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

UNIVERSITY OF CALICUT

Abstract

General and Academic - Faculty of Engineering - Corrected Curriculum and Syllabi of B.Tech Computer Science and Engineering upto Fourth Semester with effect from 2024 Admission - implemented subject to ratification by the Academic Council-Orders issued

---

G & A - IV - E

U.O.No. 8141/2024/Admn Dated, Calicut University.P.O, 23.05.2024

Read:-1.U.O.No. 3491/2024/Admn dtd:27.02.2024 and U.O.No. 3486/2024/Admn dtd:27.02.2024

2.Email received from the Dean, Faculty of Engineering

ORDER

1.Curriculum and syllabus for Combined First and Second semester and syllabus of B.Tech Computer Science and Engineering up to Fourth semester was implemented with effect from 2024 admission, vide paper read as (1) above.

2. As per paper read as (2), the Dean , Faculty of Engineering has informed that there are small typographical errors and minor corrections in the already implemented Curriculum and syllabus of B.Tech Computer Science and Engineering programme (2024 onward) and forwarded the corrected Curriculum and the Syllabus approved by the Board of Studies in Computer Engineering and IT (Single Board)

3. Considering the urgency, sanction was accorded by the Vice Chancellor on 03.05.2024 to implement the corrected version of the Curriculum and Syllabus of B.Tech Computer Science and Engineering programme up to fourth semester with effect from 2024 admission, subject to ratification by the Academic Council.

4. The Corrected Curriculum and Syllabi of B.Tech Computer Science and Engineering upto Fourth Semester with effect from 2024 Admission is, therefore, implemented subject to ratification by the Academic Council.

Orders are issued accordingly.

(Corrected Curriculum and Syllabi of B.Tech Computer Science and Engineering upto Fourth Semester appended)

Ajayakumar T.K

Assistant Registrar

To

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

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

Forwarded / By Order

Section Officer

UNIVERSITY OF CALICUT

CURRICULUM

(1 TO 8 SEMESTERS)

&

SYLLABUS

B. Tech. – Computer Science & Engineering

(2024 SCHEME)

(Applicable to 2024 admission onwards)

CURRICULUM 2024 SCHEME

I to VIII 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 (HSMC)	8
2	Basic Science courses (BSC)	23
3	Engineering Science Courses (ESC)	28
4	Professional Core Courses (PCC)	74
5	Professional Elective Courses	9
6	Open Elective Courses	9
7	Internship, Project work, Seminar & Viva Voce	12
8	Mandatory Non-credit Courses (P/F) with grade	0
9	Laboratory sessions & Mini Project	10
	Total Mandatory Credits	**173**
10	Value Added Course (Optional)	12

Semester wise credit distribution shall be as below:

Semester	1	2	3	4	5	6	7	8	Total Credits
Credits	21	24	21	21	21	23	20	22	173
Credits for Activity	1								1
Grand Total									**174**

Humanities and Social Sciences including Management Courses (HSMC)			
Sl No	**Title**	**Semester**	**Credit**
1	English for Technical Writing	1	2
2	Universal Human Values	2	3
3	Engineering Economics & Principles of Management	5	3
TOTAL CREDITS			**8**

Basic Science courses (BSC)			
Sl No	**Title**	**Semester**	**Credit**
1	Engineering Mathematics I	1	4
2	Engineering Physics	1	4
3	Biology for Engineers	2	3
4	Engineering Mathematics II	2	4
5	Engineering Chemistry	2	4
6	Engineering Mathematics III	3	4
TOTAL CREDITS			**23**

Engineering Science courses (ESC)			
Sl No	**Title**	**Semester**	**Credit**
1	Engineering Graphics	1	4
2	Programming for Problem Solving using C	1	4
3	Basics of Mechanical & Civil Engineering	1	4
4	Mechanical & Civil Engineering Workshop	1	2
5	IDEA & Design Thinking Lab	1	1
6	Basics of Electrical & Electronics Engineering	2	4
7	Electrical & Electronics Engineering Workshop	2	2
8	Microprocessors	5	3
TOTAL CREDITS			**24**

Professional Core courses (PCC)			
Sl No	**Title**	**Semester**	**Credit**
1	Data Structures and Algorithms	3	4
2	Computer Organization & Architecture	3	3
3	Software Engineering	3	4
4	Switching Theory & Logic Design	3	4
5	Discrete Computational Structures	4	4
6	Foundation of Data Science	4	3
7	Digital Data Communication	4	4
8	Programming in Python	4	4
9	Object Oriented Programming using Java	4	4
10	Database Management Systems	5	3
11	Theory of Computation	5	4
13	Wireless Communication & IoT	5	3
14	Computer Networks	5	3
15	Web & Internet Technology	6	3
16	Artificial Intelligence	6	4
17	Operating Systems	6	4
18	Design & Analysis of Algorithms	6	3
19	Compiler Design	7	4
20	Machine Learning	7	3
21	Cryptography and Network Security	7	3
22	Data Mining	8	4
23	Introduction to Cybersecurity	8	3
TOTAL CREDITS			**74**

Internship, Project work, Seminar & Viva Voce			
Sl No	**Title**	**Semester**	**Credit**
1	Internship	6	1
2	Project Phase I	7	2
3	Seminar	8	2
4	Project Phase II	8	4
5	Viva Voce	8	3
TOTAL CREDITS			**12**
Mandatory Non-credit Courses (P/F) with grade			
Sl No	**Title**	**Semester**	**Credit**
1	Concepts of National Service	1	0
2	Environmental Science	2	0
3	Life Skill & Professional Ethics	3	0
4	Constitution of India	4	0
TOTAL CREDITS			**0**

Laboratory Sessions & Mini Project			
Sl No	**Title**	**Semester**	**Credit**
1	Digital Electronics Lab	3	1
2	Data Structures Lab	3	1
3	Open Source Software Lab	4	1
4	Object Oriented Programming lab using Java	4	1
5	Database Management Systems Lab	5	1
6	Micrprocessor Lab	5	1
7	Networks Lab	6	1
8	Mini Project	6	1
9	Compiler Design Lab	7	1
10	Operating Systems Lab	7	1
TOTAL CREDITS			**10**

MINORS:-

Minor is an additional credential a student may earn if he/she does **11 credits** worth of additional learning in a discipline other than his/her major discipline of B.Tech. degree. The objective is to permit

a student to customize their Engineering degree to suit their specific interests. Upon completion of an engineering minor, a student will be better equipped to perform interdisciplinary research and will be better employable. The academic units offering minors in their discipline will prescribe the set of courses and/or other activities like projects necessary for earning a minor in their discipline.

A specialist basket of 4 courses is identified for each Minor. Each basket may rest on one or more foundation courses. A basket may have sequences within it, i.e., advanced courses may rest on basic courses in the basket. He/she accumulates credits by registering for the required courses, and if the requirements for a particular minor are met within the time limit for the course, the minor will be awarded.

This will be mentioned in the Degree Certificate as **"Bachelor of Technology in xxx with Minor in yyy".**

a) The individual course credits earned, however, will be reflected in the consolidated grade card.

b) Registration will be permitted for Minor at the **beginning of fourth semester**.

c) Total credits required to award B.Tech with Minor is **184** (173 + 11).

d) Classes for minor will be conducted along with regular academics.

e) **There won't be any supplementary examination for the courses chosen for Minor.**

HONOURS: -

Calicut University is providing this option for academically proficient students to acquire Honours. Students can attend various value added MOOC courses (Massive Open Online Courses) from NPTEL, COURSERA courses to earn a maximum of **12 additional credits** for getting **'**Honours' degree in the discipline with a condition that he/she should have secured an aggregate of **8.0 CGPA** till final semester without any history of backlogs. The selected course must be in the same discipline.

a) The additional value-added MOOC courses can be of **8 – 12 weeks** duration.

b) **4 credits** will be awarded to a student on successful completion of each MOOC. Successful completion of a MOOC is considered only when a student scores a **minimum score of 60%** in the respective course.

Thus, a student will be eligible to get an undergraduate degree with 'Honours' when he/she successfully earns an additional requirement of 12 credits through the successful completion of **3 MOOCs**. 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 his/her branch of engineering and allied sectors.

On successful achievement of 12 credits from the honours and 173 credits from their respective B-tech syllabus, the student will earn a total credit of 185 at the end of the programme which he/she will be eligible to get the Degree Certificate as **"Bachelor of Technology in Computer Science & Engineering, 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/her marks up to 7th 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 **CS24 807(P).** The first two letter code refers to the department offering the course. CS stands for Computer Science and Engineering. The next two digits represent the year in which the syllabus is implemented, thus the digit 24 represents the year 2024. 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 category. Eg. (P) Means the subject belongs to the Practical category.

L-T-P-C STRUCTURE:

Notations	Description
L	Lecture hours- For theory based courses hours are represented in this form. Eg 3-0-0-0 , means 3 hours lecture per week is dedicated for this subject
T	Tutorial hours- These hours may be assigned for solving numerical problems and allied activities. Eg. 3-1-0-0, 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, Engg/machine drawing classes, interactive sessions, group discussions and even industrial visits pertaining to a specific subject for better learning. Eg. 0-0-1-0 means one hour is dedicated for the above mentioned purpose.
C	Credits – These are assigned based on the importance of the subject to the course. Eg. 0-0-1-1 means one credit is dedicated for the above mentioned purpose.

