary for image processing
- differentiate and interpret the various image enhancement techniques.
- learn the models of image restoration
- identify the image compression models

Text Books:

1. R.C. Gonzalez and R.E. Woods, Digital Image Processing – 4th edition, Prentice Hall of India, New Delhi

Reference Books:

1. A K. Jain, Fundamentals of digital image processing, Prentice Hall of India, 1989.
2. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing (English) 3rd Edition, Pearson India, 2013.
3. Al Bovik, The Essential Guide to Image Processing, Academic Press, 2009.
4. Milan Sonka, Vaclav Hlavac and Roger Boyle, Image Processing, Analysis, and Machine Vision, Thomson Learning, 2008.
5. S Jayaraman, S Esakkirajan and T Veerakumar, Digital Image Procesing, McGraw Hill Education, 2009.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 803(B)	NEURAL NETWORKS AND DEEP LEARNING	3-1-0-3

PRE-REQUISITES: MACHINE LEARNING, ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES:

- Introduce major deep learning algorithms, the problem settings, and their applications to solve real world problems.
- To implement efficient neural networks; identify key parameters in a neural network's architecture; and apply deep learning to applications.

SYLLABUS:

Module I: (11 hours)

Introduction: Various paradigms of earning problems, Perspectives and Issues in deep learning framework, review of fundamental learning techniques. Feed forward neural network: Artificial Neural Network, activation function, multi-layer neural network.

Module II: (10 hours)

Training Neural Network: Risk minimization, loss function, backpropagation, regularization, model selection, and optimization. Supervised learning- Perceptron learning, single l layer/multilayer perceptron, linear separability, hidden layers, back propagation algorithm, Radial Basis Function network;

Module III: (10 hours)

Unsupervised learning - Kohonen, SOM, Counter-propagation, ART, Reinforcement learning, adaptive resonance architecture, applications of neural networks to pattern recognition systems such as character recognition, face recognition, application of neural networks in image processing.

Module IV: (11 hours)

Conditional Random Fields: Linear chain, partition function, Markov network, Belief propagation, Training CRFs, Hidden Markov Model, Entropy. Deep Learning: Deep Feed Forward network, regularizations, training deep models, dropouts, Convolutional Neural Network, Recurrent Neural Network, Deep Belief Network.

Module V: (10 hours)

Probabilistic Neural Network: Hopfield Net, Boltzman machine, RBMs, Sigmoid net, Autoencoders. Deep Learning research: Object recognition, sparse coding, computer vision, natural language processing. Deep Learning Tools: Caffe, Theano, Torch.

COURSE OUTCOMES:

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

- identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.
- implement deep learning algorithms and solve real-world problems.
- understand training of Neural network.
- explain the various applications of Neural network
- understand probabilistic neural networks

Text Books:

1. Jeffrey S. Saltz, Jeffrey M. Stanton, An Introduction to Data Science.

Reference Books:

1. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
2. Golub, G.H., and Van Loan,C.,F., Matrix Computations, JHU Press,2013.
3. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions **5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 803(C)	RECOMMENDER SYSTEM	3-1-0-3

PRE-REQUISITES: MACHINE LEARNING, DATA MINING

COURSE OBJECTIVES:

- To provide students with basic concepts and application in various domain
- To develop state-of-the-art recommender systems that automate a variety of choice-making strategies with the goal of providing affordable, personal and high-quality recommendations.

SYLLABUS:

Module I: (10 hours)

Introduction: Recommender system functions, Linear Algebra notation – Matrix addition, Multiplication, transposition and inverses. covariance matrices, Understanding ratings, Applications of recommendation systems, Issues with recommender system

Module II: (9 hours)

Collaborative Filtering: User-based nearest neighbor recommendation, Item-based nearest neighbor recommendation, Model based and pre-processing based approaches, Attacks on collaborative recommender systems

Module III: (12 hours)

Content-based recommendation: High level architecture of content-based systems, Advantages and drawbacks of content based filtering, Item profiles, Discovering features of documents, Obtaining item features from tags, Representing item profiles, Methods for learning user profiles, Similarity based retrieval, Classification algorithms.

Knowledge based recommendation: Knowledge representation and reasoning, Constraint based recommenders, Case based recommenders.