DEPARTMENTS:

Each course offered by a department and their two-letter course prefix is given in the table:-

Departments and their codes

Sl. No	Department	Course Prefix
01	Computer Science & Engineering	CS
02	Electronics & Communication Engineering	EC
03	Electronics & Computer Science Engineering	ES
04	Electrical & Electronics Engineering	EE
05	Mechanical Engineering	ME
06	Printing Technology	PT

INDUCTION PROGRAM:

A mandatory induction program for first semester students is designed for **one week**. This unique one-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:

- **Values and Ethics**: Focuses 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.

SCHEME OF 1st SEMESTER B.Tech COMPUTER SCIENCE & ENGG. COURSE								
Subject code	**Subject Name**	**Hours**			**Marks**		**Duration of End Semester Examination**	**Credits**
		L	**T**	**P**	**Internal**	**End Semester**		
EN24 101	Engineering Mathematics I	3	1	0	50	100	3	4
PH24 102A	Engineering Physics	2	1	2	50	100	3	4
MC24 104A	Basics of Mechanical & Civil Engineering	2	2	0	50	100	3	4
GS24 106A	Engineering Graphics	2	0	3	50	100	3	4
EN24 108	English for Technical Writing	1	0	2	50	100	3	2
EN24 109	Concepts of National Service	3	0	0	100	..	..	0
MC24 110A(P)	Mechanical & Civil Engineering Workshop	0	0	4	50	100	3	2
EN24 112(P)	IDEA & Design Thinking Lab	0	0	2	100	..	..	1
	TOTAL	**13**	**4**	**13**	**500**	**600**		**21**
		30						

SCHEME OF 2nd SEMESTER B.Tech COMPUTER SCIENCE & ENGG. COURSE								
Subject code	**Subject Name**	**Hours**			**Marks**		**Duration of End Semester Examination**	**Credits**
		L	**T**	**P**	**Internal**	**End Semester**		
EN24 201	Engineering Mathematics II	3	1	0	50	100	3	4
CH24 202B	Engineering Chemistry	2	1	2	50	100	3	4
BE24 204B	Basics of Electrical & Electronics Engineering	2	2	0	50	100	3	4
PC24 206B	Programming for Problem Solving using C	2	1	2	50	100	3	4
EN24 209	Biology for Engineers	3	0	0	50	100	3	3
EN24 210	Universal Human Values	3	0	0	50	100	3	3
EN24 211	Environmental Science	2	0	0	100	..	..	0
BE24 212B(P)	Electrical & Electronics Engineering Workshop	0	0	4	50	100	3	2
	TOTAL	**17**	**5**	**8**	**450**	**700**		**24**
		30						

SCHEME OF 3rd SEMESTER B.Tech COMPUTER SCIENCE & ENGG. COURSE								
Subject code	**Subject Name**	**Hours**			**Marks**		**Duration of End Semester Examination**	**Credits**
		L	**T**	**P**	**Internal**	**End Semester**		
EN24 301	Engineering Mathematics III	3	1	0	50	100	3	4
CS24 302	Data Structures and Algorithms	3	1	0	50	100	3	4
CS24 303	Software Engineering	3	1	0	50	100	3	4
CS24 304	Computer Organization & Architecture	3	1	0	50	100	3	3
CS24 305	Switching Theory & Logic Design	3	1	0	50	100	3	4
EN24 306	Life Skills & Professional Ethics	3	1	0	100	..	..	0
CS24 307(P)	Data Structures Lab	0	0	3	50	100	3	1
CS24 308(P)	Digital Electronics Lab	0	0	3	50	100	3	1
	TOTAL	**18**	**6**	**6**	**450**	**700**		**21**
		30						

SCHEME OF 4th SEMESTER B.Tech COMPUTER SCIENCE & ENGG. COURSE								
Subject code	**Subject Name**	**Hours**			**Marks**		**Duration of End Semester Examination**	**Credits**
		L	**T**	**P**	**Internal**	**End Semester**		
CS24 401	Discrete Computational Structures	3	1	0	50	100	3	4
CS24 402	Digital Data Communication	3	1	0	50	100	3	4
CS24 403	Programming in Python	3	1	0	50	100	3	4
CS24 404	Foundation of Data Science	3	1	0	50	100	3	3
CS24 405	Object Oriented Programming using Java	3	1	0	50	100	3	4
EN24 406	Constitution of India	3	1	0	100	..	..	0
CS24 407	Minor Course*	3	0	0	50	100	3	3
CS24 408(P)	Open Source Software Lab	0	0	3	50	100	3	1
CS24 409(P)	Object Oriented Programming Lab using Java	0	0	3	50	100	3	1
	TOTAL	**18**	**6**	**6**	**450**	**700**		**21**
		30						
**** Special timetable will be allotted for minor course***								

SCHEME OF 5th SEMESTER B.Tech COMPUTER SCIENCE & ENGG. COURSE								
Subject code	**Subject Name**	**Hours**			**Marks**		**Duration of End Semester Examination**	**Credits**
		L	**T**	**P**	**Internal**	**End Semester**		
EN24 501	Engineering Economics & Principles of Management	3	1	0	50	100	3	3
CS24 502	Theory of Computation	3	1	0	50	100	3	3
CS24 503	Database Management Systems	3	1	0	50	100	3	3
CS24 504	Wireless Communication & IoT	3	1	0	50	100	3	4
CS24 505	Microprocessors	3	1	0	50	100	3	3
CS24 506	Computer Networks	3	1	0	50	100	3	3
CS24 507	Minor Course*	3	0	0	50	100	3	3
CS24 508(P)	Database Management Systems Lab	0	0	3	50	100	3	1
CS24 509(P)	Microprocessors Lab	0	0	3	50	100	3	1
	TOTAL	**18**	**6**	**6**	**400**	**800**		**21**
		30						
**** Special timetable will be allotted for minor course***								

SCHEME OF 6^{th} SEMESTER B.Tech COMPUTER SCIENCE & ENGG. COURSE								
Subject code	**Subject Name**	**Hours**			**Marks**		**Duration of End Semester Examination**	**Credits**
		L	**T**	**P**	**Internal**	**End Semester**		
CS24 601	Design and Analysis of Algorithms	3	1	0	50	100	3	3
CS24 602	Web and Internet Technology	3	1	0	50	100	3	3
CS24 603	Artificial Intelligence	3	1	0	50	100	3	4
CS24 604	Operating Systems	3	1	0	50	100	3	4
CS24 605	Professional Elective I	3	1	0	50	100	3	3
CS24 606	Open Elective I	3	1	0	50	100	3	3
CS24 607	Minor Course*	3	0	0	50	100	3	3
CS24 608(P)	Networks Lab	0	0	3	50	100	3	1
CS24 609(P)	Mini Project	0	0	3	100	--	--	1
CS24 610(P)	Internship	0	0	0	100	--	--	1
	TOTAL	**18**	**6**	**6**	**550**	**700**		**23**
		30						
**** Special timetable will be allotted for minor course***								

Professional Elective I		**Open Elective I**	
CS24 605(A)	Big Data Essentials	CS24 606(A)	Introduction to Mobile Computing
CS24 605(B)	Information Theory & Coding	CS24 606(B)	Computer Graphics
CS24 605(C)	Signals & Systems	CS24 606(C)	Object Oriented Concepts
CS24 605(D)	Cyber Law & Ethics	CS24 606(D)	Logic for Computer Science
CS24 605(E)	Distributed Systems	CS24 606(E)	Data Analytics using Python
CS24 605(F)	Data & Computer Communication	CS24 606(F)	Data Visualization

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 a first come first serve basis.

INTERNSHIP:

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 **Computer Science and Engineering** sector in the society. 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**

SCHEME OF 7th SEMESTER B.Tech COMPUTER SCIENCE & ENGG. COURSE								
Subject code	**Subject Name**	**Hours**			**Marks**		**Duration of End Semester Examination**	**Credits**
		L	**T**	**P**	**Internal**	**End Semester**		
CS24 701	Compiler Design	3	1	0	50	100	3	4
CS24 702	Machine Learning	3	1	0	50	100	3	3
CS24 703	Cryptography & Network Security	3	1	0	50	100	3	3
CS24 704	Professional Elective II	3	1	0	50	100	3	3
CS24 705	Open Elective II	3	1	0	50	100	3	3
CS24 706(P)	Compiler Design Lab	0	0	3	50	100	3	1
CS24 707(P)	Operating Systems Lab	0	0	3	50	100	3	1
CS24 708(P)	Project Phase I	0	0	4	100	--	--	2
CS24 709(P)	Project in Minor*	0	0	3	100	--	--	2
	TOTAL	**15**	**5**	**10**	**450**	**700**		**20**
		30						

Professional Elective II		**Open Elective II**	
CS24 704(A)	Mobile Communication	CS24 705(A)	Image Processing
CS24 704(B)	Digital Signal Processing	CS24 705(B)	Neural Networks
CS24 704(C)	Deep Learning	CS24 705(C)	Information Retrieval
CS24 704(D)	Ethical Hacking	CS24 705(D)	Bioinformatics
CS24 704(E)	Pattern Recognition	CS24 705(E)	Management Information Systems
CS24 704(F)	Quantum Computing	CS24 705(F)	Graph Theory

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 nature, either fully theoretical/simulation/practical or involving both theoretical and practical work. The department can assign a group of maximum 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 research work and supporting them to make it a reality. This initiative is expected to provide a good base for the student(s) in taking up a research & development project.

Faculty themselves or 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), Department of Science & Technology (DST) 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 teamwork.
- 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;

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 COMPUTER SCIENCE & ENGG. COURSE								
Subject code	**Subject Name**	**Hours**			**Marks**		**Duration of End Semester Examination**	**Credits**
		L	**T**	**P**	**Internal**	**End Semester**		
CS24 801	Data Mining	3	1	0	50	100	3	4
CS24 802	Introduction to Cybersecurity	3	1	0	50	100	3	3
CS24 803	Professional Elective III	3	1	0	50	100	3	3
CS24 804	Open Elective III	3	1	0	50	100	3	3
CS24 805(P)	Seminar	0	0	6	100	..	3	2
CS24 806(P)	Project Phase II	0	0	8	100	..	..	4
CS24 807(P)	Viva Voce	0	0	0	..	100	..	3
	TOTAL	**12**	**4**	**14**	**400**	**500**		**22**
		30						

Professional Elective III		**Open Elective III**	
CS24 803(A)	Block Chain Technologies	CS24 804(A)	Human Computer Interaction
CS24 803(B)	Cloud Computing	CS24 804(B)	Soft Computing
CS24 803(C)	Text Mining	CS24 804(C)	Internet of Things
CS24 803(D)	Natural Language Processing	CS24 804(D)	Operational Research
CS24 803(E)	High Performance Computing	CS24 804(E)	Data Mining Concepts
CS24 803(F)	Computer Vision	CS24 804(F)	Mobile Application Development

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/her 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 phase 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 the evaluation committee

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

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**

MINOR:

Students who have registered for **B.Tech Minor in Computer Science & Engineering** can opt to study the courses listed below:

MINOR BASKET				
SEMESTER	**BASKET A**		**BASKET B**	
	Specialization – MACHINE LEARNING		**Specialization – SOFTWARE ENGINEERING**	
	Subject Code	**Subject Name**	**Subject Code**	**Subject Name**
S4	CS24 407A	Python for Machine Learning	CS24 407B	Object Oriented Programming
S5	CS24 507A	Concepts in Machine Learning	CS24 507B	Software Engineering
S6	CS24 607A	Concepts in Deep Learning	CS24 607B	Software Project Management
S7	CS24 709A(P)	Project in Minor	CS24 709B(P)	Project in Minor

ACTIVITY POINTS: -

The Tutor, HOD and Principal must ensure that the students have acquired the required mandatory activity points (100 points) and for lateral entry students (75 points) by the end of 8th semester. The accumulated activity points of all students must be consolidated and entered into the university portal by the college officials before the commencement of each semester university examinations.

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**	**POINTS DISTRIBUTION**	**ACTIVITY**	**MINIMUM DURATION**
NA1	NSO	70			2 SEM.
NA2	NCC	70			2 SEM.
NA3	NSS	70	• For ten days camp - **40 points** • Rest of the points will be allotted according to the decision of NSS Program Officer		2 SEM. (Consider at S2 and S4)
ii)	**COLLEGE LEVEL ACTIVITIES**				
CA1	Active Member /Office bearer of professional Societies (Students Chapter)	30/40	• Executive Member - **40 points** • Core Coordinator - **30 points** • Sub Coordinator - **30 points** • Active Member - **10 points**	• IEEE • ASME • NASA • SAE etc. • College Association Chapters	4 SEM.
CA2	Elected office bearer of Student forums	30	• General Post – **30 points** • Department Secretary/ Year Representative - **25 points**	**General Post -** • Chairman • Vice Chairman • Secretary • Joint Secretary • UUC • Sports • Magazine Editor • Fine Arts Secretary	2 SEM.
CA3	Member/Captain of College Athletic/Games teams	20/30	• Captain - 2**0 points** • Member- **15 points** (Additional **10 points** awarded for national level)	• Cricket • Football • Volleyball • Chess etc	2 SEM.

CA4	Executive Member of Students Clubs	20		• IEDC • TinkerHub • Hackclub • APT(E) etc	2 SEM.
CA5	Volunteer for important College functions	25		• Placement cell coordinators can be considered	2 SEM.
CA6	Participant for important College functions	20			2 SEM.
CA7	Committee member/Organizer of Tech Fest/Cultural Fest/Conference	20/30	Committee member/Organizer - **20 points** (**30 points** will be awarded for national level/international level programs)		2 SEM.
CA8	Placed within top three in Paper presentation/debate/cultural competitions etc	30	• First Prize – **30 points** • Second Prize – **25 points** • Third Prize- **20 points**	Technical Fest can also be considered	
CA9	Placed within three in State/National level Sports/Games	30	• First Prize- **30 points** • Second Prize - **25 points** • Third Prize – **20 points**		
iii)	**ENTREPRENEURSHIP**				
EA1	Any Creative Project execution	40		Concerned dept. project coordinator should form a panel with external faculty from other dept and get approved	

EA2	Awards for Projects	60			
EA3	Initiation of Start-ups	60			
EA4	Attracted Venture Capital	80			
EA5	Filed a Patent	80	• Patent -Filed - **50 points** • Patent-Published - **60 points** • Patent-Approved - **70 points** • Patent-Licensed - **80 points**		
EA6	Completed Prototype Development	80	• Prototype developed and tested - **60 points** • Completed Prototype Development - **80 points**	Concerned dept. project coordinator should form a panel with external faculty from other dept and get approved	
iv)	**SELF INITIATIVES**				
SA1	Attended College/University level conferences	25		• Seminar • Workshop can also be considered	4 SEM.
SA2	Attended National/International Conference	30		• Seminars • Workshop • STTP's conducted at IITs/NITs/ Universities can also be considered	4 SEM.
SA3	Published /got an award for a technical paper	30/40	• Publication - **30 points** • Awards - **40 points**		2 SEM

SA4	Organizer of student technical Conference/Competition	30			
SA5	Foreign Language skills	50		• TOEFL • IELTS etc	
SA6	Online courses taken & completed	50		10 hours per week or one month course duration can also onsidered	

SEMESTER - 1

EN24 101	ENGINEERING MATHEMATICS I	3-1-0-4

COURSE OBJECTIVES:

- To familiarize with functions of several variables that is essential in most branches of Engineering.
- To aquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.
- To familiarize the student with concept of vector differentiation.
- To familiarize the student with concept of vector integration.
- To develop the essential tool of Matrices and Linear algebra in a comprehensive manner.

SYLLABUS:

Module I: Multivariable Calculus (10 hours)

Functions of several variables- Limit, continuity and partial derivatives- Partial derivatives of functions of two variables-Implicit partial differentiation-Partial derivatives of functions of more than two variables-Higher order partial derivatives-total derivative-Maxima, minima and saddle points.

Module II: Multiple integrals and their applications. (10 hours)

Double integrals (cartesian and polar coordinates) - Change of order of integration of double integrals-change of variables (cartesian to polar) - triple integrals - volume of solids, change of variables (rectangular to cylindrical).

Module III: 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 -relation between the vector differential operators.

Module IV: Vector integral calculus (10 hours)

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

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 - Diagonalization of matrices.

COURSE OUTCOMES:

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

- Develop skills of using the derivatives to find critical points, inflection points and local extrema.
- Acquire the basic concept of partial differentiation and its applications in engineering physical phenomena involving continuous changes of variables and parameters.
- Acquire the knowledge of vector differentiation.
- Develop skills for using integration of vector functions.
- Use matrices and determinants for solving system of linear equations and applying it in engineering problems.

TEXT BOOKS:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. N.P. Bali, Manish Goyal, A text book of Engineering Mathematics, Laxmi Publication Reprint, 2008

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9 th Edition, John Wiley& Sons, 2006.
2. Veerarajan T., Engineering Mathematics for First year, Tata McGraw-Hill, New Delhi, 2008.
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. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers,36th Edition ,2010.
6. K.B.Dutta, Matrices and Linear Algebra, PHI Learning Pvt Ltd, New Delhi, 2003.
7. M.D.Raisinghania, Vector Analysis, S.Chand & Co, India, 1997.
8. Jack L Goldbeg, Matrix Theory with applications, Mc Graw Hill, Newyork, 1992.
9. A.K.Hazra, Matrix Algebra, Calculus and generalized inverse, Viva Books, New Delhi.

Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2).

30% - 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.

PH24 102A	ENGINEERING PHYSICS	2-1-2-4

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 programs.
- To explain the dual nature of radiation and matter.
- To apply Schrodinger's equation to solve finite and infinite potential problems and apply quantum ideas at the nanoscale.
- To understand the Maxwell's equations for electromagnetic waves.