Module IV : (10 hours)

Hybrid approaches: Opportunities for hybridization, Monolithic hybridization design: Feature combination, Feature augmentation, Parallelized hybridization design: Weighted, Switching, Mixed, Pipelined hybridization design: Cascade Meta-level, Limitations of hybridization strategies

Module V: (11 hours)

Evaluating Recommender System: Introduction, General properties of evaluation research, Evaluation designs, Evaluation on historical datasets, Error metrics, Decision-Support metrics, User-Centred metrics.

COURSE OUTCOMES:

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

- understand various issues related to Personalization and Recommendations.
- understand Collaborative Filtering
- explain Content-based recommendation
- understand opportunities for hybridization
- design and implement a set of well-known Recommender System approaches

Text Books:

1. Jannach D., Zanker M. and FelFering A., Recommender Systems: An Introduction, 1st Edition, Cambridge University Press, 2011.

Reference Books:

1. Ricci F., Rokach L., Shapira D., Kantor B.P., Recommender Systems Handbook, 1st Edition, Springer, 2011).
2. Manouselis N., Drachsler H., Verbert K., Duval E., Recommender Systems For Learning, 1st Edition, Springer, 2013).

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A*: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks***

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions **5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 803(D)	OPTIMIZATION TECHNIQUES	3-1-0-3

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To build an understanding on the basics of optimization techniques.
- To introduce basics of linear programming and meta- heuristic search techniques

SYLLABUS:

Module I: (11 hours)

Decision-making procedure under certainty and under uncertainty - Operations Research- Probability and decision- making- Queuing or Waiting line theory-Simulation and Monte-Carlo Technique Nature and organization of optimization problems Scope and hierarchy of optimization- Typical applications of optimization.

Module II: (11 hours)

Essential features of optimization problems - Objective function- Continuous functions - Discrete functions - Unimodal functions - convex and concave functions, Investment costs and operating costs in objective function - Optimizing profitably constraints -Internal and external constraints Formulation of optimization problems. Continuous functions - Discrete functions - Unimodal functions - convex and concave functions.

Module III: (11 hours)

Necessary and sufficient conditions for optimum of unconstrained functions -Numerical methods for unconstrained functions - One-dimensional search - Gradient-free search with fixed step size. Linear Programming - Basic concepts of linear programming - Graphical interpretation -Simplex method - Apparent difficulties in the Simplex method.

Module IV: (11 hours)

Transportation Problem, Loops in transportation table, Methods of finding initial basic feasible solution, Tests for optimality. Assignment Problem, Mathematical form of assignment problem, methods.

Module V: (8 hours)

Genetic Algorithms- Basic concepts, Encoding, Selection, Crossover, Mutation. Simulated Annealing - Acceptance probability, Cooling, Neighborhoods, Cost function. Application of GA and Simulated Annealing in solving sequencing and scheduling problems and Travelling salesman problem.

COURSE OUTCOMES:

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

- formulate mathematical models for optimization problems.
- analyze the complexity of solutions to an optimization problem.
- design programs using meta-heuristic search concepts to solve optimization problems.
- develop Techniques to solve Transportation problem.
- understand Genetic Algorithm and its application

Text Books:

1. Rao S.S., Optimization Theory and Applications, Wiley Eastern 1979,2nd Edition
2. Hamdy A. Taha, Operations Research – An introduction, Prentice – Hall India 2017.10th Edition
3. G. Zapfel, R. Barune and M. Bogl, Meta heuristic search concepts: A tutorial with applications to production and logistics, Springer 2010,1st Edition

Reference Books:

1. Gass S. I., Introduction to Linear Programming, Tata McGraw Hill 2012,5th Edition
2. Reeves C., Modern heuristic techniques for combinatorial problems, Orient Black Swan 1993,1st Edition
3. Goldberg, Genetic algorithms in Search, optimization and Machine Learning, Addison Wesley.1989,1st Edition
4. K. Deb, Optimization for engineering design – algorithms and examples, Prentice Hall of India 2012,2nd Edition

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 803(E)	SOFTWARE QUALITY MANAGEMENT	3-1-0-3

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To understand the role of standards and measurements used in accessing software quality.
- To test a system and find the system defects and inconsistencies.

SYLLABUS:

Module I: (12 hours)

Introduction: Software Process assessment overview – Quality management –Quality assurance plan – Considerations – Verification and Validation – Concepts of Quality Control, Quality Assurance, Quality Management – Total Quality Management; Cost of Quality; QC tools – 7 QC Tools and Modern Tools; Other related topics – Business Process Re-engineering – Zero Defect, Six Sigma, Quality Function Deployment, Benchmarking, Statistical process control.

Module II: (10 hours)

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

Module III: (10 hours)

Software Standards and Inspection: Definitions – The Reason for software standards – Benefits of standards – Establishing standards – Guidelines – Types of reviews – Inspection of objectives – Basic inspection principles – The conduct of 99inspection – Inspection training Models for Quality Assurance-ISO-9000 – Series, CMM, SPICE, Malcolm Baldrige Award – quality management models.

Module IV: (10 hours)

Testing and Managing Software Quality: Testing principles – Types of tests– Test planning – Test development – Test execution and reporting – Test tools and methods – Real Time testing – quality management paradigm – Quality motivation– Measurement criteria – Establishing a software quality program – Estimating software quality.

Module V: (10 hours)

Defect Prevention: Principles of software defect prevention – Process changes for defect prevention – Defect prevention considerations – Managements role –Framework for software process change – Managing resistance to software process change – Case studies.

COURSE OUTCOMES:

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

- explain basic differences between database design and conventional programming.
- develop in-depth understanding of relational databases and skills to optimize database performance in practice.
- design ER-models to represent simple database application scenarios
- improve the database design by normalization.
- get in depth about knowledge about database security

Text Books:

1. Managing the Software Process, Humphrey, Pearson Education India, 1989

Reference Books:

1. Roger S. Pressman, Software Engineering, 8/e, McGraw Hill, 2014.
2. Ian Sommervile, Software Engineering, 7/e, University of Lancastor, Pearson Education, 2004.
3. Bob Huges, Mike Cotterell, Rajib Mall, Software Project Management, 8/e, McGraw Hill,2015.
4. Walker Royce, Software Project Management: A Unified Frame Work, Pearson Education.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 803(F)	MOBILE APPLICATION DEVELOPMENT	3-1-0-3

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To learn the characteristics of mobile applications.
- To learn about the intricacies of UI required by mobile applications.
- To study about the design aspects of mobile application.
- To learn development of mobile applications.
- Learn to setup Android application development environment

SYLLABUS:

Module I: (13 hours)

Introduction - Mobile Applications – Characteristics and Benefits – Application Model – Infrastructure and Managing Resources – Mobile Software Engineering – Frameworks and Tools – Mobile devices Profiles

Module II: (12 hours)

User Interface - Generic UI Development – VUIs and Mobile Applications – Text to Speech techniques – Designing the right UI – Multimodal and Multichannel UI – Gesture based UIs – Screen Elements and Layouts – Voice XML – Java API.

Module III: (13 hours)

Application Design - Memory Management – Design patterns for limited memory – Work flow for Application Development – Techniques for composing Applications – Dynamic Linking – Plug ins and rules of thumb for using DLLs – Concurrency and Resource Management – Look and feel

Module IV: (13 hours)

Application Development - Intents and Services – Storing and Retrieving data – Communication via the Web – Notification and Alarms – Graphics and Multimedia – Telephony – Location based services – Packaging and Deployment – Security and Hacking.

Module V: (6 hours)

Tools - Google Android Platform – Eclipse Simulator – Android Application Architecture – Event based programming – Apple iPhone Platform – UI tool kit interfaces – Event handling and Graphics services – Layer Animation

COURSE OUTCOMES:

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

- To design and implement the user interfaces for mobile applications.
- To design the mobile applications that is aware of the resource constraints of mobile devices.
- To develop advanced mobile applications that accesses the databases and the web.
- To develop useful mobile applications in the current scenario using Google Android and Eclipse simulator.
- Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces,

Text Books:

1. Share Conder, Lauren Darcey, "Android Wireless Application Development" Pearson 3rd Edition. 2. Zigurd Mednieks, Laird Dornin, G, Blake Meike and Masumi Nakamura, —Programming Android‖, O"Reilly, 2011.
2. Google Developer Training, "Android Developer Fundamentals Course – Concept Reference", Google Developer Training Team, 2017.