SYLLABUS:

Module I: **(12 hours)**

Damped harmonic oscillator- derivation of equation of motion and its solution, under damped oscillators- energy decay in damped harmonic oscillator, Quality factor (qualitative)- Forced harmonic oscillator: equation of motion and its solution (No derivation), Amplitude resonance - Electrical analogy of mechanical oscillators.

Transverse and Longitudinal waves - Transverse waves on a stretched string; the wave equation on a string, derivation for the velocity and frequency of transverse vibrations on a stretched string.

Practical Work:

1. Melde's string apparatus - Measurement of frequency in the transverse and longitudinal mode.

Module II: **(10 hours)**

Interference of reflected light in thin films - Interference in thin films (Cosine law)- Derivation of the conditions of constructive and destructive Interference - Air Wedge- Determination of thickness of a thin wire - Antireflection coatings. Fresnel and Fraunhofer classes of diffraction - Diffraction grating - Grating equation - Rayleigh's criterion for limit of resolution - Resolving power of a grating with expression (no derivation), Comparison of interference and diffraction.

Practical Work:

1. Wavelength of sodium light by Newtons Ring method.
2. Wavelength of mercury spectral lines using diffraction grating and spectrometer.
3. Diameter of a thin wire or thickness of a thin wire by Air-wedge method.

Module III: **(10 hours)**

Wave-Particle dualism- de Broglie hypothesis, de-Broglie wavelength – Wave function- Admissibility conditions, Physical significance, Probability density, Normalization condition - Time dependent Schrodinger wave equation - Time independent Schrodinger wave equation, Applying the Schrodinger equation. Nanophysics- Quantum confinement in one dimension, two dimensions and three dimensions- Quantum well, Quantum wires and Quantum dots.

Module IV: **(10 hours)**

Physics of gradient, divergence and curl – Gauss's divergence theorem and Stoke's theorem- Equation of continuity, Deduction of Maxwell's equations in vacuum - Electromagnetic waves: Electromagnetic wave equation in free space, velocity of Electromagnetic waves in free space.

Module V: **(10 hours)**

Laser -Properties of laser - Absorption and Emission of radiation - Spontaneous and Stimulated emission of radiation - population inversion - metastable states - Basic components of laser; active medium, pumping mechanism, optical resonant cavity - Construction and working of Ruby laser - Applications of lasers in Engineering (qualitative ideas). Acoustics - Characteristics of Sound-Pitch

or frequency - Loudness or Intensity - Quality or timbre, Absorption coefficient, Reverberation and echo - Reverberation time - Sabine's formula (no derivation), Factors affecting architectural acoustics and their remedies.

Practical Work:

1. Wavelength of laser using Grating, standardize the Grating using sodium light.

COURSE OUTCOMES:

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

- Familiarized with the principles of Physics and its significance in engineering systems and technological advances.
- Apply the concept of interference and diffraction for determination of wavelength of unknown sources.
- Apply the basic principles of Quantum mechanics by determining the energy Eigen values and Eigen functions of a particle in a box.
- Apply Maxwell's equations in estimating the speed of light.
- Use low power lasers by doing optical and fiber optical experiments.

TEXT BOOKS:

1. M.R.Seenivasan, Physics for Engineers, New Age Publishers, 1996 Edition.
2. Beiser A, Concepts of Modern Physics, McGraw Hill India Ltd.
3. Brijlal, Subramanyam, A Text Book of Optics, S.Chand & Co.
4. Mehta V K, Principles of Electronics, S.Chand & Co.
5. Rajendran V, Marikani A, Physics I, Tata McGraw Hill Co Ltd.
6. T. Pradeep, "Nano:The Essentials'', McGraw Hill India Ltd, 2007.
7. Griffiths "Introduction to Electrodynamics" 4th Edition, Pearson.

REFERENCE BOOKS:

1. Aruldhas G, Engineering Physics, PHI Ltd.
2. Bhattacharya, Tandon, Engineering Physics , Oxford India.
3. Dominic, Nahari, A Text Book of Engineering Physics, Owl Books Publishers
4. Hecht E, Optics, Pearson Education.
5. Mehta N, Applied Physics for Engineers, PHI Ltd.
6. Palais J. C, Fiber Optic Communications, Pearson Education.
7. Pandey B. K, 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, Rewal A, Engineering Physics, Wiley India Pvt Ltd.
11. Sears, 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 publishers 2000 Edition.
14. . Md.N.Khan, S.Panigrahi "Principles of Engineering Physics 1&2", Cambridge University Press, 2016.

Internal Continuous Assessment (Maximum Marks-50)

50% - Tests (minimum 2)

10% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

30% - Lab performance including test and record

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.

MC24 104A	BASICS OF MECHANICAL & CIVIL ENGINEERING	2-2-0-4

COURSE OBJECTIVES:

- 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 gain knowledge in metal casting, joining and machining process
- To understand basic thermodynamic principles and laws to analyze and design thermodynamic systems.
- To familiarize various theories behind the working of hydraulic machines.

SYLLABUS:

Module I: (10 hours)

Scope of civil engineering

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 - Structural components of a residential building and their functions.

Building planning

Introduction to planning of residential buildings - Principles of building planning - Selection of site for buildings, Orientation of a building.

Introduction to surveying

Surveying: Objects – classification – principles - Modern tools of Surveying and Mapping - Total Station, Global Positioning System, Remote Sensing and Geographic Information System

Module II: (10 hours)

Modern trends in civil engineering

Robotics and automation in construction industry - Artificial Intelligence and Machine Learning techniques-Applications of AI in Civil Engineering – 3D Printing in prefabricated construction – (BIM) Building Information Modelling (Only brief description is expected)-civil engineering aspects only

Civil engineering materials

Brief description of Engineering properties and applications of the following construction materials - Cement – concrete – steel - Reinforced cement concrete fundamentals (Only brief description is expected)-modern materials (Study on laboratory tests not expected, detailed manufacturing processes of materials not expected)

Module III: (12 hours)

Manufacturing Process: Basic description of the manufacturing processes – Sand Casting, Forging, Rolling, Extrusion and their applications.

Metal Joining Processes: Types of welding, Description with sketches of Arc Welding, Soldering, Brazing and their applications

Basic Machining operations: Turning, Drilling, Milling and Grinding.

Description about working with block diagram of: Lathe, Drilling machine, Milling machine, CNC Machine. Principle of CAD/CAM, Rapid and additive manufacturing.

Module IV: **(10 hours)**

Analysis of thermodynamic cycles: Carnot, Otto, Diesel cycles, Derivation of efficiency of these cycles, Problems to calculate heat added, heat rejected, net work and efficiency.

IC Engines: CI, SI, 2-Stroke, 4-Stroke engines. Listing the parts of different types of IC Engines. Efficiencies of IC Engines (Definitions only), Air, fuel, cooling and lubricating systems in SI and CI Engines, CRDI, MPFI. Concept of hybrid engines.

Module V: **(10 hours)**

Refrigeration: Unit of refrigeration, reversed Carnot cycle, COP, vapour compression cycle (only description and no problems); Definitions of dry, wet and dew point temperatures, specific humidity and relative humidity, Cooling and dehumidification, Layout of unit and central air conditioners.

Description about working with sketches of: Reciprocating pump, Centrifugal pump, Pelton turbine, Francis turbine and Kaplan turbine.

Description about working with sketches of: Belt and Chain drives, Gear and Gear trains, Single plate clutches.

COURSE OUTCOMES:

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

- 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, modern techniques for construction industry.
- Get an overview of metal casting, joining and machining process.
- Analyze thermodynamic cycles and calculate its efficiency.
- Describe the working of hydraulic machines.

TEXT BOOKS:

1. Dr. B.C. Punamia, Surveying Vol. I, II, Laxmi Publications.
2. Gurcharan Singh, Building planning, designing and scheduling, Standard Publishers.
3. Rangwala, S. C., Dalal, K. B., Building Construction., Charotar Publishing house
4. S.S Bhavikatti, Basic Civil Engineering., New Age International Pvt .Ltd, Publishers
5. Plevris, Vagelis, Ahmad Lagaros Artificial intelligence and machine learning techniques for civil engineering, IGI Global publishers.
6. Benjamin,J, Mechanical Engineering, Pentex Books, 9th Edition, 2018.

7. Balachandran, P, Basic Mechanical Engineering, Owl Books.

REFERENCE BOOKS:

1. T.P Kanetkar, S.V Kulkarni, Surveying and Levelling Vol. I and II.
2. James M. Anderson, Edward M. Mikhail, Surveying Theory and Practice (Seventh Edition).
3. T.M Lillesand, R.W Kiefer, J.W Chipman, Remote sensing and Image interpretation, 5th edition.
4. S.V.Deodhar, Building Science and Planning.
5. Keeble Lewis, Principles of Town planning.
6. Rangwala, S. C., Essentials of Civil Engineering, Charotar Publishing House
7. Clifford, M., Simmons, K, Shipway, P., An Introduction to Mechanical Engineering Part I - CRC Press
8. Roy Choudhary, Elements of Mechanical Engineering, Media Promoters &Publishers Pvt. Ltd., Mumbai.
9. Sawhney, G. S., Fundamentals of Mechanical Engineering, PHI
10. G Shanmugam, M S Palanichamy, Basic Civil and Mechanical Engineering, McGraw Hill Education; First edition, 2018

Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2).

30% - 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.

GS24 106A	ENGINEERING GRAPHICS	2-0-3-4

COURSE OBJECTIVES:

- To enable the students with various concepts like dimensioning, conventions and standards related to Engineering drawing
- To impart knowledge on the projection of points, lines and plane surfaces
- To improve the visualization skills for better understanding of projection of solids
- To develop the imaginative skills of the students required to understand section of solids and developments of surfaces.
- To enable the students to draw the different machine elements / mechanical parts.

SYLLABUS:

Module I: **(10 Hours)**

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

Module II: **(12 Hours)**

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: **(13 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, 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, Cone and Cylinder).

Module IV: **(13 hours)**

a) Development of surfaces of solids - 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.

Module V: **(12 hours)**

a) Introduction to perspective projections – Visual ray 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, locking arrangements of nuts - Foundation bolts.

COURSE OUTCOMES:

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

- Familiarize with the fundamentals of engineering drawing standards.
- Interpret 3D shapes from orthographic projections of objects and to make orthographic projections of any object.
- Draw the sectional view of the solids.
- Make developments of surfaces and solids.
- Create drawings using visual ray method and to draw conventional representation of threaded fasteners.

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, 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% - Attendance and Regularity in the class

University Examination Pattern (Maximum Marks-100)

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

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

Q 3. 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 4. 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.

Q 5. Two questions (a) and (b) of 20 marks each from module V, one from module V(a) and one from module V(b), with choice to answer any one.

EN24 108	ENGLISH FOR TECHNICAL WRITING	1-0-2-2

COURSE OBJECTIVES:

- To provide a learning environment to practice listening, speaking, reading, and writing skills.
- To develop vocabulary and language skills relevant to Engineering as a profession.
- To assist the students in carrying on the tasks and activities through guided instructions and materials.
- To effectively integrate English language learning with employability skills and training.
- To provide hands-on experience through case studies, mini-projects, group and individual presentations.

SYLLABUS:

Module I: **(8 hours)**

Basic writing skills: Sentence structures, Use of phrases and clauses in sentences – Importance of proper punctuation – Parts of Speech – Identifying Common Errors in Writing – Subject-verb agreement.

Module II: **(12 hours)**

Vocabulary Building: The concept of word formation, Root words from foreign languages and their use in English, Acquaintance with prefixes and suffixes from foreign languages–Technical report writing: Synopsis writing, formats for reports, Introductory report, Progress report, Incident report, Feasibility report, Marketing report, Field report, Laboratory test report, and Project report.

Module III: **(12 hours)**

Technical Writing: Definition and preparation of manual – Memorandum – Agenda, Minutes of a meeting – PowerPoint presentation – Written communication: Note making and taking, narrating events chronologically – Writing resumes and cover letters.

Module IV: **(8 hours)**

Writing practices: Essay writing–Formal letters–Reading Comprehension–Precis writing –Memos.

Module V: **(8 hours)**

Oral communication (interactive practice sessions in Language Lab) – Listening comprehension – Vocabulary games–Pronunciation – Intonation, Stress and Rhythm– Common everyday situations: Conversations and dialogues– Group discussions – Interviews –Oral presentation –Debates.

COURSE OUTCOMES:

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

- Heighten their awareness of correct usage of English grammar in writing and sounds in speaking.
- Write official correspondence i.e., reports, memos, letters and E-mails, prepares impressive curriculum vitae and resumes.
- Enhance their verbal communication skills through free speeches, role plays, activities and interactions.
- Improve their self-esteem and captivate them to be effective in facing interview boards confidently.

- Create effective presentations in front of different clusters.

REFERENCE BOOKS:

1. Kul Bhushan Kumar, Effective Communication Skills., Khanna Book Publshing, 2022.
2. F.T. Wood, Remedial English Grammar, Macmillan.2007
3. William Zinsser, On Writing Well, Harper Resource Book. 2001
4. Liz Hamp-Lyons, Ben Heasly, Study Writing, Cambridge University Press. 2006.
5. Sanjay Kumar, Pushpa Lata, Communication Skills, Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

Internal Continuous Assessment (Maximum Marks-50)

50% - Tests (minimum 2)

10% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

30% - Lab Performance

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.

EN24 109	CONCEPTS OF NATIONAL SERVICE	3-0-0-0

COURSE OBJECTIVES:

- Understand the community in which they work.
- Identify the needs and problems of the community and involve them in problem solving.
- Develop among themselves a sense of social and civic responsibility and utilize their knowledge in finding practical solutions to individual and community problems.

- Develop competence required for group living and sharing of responsibilities and gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.
- Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.

SYLLABUS:

Module I: (10 hours)

Basic Concepts of NSS: History, Philosophy, Definition, Aims and Objectives – Emblem, Flag, Motto, Song, Badge, NSS day etc, – Organizational structure (from national to regional level) Roles and responsibilities of various NSS functionaries.

Environmental Issues: Environment conservation, enrichment and sustainability Climate change, global efforts for environment conservation. Conservation of natural resources (Rain water harnessing) – Renewable energy: Solar, Air, and Water Waste land development, soil conservations and afforestation.

Module II: (10 hours)

Understanding Youth: Definition, profile of youth, categories, issues, challenges and opportunities for youth – Youth as an agent of social change - Youth development programmes at University level, college level, National level, State level and voluntary sector (NGO).

Role of Youth Leadership: Meaning, types, importance, role and traits of youth leadership Qualities of good leaders – Role of youth in Peace-building, conflict resolution, and nation-building.

Module III: (7 hours)

Youth and Health: Healthy lifestyles – Alcohol, Smoking and drug abuse – Stress management

Youth and Crime: Sociological and psychological factors influencing youth crime – Juvenile justice Peer mentoring in preventing crimes – Awareness about anti-ragging – Cyber-crime and its prevention.

Module IV: (10 hours)

Family and Society: Concept of family, community and society – Dynamics and impacts of growing up in the family – Human values – Decline of value and family system – Gender discrimination issues Regionalism and Caste system in India.

Health and Hygiene: Definition, needs and scope of health education – National health programme Food and nutrition – Reproductive health – Safe drinking water, water borne diseases and sanitation. Concept of hygiene and maintenance of hygiene – Health and hygiene awareness programmes for community – Social service programmes for child welfare, physically and mentally challenged.

Module V: (8 hours)

Awareness Programme in Community: Road safety, Food safety programme, Cyber safety, Substrate abuse safety, and Drugs safety programme – Blood donation, Eye donation, Organs donation, and Body donation awareness programme – AIDS/HIV awareness and Stress management programme.

Disaster Management: Introduction and classification of disasters – Role of youth Disaster Management Pre-disaster: Educating the community – Sensitizing Government servants during the disasters.

COURSE OUTCOMES:

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

- Understand the importance of his / her responsibilities towards society.
- Analyse the environmental and societal problems/issues and to design solutions for the same.
- Evaluate the existing system and to propose practical solutions for the same for sustainable development.
- Implement government or self-driven projects effectively in the field.
- Develop capacity to meet emergencies and natural disasters and practice national integration and social harmony in general.

REFERENCE BOOKS:

1. National Service Scheme Manual (Revised) 2006, Government of India, Ministry or Youth Affairs and Sports, New Delhi.
2. Rashtriya Seva Yojana Sankalpana – Prof. Dr. Sankay Chakane, Dr. Promad\Prabhakar, Diamond Publication, Pune.
3. National Service Scheme Manual for NSS District Coordinators, National Service Scheme cell, Dept. of Higher and Technical Education, Mantralaya.
4. Annual report of National service Scheme (NSS) published by dept. of Higher and Technical Education, Mantralaya.

5. NSS Cell, Dept. of Higher and Technical Education, Mantralaya, UTKARSHA- Socio and cultural guidelines.
6. Case material as a Training Aid for Field Workers, Gurmeet Hans.
7. Social service opportunities in hospital, Kapil K. Krishnan, TISS.
8. New Trends in NSS, Research papers published by University of Pune.

Internal continuous assessment: (Maximum Marks-100)

50% - Assessment and evaluation pattern

50% - Activities

MC24 110A(P)	MECHANICAL & CIVIL ENGINEERING WORKSHOP	0-0-4-2

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 necessary skills for planning, preparing and executing an engineering project.
- To inculcate engineering aptitude, confidence and experience towards technical skills.
- To train the students mentally and physically for industries.
- To impart knowledge and technical skills on basic manufacturing methods.

SYLLABUS:

List of experiments

(Minimum 10 experiments out of 14)

1. Chain and Cross staff Surveying - Study of chain and accessories, Calculate the area of Built up Space and a small parcel of land using chain and cross-staff
2. Levelling - Study of levelling instruments, Determination of reduced levels of five or six points in the field.
3. Theodolite - Study of Theodolite, Measuring horizontal and vertical angles
4. Brick Masonry - Elevation and plan (Construct a one and half thick brick wall of 50cm height and 60cm length using English bond). Use spirit level to assess the tilt of walls.
5. Total Station Survey - Site plan preparation (Determination of area and traversing)
6. Setting out of a building: Computation of plinth area / built up area, Floor area / carpet area - for a simple single storeyed building (single room only); The student should set out a building as per the given building plan using tape only.