Reference Books:

1. Professional mobile Application Development paperback,2012 Jeff Mcherter (Author),Scott Gowell (Author), Wiley India Private Limited .
2. Reto Meier, Wrox Wiley, —Professional Android 2 Application Development‖, 2010.
3. Alasdair Allan, —iPhone Programming‖, O"Reilly, 2010.
4. Wei-Meng Lee, —Beginning iPhone SDK Programming with Objective-C‖, Wrox Wiley, 2010.
5. Stefan Poslad, —Ubiquitous Computing: Smart Devices, Environments and interactions‖, Wiley, 2009.
6. Pro iOS Table VIews: for iPhone, iPad and IPod Touch Paperback,2012, Tim Duckett, Apress.

7. iOS Programming: The Big Nerd Ranch Guide Paperback, 2014, Joe COnway, Aaron Hilegass, Christian Keur.
8. iOS in Practise Paperback, 2012, Bear Cachil.
9. Mobile Authentication: Problems and Solutions (SpringerBriefs in Computer Science) Paperback, 2012, Markus Jakobsson.
10. Android App Development for Young Adults & The Rest of US Paperback, 2015, Paula Beer, Carl Simmons.
11. Oracle Mobile Application Framework Developer Guide: Build Multiplatform Enterprise Mobile Apps Paperback, 2014, Luc Bros.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 804(A)	INFORMATION RETRIEVAL	3-1-0-3

PRE-REQUISITES: DATA STRUCTURES AND ALGORITHMS

COURSE OBJECTIVES:

- To familiarize the students with tools and techniques for deriving the right information at the right time, in the current scenario of information explosion
- To present the techniques for storage of many forms of information, such as text, image, audio and video formats, and to present several issues related to different IR tasks.

SYLLABUS:

Module I: (12 hours)

Introduction - Information versus Data Retrieval, Basic Concepts, Past present and future, The retrieval process. Modeling - A Taxonomy of IR models, ad-hoc retrieval and filtering, Classic IR models, Alternate set theoretic models, Alternate algebraic models, Alternate probabilistic models, Structured text retrieval models, Models for Browsing.

Module II: (10 hours)

Retrieval Evaluation- Performance evaluation of IR, Reference Collections. Query languages- Keyword based querying, Pattern matching, Structural queries. Query Operations- User relevance feedback, automatic local and global analysis. Text Operations- Document preprocessing, Text compression.

Module III: (9 hours)

Indexing and searching- Inverted files, Suffix trees and suffix arrays, signature files, sequential searching, Pattern matching.

Module IV: (10 hours)

Parallel IR-MIMD Architecture, SIMD Architecture. Distributed IR-Collection partitioning, Source selection, Query processing, Web issues

Module V: (11 hours)

Searching the web – modeling the web, Search engines: architecture, user interfaces, ranking, crawling, indices. Web Directories, Meta searchers, Dynamic search and Software Agents.

COURSE OUTCOMES:

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

- possess the ability to store and retrieve textual documents using appropriate models.
- possess the ability to use the various retrieval utilities for improving search.
- identify indexing and compressing documents to improve space and time efficiency
- understand parallel IR and distributed IR
- demonstrate and evaluate various indexing and searching techniques.

Text Books:

1. R. Baeza-Yates and B. R. Neto, Modern Information Retrieval, Pearson Education.

Reference Books:

1. C. D. Manning, P. Raghavan, and H. Schutze, An Introduction to Information Retrieval, Cambridge University Press, 2009.
2. C.J. van Rijsbergen, Information Retrieval, Butterworths.
3. R.R.Korfhage, Information Storage and Retrieval, Wiley Student Edn.
4. C.D. Manning and H. Schutze, Foundations of Statistical natural Language Processing, The MIT Press, Cambridge, London.2001
5. Hand, H. Mannila, P. Smyth, Data Mining, Prentice Hall of India.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 804(B)	PARALLEL AND DISTRIBUTED ALGORITHMS	3-1-0-3

PRE-REQUISITES: DATA STRUCTURES, COMPUTER NETWORKS.

COURSE OBJECTIVES:

- To learn parallel computers and parallel processing concepts.
- To study different data structures for parallel processing.
- To impart the tree, graph, searching and merging, and sorting algorithms.
- To learn the distributed system concepts.
- To impart the different distributed algorithms.