7. Collection and study of various civil engineering drawings like plan, elevation, structural drawing, plumbing drawing etc.
8. Carpentry: Introduction to workshop safety and personal protective equipment (PPE).Study of carpentry tools and their uses. Practice in marking, sawing, chiselling, and planning. Introduction to different types of joints and their applications. Hands-on project: Building a simple wooden structure or piece of furniture. Introduction to power tools used in carpentry.
9. Fitting: Workshop safety and tool usage guidelines. Study of fitting tools, including chisels, files, saws, and drills. Techniques for chipping, filing, cutting, drilling, and tapping. Practice in creating male and female joints and stepped joints. Introduction to precision measuring techniques. Use of micro meters and callipers for accurate measurements.
10. Smithy: Safety procedures for the smithy workshop. Study of smithy tools and equipment. Forging of square prisms and hexagonal bolts. Heat treatment and tempering of metals. Hands-on project: Forging a basic tool or decorative item.
11. Foundry: Workshop safety and sand preparation techniques. Study of foundry tools and equipment. Practice in sand moulding and casting. Introduction to different casting methods (e.g., sand casting, investment casting). Hands-on project: Creating a casting mould and pouring molten metal.
12. Sheet Metal Work: Safety guidelines for sheet metal work. Study of sheet metal tools and equipment. Selection of different gauge sheets. Types of joints, trays, and containers in sheet metal work. Hands-on project: Design and build a sheet metal enclosure or housing.
13. Welding: Introduction to welding safety and precautions. Study of welding tools and equipment. Different types of welding joints. Practice in welding various joints. Introduction to welding processes (e.g., MIG, TIG, stick welding) Hands-on project: Welding a small assembly.
14. Materials and Properties: Overview of common engineering materials and their properties. Introduction to material selection and its importance in engineering design.

COURSE OUTCOMES:

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

- Name different devices and tools used for civil engineering measurements
- Demonstrate the steps involved in basic civil engineering activities like plot measurements, setting out operation, evaluating the natural profile of land and undertaking simple construction works.

- Carpentry: Basic use of carpentry tools, execution of precision tasks (e.g., marking, sawing, chiseling), creation of diverse joints, and safe operation of power tools.
- Fitting: Mastery of fitting operations (e.g., chipping, filing, and cutting), accurate construction of male/female joints, and application of precision measurement techniques.
- Smithy: Competence in using smithy tools, forging square prisms and hexagonal bolts, and understanding heat treatment of metals.
- Sheet Metal Work: Selection of suitable gauge sheets, skill ful joining techniques, and effective fabrication of trays and containers.
- Welding and Metal Properties: Knowledge of welding safety, proficiency in various welding joints, and comprehension of metal properties in fabrication.
- Fitting Tools and Operations: Recognition and explanation of fitting tool functions, precise execution of operations (e.g., marking, sawing, drilling), and understanding the applications of male and female joints.
- Materials and Properties: comprehensive understanding of engineering materials and their properties, enabling them to make informed material selections crucial for effective engineering design.

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% - Procedure and tabulation form, Conducting experiment, results and inference

20% - Viva voce

10% - Fair record

EN24 112(P)	IDEA & DESIGN THINKING LAB	0-0-2-1

COURSE OBJECTIVES:

- To cultivate creativity and innovation among students.
- To develop problem-solving skills using design thinking methodologies.
- To foster collaborative teamwork and effective communication.
- To provide practical experience in idea generation and prototyping.
- To prepare students for real-world problem-solving scenarios.

SYLLABUS*:*

List of experiments

(Minimum 9 experiments out of 12)

1. Introduction to Idea and Design Thinking, Overview of innovation and design thinking, Historical context and case studies and Understanding the design thinking process.
2. Empathize and Define, Conducting user interviews, identifying problems and needs, defining problem statements.
3. Ideation, Techniques for brainstorming, Idea selection and prioritization, Prototyping and testing ideas.
4. Teamwork and Collaboration, Building effective teams, Communication and collaboration skills, Group dynamics and conflict resolution.
5. Prototyping and user testing, Rapid prototyping techniques, conducting user testing, Iterative design.
6. Design Thinking in Real-World Context, Applying design thinking to various industries, Ethical considerations in design.
7. Refining prototypes.
8. Testing-Documentation and the Pitching.
9. Software Development using Scrum Framework –Scrum tools - Case Studies.
10. DevOPs the advanced process of software engineering for faster problem resolution and team collaboration.
11. Agile software methodology for faster development of quality software.
12. Unresolve different transformations of a product or a service through brainstorming and incremental approach, etc.

COURSE OUTCOMES:

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

- Foster a mindset for innovation by providing insights into how innovative ideas have been generated and implemented through the study of design thinking and historical case studies
- Enhance problem-solving skills by equipping students with the ability to conduct user interviews, identify problems, and define problem statements effectively, enabling them to empathize with users.
- Help students to generate a wide range of creative solutions to address the identified problems, fostering creativity and divergent thinking.
- Develop essential interpersonal skills necessary for successful collaboration in diverse team settings.
- Create prototypes quickly, gather feedback from users, and refine their solutions based on user needs, ensuring that the final product or service is user-centric and meets the desire outcomes.

TEXT BOOK:

1. Christian Muller-Roterberg, Design Thinking for Dummies, John Wiley & sons

Internal Continuous Assessment (Maximum Marks-100)

30% - Individual assignments
40% - Group projects
15% - Final presentation
15% - Attendance and participation

SEMESTER - 2

EN24 201	ENGINEERING MATHEMATICS II	3-1-0-4

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To introduce effective mathematical tools for the solutions of differential equations of first order that model physical process.
- To introduce effective mathematical tools for the solutions of differential equations of higher order.
- To develop the tool of Power series for learning advanced Engineering mathematics.
- To introduce Laplace transforms of elementary functions and solution of differential equations using Laplace transforms.
- To develop the tool of Fourier transforms for learning advanced Engineering mathematics.

SYLLABUS:

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

Homogeneous differential equations, differential equations reducible to homogeneous, Exact, linear and Bernoulli's equations. Applications of differential equations of first order - orthogonal trajectories.

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

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

Module III: Power series (10 hours)

Taylor's and Maclaurin's theorems, Power series, Taylor's Series, Maclaurin's series, series for exponential, trigonometric, hyperbolic and logarithmic functions. Leibnitz formula for n^{th} derivative of product of two functions.

Module IV: Laplace Transforms (10 hours)

Laplace transform - Elementary properties - Inverse Laplace transform- Solution of ordinary differential equations using Laplace transform.

Module V: Fourier Transforms **(12 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

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 analyze differential equations in a wide range of physical phenomena.
- Acquire the knowledge of power series expansions.
- Use tools for Laplace transforms and apply it in solution of differential equations.
- Use tools for Fourier Transforms.

TEXT BOOKS:

1. G.B.Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,2002
2. Erwin Kreyszig, Advanced engineering mathematics, 9th Edition, John Wiley & sons, 2006
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications Reprint, 2008.

REFERENCE BOOKS:

1. E. A. Coddington, An introduction to ordinary differential equations, Prentice Hall 1995.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers,36th Edition, 2010.
3. Veerarajan T, Engineering Mathematics for First year, Tata McGraw-Hill, New Delhi,2008.
4. Ramana B.V. Higher Engineering Mathematics, Tata McGraw-Hill, New Delhi, 11th Reprint, 2010.
5. George.F.Simmons, Differential Equations, Tata Mc Graw Hill ,2001
6. George.F.Simmons , Differential Equations with Applications and Historical notes, Tata Mc Graw Hill, 2005
7. Ronald.N.Bracewell, Fourier Transforms and its Applications, Tata Mc Graw Hill, 2005
8. J.Billingham,A.C.King and S.R.Otto,Differential Equations,Linear, Non Linear,Ordinary, Partial,Cambridge University press,2005

Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2).

30% - 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.

CH24 202B	ENGINEERING CHEMISTRY	2-1-2-4

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, metal ions in biological system fuels, lubricants, batteries, energy storage devices, etc.
- To illuminate the students with the chemistry of compounds which involved in petrol, diesel, lubricants and their functions in the respective areas.
- To develop abilities and skills that is relevant to the study and practice of chemistry.
- To equip the students with the working knowledge of chemical principles, nature and transformation of materials and their applications.

SYLLABUS:

Module I: **(10 hours)**

Polymers - Polymerisation reactions (Condensation and addition polymerization, Free radical, Cationic, Anionic and Coordination mechanism of polymerisation), Crystallinity in polymers (Amorphous, Crystalline and Semi-crystalline Polymers), Concept of Glass Transition Temperature (Tg) in polymers.

Practical Work:

Preparation of

(i) Urea-Formaldehyde resin

(ii) Phenol Formaldehyde resin

Module II: **(7 hours)**

Water- Hardness, Determination of hardness by EDTA method Softening (Lime-Soda and Ion Exchange methods), Numerical based on the above Purification of water for domestic use.

Practical Work:

Determination of

(i) Total hardness of a given water sample,

(ii) Chloride ion in a given water sample,

(iii) Dissolved oxygen present in a given water sample

(iv) Percentage of available chlorine present in a given bleaching powder sample

Module III: **(12 hours)**

Lubricants - Classification (Liquid, Solid, and Semisolid) - Mechanism of lubrication of lubricants (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 - Calorific value and its determination using Bomb Calorimeter (Numerical problems) - Refining of Petroleum - Cracking and Reforming - Petrol Knocking and Octane number - Diesel knocking and Cetane number

Module IV: **(10 hours)**

Electrochemistry - Electrochemical cells - Salt bridge - Helmholtz double layer -Single electrode potential - EMF of an electrochemical cell and its determination-Standard Hydrogen Electrode (SHE) - Determination of standard reduction potential using SHE - Electrochemical series and its applications Nernst equation and its applications (Numerical problems) Storage cells - Lead acid accumulator and Nickel-Cadmium - Fuel cells – H_2 - O_2 fuel cell battery

Module V: **(8 hours)**

Corrosion - Dry corrosion (Self protecting corrosion products - Pilling-Bed worth rule), Wet corrosion (Corrosion of iron in acidic, neutral and basic conditions), Differential aeration and Stress corrosion.

Galvanic corrosion and galvanic series corrosion control by cathodic protection inorganic coatings like Galvanizing, Tinning, Electroplating and Anodising of Aluminium.

COURSE OUTCOMES:

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

- Analyse 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 metal ions in biological system and their importance.
- Streamline the worth of electrical storage using batteries or fuel cells by learning the electrochemistry.
- List major chemical corrosion reactions and prevention methods that can be utilised in the protection of metal.

TEXT BOOKS:

1. A textbook of Engineering Chemistry by Dr. Sunitha Rattan, S. K. Kataria Publisher
2. Engineering Chemistry, 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 Interscience, 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
5. F. A. Cotton and G. Wilkinson, Advanced Inorganic Chemistry, 3 rd Ed., Wiley Eastern Ltd
6. P. W. Atkins, Physical Chemistry, J.D. Paula, Oxford University Press
7. V. Kumar, Introduction to Green Chemistry, Vishal Publishing House.
8. B. S. Bahl and Arun Bahl S., Advanced Organic Chemistry, Chand & Company.
9. Janice Gorzynski Smith, Organic Chemistry, McGraw-Hill publications
10. Engineering Chemistry, Jain and Jain, Dhanpat Rai Publishers
11. Engineering Chemistry, P. Rath, Cengage Learning
12. Engineering Chemistry, M.J. Shultz, Cengage Learning, New Delhi
13. Engineering Chemistry, R. Mukhopadhyay and S. Datta, New Age International Publishers
14. A textbook of Engineering Chemistry, S. S. Dara and S. S. Umare, S. Chand Pvt Ltd

Internal Continuous Assessment (Maximum Marks-50)

50% - Tests (minimum 2)

10% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

30% - Lab performance including test and record

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.

BE24 204B	BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING	2-2-0-4

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To set a firm and solid foundation in Electrical and Electronics Engineering with strong analytical skills and conceptual understanding of basic laws and analysis methods in electrical and magnetic circuits.
- 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.

SYLLABUS:

Module I: **(10 hours)**

DC Circuits (Only Independent sources) Kirchhoff's law, ideal and practical voltage and current sources. Mesh and Nodal analysis (Super node and super Mesh excluded). Star and delta transformation (resistive networks only-derivation is not needed).

AC Fundamentals: Mathematical and graphical representation of sinusoidal voltage, concept of cycle, period, frequency, instantaneous, peak, average, R.M.S. values, peak factor and form factor, phase difference, lagging, leading and in phase quantities and phasor representation. Rectangular and polar representation.

Module II: (12 hours)

Single phase AC Circuits: Study of series R-L, R-C, R-L-C circuits, concept of impedance and admittance for different combinations, waveform and relevant voltage current phasor diagrams. Concept of active, reactive, apparent power.

Polyphase AC circuits: Concept of three phase supply and phase sequence. Balanced and unbalanced loads voltage current and power relations in three phase balanced star and delta loads and their phasor diagrams - numerical problems.

Module III: (8 hours)

Magnetic circuits: MMF, field strength, flux density and reluctance (definitions only). Comparison of 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 and dynamically induced EMF – self inductance, mutual inductance and coefficient of coupling.

Module IV: (10 hours)

Passive components: Resistors: Different types- construction - color code- power rating and tolerance. Capacitors: different types- construction- color code. Inductors: construction - different types- transformers - Electro mechanical components: relays and contactors.

PN junction diode- principle of operation-VI characteristics- bipolar junction transistor- PNP and NPN structures, Principle of operation, input and output characteristics of common emitter configuration (NPN only)

Module V: (12 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.

Amplifiers: principle of electronic amplifiers, circuit diagram and working of common emitter amplifier- Oscillators: working principles of oscillators, concepts of feedback, circuit diagram and

working of RC phase shift oscillator, Functional block diagram of operational amplifier, ideal operational amplifier, inverting and non-inverting amplifier.

COURSE OUTCOMES:

At the end of this course, students will acquire the ability

- Apply fundamental concepts and circuit laws to solve simple DC electric circuits.
- Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state
- List the basic electronic components such as passive and electro mechanical components.
- Develop simple circuits using diodes and transistors.
- Analyze simple circuits on operational amplifiers and digital gates.

TEXT BOOKS:

1. Edward Hugs, Electrical & Electronic Technology, 9/e, Pearson Education.
2. Vincent Del Toro, Electrical Engineering Fundamentals, Pearson Education.
3. S K Bhattacharya, Basic Electrical & Electronics Engineering, Pearson.
4. M.S Sukhija and T.K Nagsarkar, Basic Electrical and Electronics Engineering, Oxford University press, 2012.
5. Bell D. A., Electronic Devices and Circuits, Oxford University Press.
6. Tomasy W., Advanced Electronic Communication system, PHI Publishers.

REFERENCE BOOKS:

1. Kothari and Nagrath, Theory & problems of Basic Electrical engineering. Tata McGraw Hill.
2. JB Gupta, A course in electrical Engg. SK. Kataria & Sons.
3. BL Theraja, Electrical Technology Vol. 1.
4. K Uma Rao, Basic Electrical Engineering, Pearson.
5. Boylested R. L. and Nashelsky L., Electronic Devices and Circuit Theory, Pearson Education.
6. Frenzel L. E., Principles of Electronic Communication Systems, McGraw Hill.
7. Kennedy G. and Davis B., Electronic Communication Systems, McGraw Hill.
8. Rajendra Prasad, Fundamentals of Electronic Engineering, Cengage Learning.

Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2).

30% - 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.

PC24 206B	PROGRAMMING FOR PROBLEM SOLVING USING C	2-1-2-4

COURSE OBJECTIVES:

- To understand the various steps in program development.
- To understand the basic concepts in C programming language.
- To understand the various concepts in arrays and user defined functions.
- To understand the basic concepts of structure and union.
- To familiarize different file operations in C.

SYLLABUS:

Module I: **(9 hours)**

Computer basics: A simple model of a computer- hardware and software, characteristics of computers, Computer generations and classification. Input/ Output Units. Computer memory: Read Only Memory, RAM, Hierarchy of memory. Processor; System Software: Operating Systems, Compiler, Interpreter, Assembler, Loader, Linker, Macro; Application Software; Computer Languages: Machine language, Assembly language, High level languages.

Module II: **(12 hours)**

Flowchart and algorithm -Overview of C- Importance of C- Basic structure of C program - Constants, Variables and Data Types- Operators and Expressions- Decision making and branching- Decision making and Looping- Programming examples

Module III: **(12 hours)**

Arrays- Declaration and Initialization of One dimensional array – Two dimensional array-Initializing Two dimensional Arrays- Character Arrays and Strings- Initializing String Variables- Reading and writing String- Putting Strings Together- Comparison of Two Strings- String handling Functions – User defined functions- Declaring, defining, and accessing functions – parameter passing methods – passing arrays to functions -Recursion – The Scope, Visibility and lifetime of Variables - Programming examples

Module IV: **(9 hours)**

Structures and Union-Defining a Structure -Declaring Structure Variables- Accessing Structure Members- Structure initialization- Arrays of Structures -Arrays within structures-Unions- Pointers – Understanding of pointers – Accessing the address of a variable – Declaring the pointer variables – Initializing pointer variables – Accessing a variable through its pointer – Pointers as function arguments - simple example programs.

Module V: **(10 hours)**

File Management in C – Defining and opening a file – Closing a file – Input and output operations on file- Dynamic memory allocation and linked lists - Dynamic memory allocation - Allocating a block of memory: malloc - Allocating multiple blocks of memory: calloc – Releasing the used space: Free – Altering the size of a block: realloc.

Case Study: Apply programming constructs of C language to solve the real-world problems like temperature conversion tool, Simple calculator, Gradebook application etc.

COURSE OUTCOMES:

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

- Elucidate the basic architecture and functionalities of a computer.
- Apply programming constructs of C language to solve the real-world problem.
- Design and implement applications using arrays, strings and structures.
- Develop and implement applications in c using pointers.

- Design and develop solutions to problems using modular programming constructs using functions.