SYLLABUS:

Module I: (9 hours)

Introduction- computers, parallel computers, parallel processing concepts, Levels of parallelism, Taxonomy of parallel computers, Models for parallel computation, PRAM model, Performance of Parallel algorithms

Module II: (10 hours)

Data structures for parallel computing- Arrays and Lists, Linked lists, Euler's and Hamiltonian graphs, trees, Graph traversal, Connectivity. Binary tree paradigm

Module III: (12 hours)

Tree algorithms- Euler circuits, Rooting a tree, Post order numbering. Graph algorithms- Simple graph algorithms, BFS, Connected components using BFS, Biconnected components, Spanning trees, shortest path problem. Searching and merging, Sorting algorithms

Module IV: (11 hours)

Introduction to Distributed systems, message passing, Preliminaries, Snapshots- Chandy Lamport algorithm, Lai Yang algorithm. Waves-Traversal algorithms, Tree algorithm, Echo algorithm. Deadlock detection- Wait for graph, Bracha Toueg algorithm. Termination detection- Dijkstra Scholten algorithm, Weight throwing algorithm.

Module V: (10 hours)

Garbage collection-Reference counting, Garbage collection implies termination detection, tracing. Routing-Chandy Misra algorithm, Packet switching, Routing on the internet. Election- Election in rings, Tree election algorithm.

COURSE OUTCOMES:

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

- construct parallel algorithms, i.e., identify parallelism in a given algorithm and implement it.
- understand various distributed algorithms.
- analyze properties such as efficiency, speedup etc., of parallel and distributed algorithms.
- Understand the performance of parallel and distributed algorithms.
- learn garbage collection concepts, packet switching and routing on internet.

Text Books:

1. C. Xavier and S. Sitharama Iyengar, Introduction to Parallel Algorithms
2. Wan Fokkink, Distributed Algorithms – An Intuitive Approach 2e (The MIT Press)

Reference Books:

1. V.Rajaraman, C. Siva Ram Murthy, & quot; Parallel Computers Architecture and Programming & quot;, PHI, New Delhi, 2000
2. Gerard Tel, Introduction to distributed algorithms 2nd ed., Cambridge university press
3. M.Sasikumar, et.al., & quot; Introduction to Parallel Processing & quot;, PHI, New Delhi, 2000

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 804(C)	DATA ANALYTICS	3-1-0-3

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To understand the data analysis techniques.
- To understand the concepts behind the descriptive analytics and predictive analytics of data.
- To familiarize with Big Data and its sources.
- To familiarize data analysis using R programming.
- To understand the different visualization techniques in data analysis.

SYLLABUS:

Module I: (10 hours)

Introduction to Data Analysis -Evolution of Analytic scalability, analytic processes and tools, Analysis vs reporting -Modern data analytic tools. Statistical concepts: Sampling distributions, re-sampling, statistical inference, prediction error.

Module II: (10 hours)

Predictive Analytics –Regression, Decision Tree, Neural Networks. Dimensionality Reduction -Principal component analysis-Descriptive Analytics -Mining Frequent item sets -Market based model –Association and Sequential Rule Mining.

Module III: (10 hours)

Clustering Techniques –Hierarchical –K-Means-Introduction to Big data framework -Fundamental concepts of Big Data management and analytics -Current challenges and trends in Big Data Acquisition.

Module IV: (12 hours)

Data Analysis Using R -Introduction to R, R Graphical User Interfaces, Data Import and Export, Attribute and Data Types, Descriptive Statistics, Exploratory Data Analysis, Visualization Before Analysis, Dirty Data, Visualizing a Single Variable, Examining Multiple Variables, Data Exploration Versus Presentation, Statistical Methods for Evaluation.

Module V: (10 hours)

Popular Big Data Techniques and tools -Map Reduce paradigm and the Hadoop System-Applications Social Media Analytics-Recommender Systems-Fraud Detection.

COURSE OUTCOMES:

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

- understand the techniques to analyze different types of data, characterize it and can apply them to make decision modeling process more intelligent.
- get a clear insight into data analysis, modern data analytic tools and various statistical concepts.
- understand the concepts of predictive analytics, decision tree and neural networks.
- gain knowledge about data analytics using R, descriptive statistics, visualization concepts etc.
- get in depth knowledge about popular big data techniques, tools and hadoop systems.

Text Books:

1. MC Education Services, Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data. John Wiley & Sons, 2015.
2. Jaiwei Han, Micheline Kamber, "Data Mining Concepts and Techniques", Elsevier, 2006.
3. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007

Reference Books:

1. Bart Baesens," Analytics in a Big Data World: The Essential Guide to Data Science and its Business Intelligence and Analytic Trends", John Wiley & Sons, 2013Challenges and Future Prospects, Springer, 2014.
2. Michael Minelli, Michele Chambers, Ambiga Dhiraj , "Big Data, Big Analytics: Emerging Min Chen, Shiwen Mao, Yin Zhang, Victor CM Leung ,Big Data: Related Technologies, Applications", John Wiley & Sons, 2014

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 804(D)	NATURAL LANGUAGE PROCESSING	3-1-0-3

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- The course is intended to impart the use of computers to process written and spoken language for the practical and useful purposes:
- To translate languages, to get information from the web on text data.

SYLLABUS:

Module I: (10 hours)

Introduction: Issues and difficulties in NLP – Evaluating Language understanding Systems – The different levels of language representations – Organization of NLP Systems – Types of NLP Systems.

Module II: (12 hours)

Grammars and Parsing: Grammars and sentence structures – Top-down parser – Bottom-up chart parser – Top-down chart parsing – Features and Augmented grammars – A simple Grammar with features – Parsing with features – Augmented Transition Networks (ATN)– Efficient parsers – Shift reduce parsers – deterministic parsers.

Module III: (10 hours)

Semantic interpretation-Semantics and logical form-word sense and ambiguity-The basic logical form language-verbs and states in logical form

Module IV: (10 hours)

Linking syntax and semantics-Semantic interpretation and compositionality-A simple grammar and lexicon with semantic interpretation-Prepositional phrases and verb phrases-Lexicalized semantic interpretation and semantic roles

Module V: (10 hours)

Knowledge representation and reasoning-Knowledge Representation-Frames: representing stereotypical information-Handling natural language quantification

COURSE OUTCOMES:

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

- understand NLP and NLP systems
- explain some naïve parsing techniques
- get a knowledge about basic notions of meaning and semantics
- understand Semantic Interpretation
- get a clear insight into different techniques for representing knowledge and reasoning

Text Books:

1. James Allen, Natural Language Understanding, Pearson Education Inc., 2003

Reference Books:

1. Gonzalez and D. Dankel, The Engineering of Knowledge-Based Systems Second Edition, Prentice Hall, 2004.
2. Daniel Jurafsky and James H Martin," Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", Prentice Hall, 2nd Edition,
3. C. Manning and H. Schutze, "Foundations of Statistical Natural Language Processing", MIT Press. Cambridge, MA:,1999,2nd Edition.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 804(E)	CYBER SECURITY	3-1-0-3

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To familiarize various types of cyber-attacks and cyber-crimes.
- To give an overview of the cyber laws
- To study the defensive techniques against these attack

SYLLABUS:

Module I: (10 hours)

Introduction to Vulnerability Scanning-

Overview of vulnerability scanning, Open Port / Service Identification, Banner / Version Check, Traffic Probe, Vulnerability Probe, Vulnerability Examples, OpenVAS, Metasploit.

Module II: (10 hours)

Networks Vulnerability Scanning

Networks Vulnerability Scanning - Netcat, Socat, understanding Port and Services tools - Datapipe, Fpipe, WinRelay, Network Reconnaissance – Nmap, THC-Amap and System tools, Network Sniffers and Injection tools – Tcpdump and Windump, Wireshark, Ettercap, Hping, Kismet 7 15% FIR

Module III: (10 hours)

Network Defense tools

Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding, the basic of Virtual Private Networks, Linux Firewall, Windows Firewall, Snort: Introduction Detection

Module IV: (11 hours)

Web Application Tools

Scanning for web vulnerabilities tools: Nikto, W3af, HTTP utilities - Curl, OpenSSL and Stunnel, Application Inspection tools – Zed Attack Proxy, Sqlmap. DVWA, Webgoat, Password Cracking and Brute-Force Tools – John the Ripper, L0htcrack, Pwdump, HTC-

Hydra

Module V: (11 hours)

Introduction to Cyber Crime and law

Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Clarification of Terms, Traditional Problems Associated with Computer Crime, Introduction to Incident Response, Digital Forensics, Computer Language, Network Language, Realms of the Cyber world, A Brief History of the Internet, Recognizing and Defining Computer Crime, Contemporary Crimes, Computers as Targets, Contaminants and Destruction of Data, Indian IT ACT 2000.

COURSE OUTCOMES:

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

- understand cyber-attacks and also how to protect them self and ultimately the entire Internet community from such attacks
- learn the networks vulnerability scanning.
- develop a clear view of network defense tools
- identify web application tools.
- explain types of cybercrimes and cyber laws

Text Books:

1. Mike Shema , Anti-Hacker Tool Kit, Mc Graw Hill
2. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley

Reference Books:

1. Achyut S.Godbole Data Communication and Networking,2e, McGraw –Hill Education New Delhi,2011
2. Forouzan, Data Communication and Networking (Global Edition) 5/e, McGraw Hill Education India, 2013.
3. Forouzan,TCP/IP Protocol Suite 4e, McGraw Hill Education India, 2010

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions* ***10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 804(F)	HIGH SPEED NETWORKS	3-1-0-3

PRE-REQUISITES: COMPUTER NETWORKS

COURSE OBJECTIVES:

- To provide the basic concepts of frame relay and ATM networks.
- To know about the end-to-end performance parameters and techniques used by TCP.
- To update knowledge about the development in high-speed networks.

SYLLABUS:

Module I: (10 hours)

High Speed Networks

Frame Relay Networks – Asynchronous transfer mode: ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories, AAL, High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel – Wireless LANs: applications, requirements, Architecture of 802.11

Module II: (10 hours)

Congestion And Traffic Management

Queuing Analysis: Queuing Models, Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

Module III: (11 hours)

TCP And ATM Congestion Control

TCP Flow control – TCP Congestion Control: Retransmission Timer Management, Exponential RTO back off, KARN"s Algorithm, Window management – Performance of TCP over ATM -Traffic and Congestion control in ATM – Requirements, Attributes, Traffic Management Frame work, Traffic Control.

Module IV: (10 hours)

Integrated and Differentiated Services

Integrated Services Architecture: Approach, Components, Services- Queuing Discipline: FQ, PS, BRFQ, GPS, WFQ – Random Early Detection - Differentiated Services.

Module V: (11 hours)

Protocols for QOS Support

RSVP: Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching: Operations, Label Stacking – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.

COURSE OUTCOMES:

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

- understand the knowledge about Asynchronous transfer protocol and TCP/IP.
- identify different extents of quality of service to different applications.
- understand the advancement in protocols.
- get a clear insight into different queuing techniques.
- acquire the knowledge about the progress of high speed networks.

Text Books:

1. William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Education, Second Edition, 2010.

Reference Books:

1. Warland, Pravin Varaiya, "High performance communication networks", Second Edition, Jean Harcourt Asia Pvt. Ltd., , 2001.
2. Irvan Pepelnjk, Jim Guichard, Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003.
3. Abhijit S. Pandya, Ercan Sea, "ATM Technology for Broad Band Telecommunication Networks", CRC Press, New York, 2004.

Internal Continuous Assessment *(Maximum Marks-50)*

70% - Tests (minimum 2).

20% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

University Examination Pattern *(Maximum Marks-100)*

PART A**: Analytical/problem solving SHORT questions **10x 5 marks= 50 marks

Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE

questions from each module with total FIFTEEN questions.

PART B**: Analytical/Problem solving DESCRIPTIVE questions* ***5 x 10 marks= 50 marks

Two questions from each module with choice to answer one question.

IT19 805(P)	SEMINAR	0-0-6-2

PRE-REQUISITE: NIL

COURSE OBJECTIVES:

- To assess the ability of the student to study and present a seminar on a topic of current relevance in the field of Information Technology or allied areas.
- To develop skills in doing literature survey, technical presentation and report preparation.

SYLLABUS:

Seminar is intended to encourage and motivate the students to explore the latest trends in technology related to their area of interest confined to the relevant discipline. They need to identify a topic from latest technical publications including peer reviewed journals, conference proceedings, technical reports, books etc. The student needs to prepare a report based on a topic and present it before a team of faculty and students. A faculty member can guide maximum of five students of his area of interest to have better interaction and creative support in guiding the seminar. Each student shall present the seminar for about 20 minutes duration on the selected topic. A committee consisting of three faculty members can evaluate the seminar presentation and report. The evaluation can be based on various factors like, depth of knowledge in the topic, presentation skills, confidence level of the candidate, ability in answering questions etc. Due consideration will be given to the technical content, adequacy of references, and overall presentation and quality of the candidate's seminar report during the evaluation process.

COURSE OUTCOMES:

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

- Analyse a current topic of professional interest and present it before an audience.
- Review literature on a given advance topic related to the specific stream.
- Prepare a summary of various concepts systematically after considerable study of the content from primary as well as secondary sources.
- Present and discuss the concept & conclusion in an open seminar.

- Present technical report as per specified norms.

Internal Continuous Assessment *(Maximum Marks-100, Minimum required to pass-50)*

10% - Attendance

20% - Seminar Guide

30% - Technical content of the report

40% - Presentation

IT19 806(P)	PROJECT PHASE II	0-0-8-6

PRE-REQUISITE: PROJECT PHASE I

COURSE OBJECTIVES:

- To enable the students to apply the engineering knowledge in practical problem solving.
- To foster innovation in design of products, processes or systems.
- To develop creative thinking in finding viable solutions to engineering problems.
- To design and develop a software/hardware project to innovatively solve a real-world problem.

SYLLABUS:

This project work is the continuation of the project initiated in seventh semester. The performance of the students in the project work shall be assessed on a continuous basis by the project evaluation committee through progress seminars and demonstrations conducted during the semester. Each project group should maintain a log book of activities of the project. It should have entries related to the work done, problems faced, solution evolved etc.

There shall be at least two Interim Evaluation and a final evaluation of the project in the 8^{th} semester. Each project group has to submit an interim report in the prescribed format for the interim evaluation.

Each project group should complete the project work in the 8th semester. Each student is expected to prepare a report in the prescribed format, based on the project work. Members of the group will present the relevance, design, implementation, and results of the project before the project evaluation committee comprising of the HOD or a senior faculty member, guide and three/four faculty members specialized in different streams in Information Technology i.e., Machine Learning/ Cyber Security/ Data Mining/ Image Processing etc.

COURSE OUTCOMES:

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

- Apply engineering knowledge in practical problem solving.
- Develop creative thinking in finding viable solutions to engineering problems.

- Design innovative products, processes or systems.
- Practice team dynamics to work effectively in a team for the development of technical projects.
- Develop skills in technical presentation and report preparation.

Assessment Pattern

The Continuous Internal Evaluation (CIE) will be conducted as 2 Interim evaluations and a final evaluation.

The Interim evaluation, 2 times in the semester will be conducted as an internal evaluation based on the product, the report and a viva- voce examination, conducted by a project evaluation committee appointed by Head of the Department. First evaluation is to assess the progress of the work, presentation and discussion. Second Evaluation would be a pre-submission presentation before the evaluation committee to assess the quality and quantum of the work done. It is advised to invite the project guide of the concerned batch for the final evaluation.

The final evaluation committee comprises Project coordinator, two faculty members/ expert from Industry/research Institute/ senior faculty from another department (for interdisciplinary projects-(if any)).

Internal Continuous Assessment *(Maximum Marks-100, Minimum required to pass-50)*

30% - Project Guide

20% - Interim evaluation by the evaluation committee

20% - Quality of the report evaluated by the above committee

30% - Final evaluation by a three- member faculty committee

IT19 807(P)	VIVA VOCE	0-0-0-3

PRE-REQUISITE: NIL

COURSE OBJECTIVES:

- To examine the knowledge acquired by the student during the B.Tech. course, through an oral examination

SYLLABUS:

The students shall prepare for the oral examination based on the theory and laboratory subjects studied in the B.Tech. course, seminar, and project. There is only university examination for viva-voce. University will appoint two external examiners and an internal examiner for viva-voce. These examiners shall be senior faculty members having minimum five years teaching experience at engineering degree level.

For final viva-voce, candidates should produce certified reports of Internship, Seminar and Project. If he/she has undergone industrial visit/educational tour or presented a paper in any conference, the certified report/technical paper shall also be brought for the viva-voce.

COURSE OUTCOMES:

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

- Demonstrate knowledge in the program domain.
- Present his views cogently and precisely
- Exhibit professional etiquette suitable for career progression

Assessment in Viva Voce *(Maximum Marks-100, Minimum required to pass-50)*

10% - Industrial training/industrial visit/educational tour or Paper presented at National-level

20% - Seminar

30% - Project

40% - Subjects