TEXT BOOKS:

1. E. Balaguruswamy, Programming in ANSI C, 3rd edition., Tata McGraw Hill, New Delhi, 2018.
2. Goel A, Computer Fundamentals, Pearson Education, India,2010.

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. M. Meyer, R. Baber, Computers in Your Future, 3rd edition, Pearson Education India.
5. Raja Raman V, Computer basics programming in C, 6th edition, PHI Learning.
6. Thomas H Cormen, Charles E. Leiserson, Ronald L. Rivest, Introduction to algorithms, 3rd ed. MIT press.

Internal Continuous Assessment (Maximum Marks-50)

40% - Test -1 (Theory)

40% - Test-2 (Internal lab examination)

10% - Fair Record

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.

EN24 209	BIOLOGY FOR ENGINEERS	3-0-0-3

PRE-REQUISITES: Basic knowledge in the biological aspects of the human body.

COURSE OBJECTIVES:

- Analysis of physiological systems, enzyme classification and genetic principles.
- Understand various instrumentation systems for measurement and analysis of physiological parameters.
- Understand the foundational principles of proficiency in respiratory measurements and pulmonary function assessments.
- Apply knowledge of diagnostic imaging techniques.
- Evaluate the physiological impacts of electric currents and implement preventive measures to mitigate electrical hazards in healthcare.

SYLLABUS:

Module I: **(10 Hours)**

Introduction to biomedical engineering - Role of biomedical engineers - Physiological systems of the human body - Circulatory systems - Pulmonary circulation. Blood group - Proteins - structure and function - RNA, DNA, Mendel's laws (principle only)

Module II: **(10 Hours)**

Cardiovascular system: Heart- structure of heart and major blood vessels, cardiac cycle, ECG waveform – Einthoven triangle - Electroencephalogram (EEG): structure of brain, waveform, stroke. Electrodes and leads - Bio electric potentials: EMG, EGG, ERG, EOG. (basic principle and waveform only)

Module III: **(10 Hours)**

Respiratory measurements: Spirometry – Basic system and applications- Pulmonary function measurements: Respiratory volumes, lung capacity, tidal volume - Blood Pressure, Ventilator, cardiac pacemaker, Dialysis, infant incubator, Diathermy, Lithotripsy (concepts only).

Module IV: **(10 Hours)**

Ultrasound scanning (application level) 3D and 4D. Angiography, Endoscopy, X-Ray, CT, MRI, Oximeter (application level). A- scan, B-scan and M -scan.

Module V: **(9 Hours)**

Physiological effects of electric currents, Macro shock and Microshock. Leakage current. Sources of electrical hazards. Different methods of electric accident prevention. Safety codes.

COURSE OUTCOMES:

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

- To serve as a foundation course for engineers in the healthcare field.
- To introduce the basic anatomy of the major systems of engineering importance in the human body.
- To study the basic physiological concepts of the systems.
- To explore the basic engineering principles related to human physiology.
- To understand the electrical safety and ability to design relevant protection systems.

TEXT BOOKS:

1. Laura lee Sherwood, Human Physiology: From Cells to Systems, Brooks/Cole, Cengage Learning.
2. Arthur C. Guyton, Textbook of Medical Physiology, Prism Books (Pvt) Ltd & W.B. Saunders Company.
3. John G Webster, Medical Instrumentation Application And Design, 5/e, Wiley.

REFERENCE BOOKS:

1. Samson Wright, Cyril A. Keele (editor), Eric Neil (editor): Applied Physiology, Oxford University Press.
2. J.B.West, Best and Taylor's Physiological Basis of Medical Practice, Williams and Wilkins, Baltimore.
3. Valerie C. Scanlon, Tina sanders: Essentials of anatomy and physiology.
4. W.F.Ganong: Review of Medical Physiology, Prentice-Hall, Connecticut. Kathleen
5. J.W. Wilson, Ross, Wilson, Anatomy and Physiology in Health and Illness, ELBS/Churchill Livingstone.

Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2).

30% - 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.

EN24 210	UNIVERSAL HUMAN VALUES	3-0-0-3

COURSE OBJECTIVES:

- To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings.
- To facilitate the development of a holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence.
- Such a holistic perspective forms the basis of universal human values and movement towards value-based living in a natural way.
- To highlight plausible implications of such a holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with nature.
- To know the holistic technologies, management models and production systems.

SYLLABUS:

Module I: **(10 hours)**

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

Understanding the need, basic guidelines, content and process for Value Education. Self-Exploration– its content and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self-exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and physical Facilities- the basic requirements for fulfilment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfil the above human aspirations: understanding and living in harmony at various levels

Module II: **(10 hours)**

Understanding Harmony in the Human Being - Harmony in Myself!

Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the characteristics and activities of 'I' and harmony in 'I'. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

Module III: **(10 hours)**

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding Harmony in the family – the basic unit of human interaction. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfilment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family.

Module IV: **(10 hours)**

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

Understanding the harmony in the Nature. Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

Module V: **(12 hours)**

Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order.

Competence in professional ethics:

a) Ability to utilize the professional competence for augmenting universal human order

b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,

c) Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order:

a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers

b) At the level of society: as mutually enriching institutions and organizations.

COURSE OUTCOMES:

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

- Find that technical education without study of human values can generate more problems than solutions.
- See that they can enlist their desires and the desires are not vague.
- See that all physical facilities they use are required for a limited time in a limited quantity.
- Differentiate between the characteristics and activities of different orders and study the mutual fulfilment among them.
- Present sustainable solutions to the problems in society and nature, draw roadmaps to achieve them.

TEXT BOOKS:

1. B L Bajpai, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.
2. PL Dhar, RR Gaur, Science and Humanism, Commonwealth Publishers, 1990
3. Sussan George, How the Other Half Dies, Penguin Press. Reprinted 1991
4. Subhas Palekar, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati, 2000.
5. A Nagraj, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak, 1998.
6. A.N. Tripathy, Human Values, New Age International Publishers, 2003.

REFERENCE BOOKS:

1. R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010.
2. R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics – Teacher's Manual, Excel books, New Delhi, 2010

Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2).

30% - 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.

EN24 211	ENVIRONMENTAL SCIENCE	2-0-0-0

COURSE OBJECTIVES:

- To impart basic knowledge about the environment and its allied problems.
- 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.
- To make students aware of the basic structure and functions of ecosystem.
- To explain and discuss the distribution of different natural resources and their sustainable management.

SYLLABUS:

Module I: (7 hours)

Environment and Environmental Science- Definition, concept, components, and importance- Ecosystem and Ecology- Structure and Function of Ecosystem, Food chain, food web and ecological pyramids.

Module II: (7 hours)

Environmental Pollution - Definition, causes, effects and control measures- a. Air pollution b. Water pollution (thermal and marine pollution) c. Land pollution d. Radiation pollution and Nuclear hazard. e. Noise pollution.Solid waste management- Causes, effects and control measures - Global warming and climate change Ozone depletion- Acid rain- Causes, effects and control measures.

Module III: *(*7 hours)

Biodiversity - Definition, concept, levels, and biodiversity values- Biodiversity of India, India as a diversity nation and Hotspot of biodiversity- Threats to Biodiversity (Habitat loss, poaching of wildlife and man-wildlife conflict).

Module IV: *(*7 hours)

Natural resources and their Conservation- Forest Resources- Uses and overexploitation of forests and consequences of deforestation- Water Resources- Use and consequences of over-utilization, concept of rainwater harvesting and watershed management, water conflicts. Food Resources- Sources of food, food problems - Impacts of modern agriculture on the environment.

Module V: *(*7 hours)

Environmental Technology- cleantech, STEM, BAT, green technologies, environmental sustainability, environmental projects.

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. Anindita Basak, 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 Textbook 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)

60% - Tests (minimum 2).

30% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Attendance and Regularity in the class.

BE24 212B(P)	ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP	0-0-4-2

COURSE OBJECTIVES:

- To learn how to use and maintain electrical tools and equipments.
- To develop skills in electrical safety practices and procedures.
- To impart a basic knowledge of electrical circuits, wiring and systems.
- Identification of active and passive components
- Build electronic circuits on bread board and solder electronic circuits on PCB

SYLLABUS*:*

List of experiments

(Minimum 10 experiments out of 12)

1. Familiarization of general symbols used in electrical circuits.
2. Precautions against and cure from electric shock.
3. Wiring practice of a circuit to control two lamps by two SPST switches.
4. Wiring practice of a circuit to control one lamp by two SPDT switches.
5. Wiring practice of a circuit to control one fluorescent lamp and one three pin plug socket.
6. Wiring practice of a main switch board consisting of ICDP switch, DB, MCB and ELCB.
7. Familiarization/identification of electronic components.
8. Familiarization/application of instruments and equipment: multimeter, power supply, CRO, function generator.
9. Assembling electronic circuit on general purpose bread board: Fixed voltage power supply with transformer, rectifier diode, capacitor filter, zener regulator.
10. Introduction to soldering practice: study of soldering components, solders, tools, heat sink.
11. PCB assembly and testing of full wave rectifier circuit diagram.
12. Familiarization of setting up of a PA system with different microphones, loud speakers, mixer etc.

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.
- Build electronic circuits on breadboard.
- Solder electronic circuits on PCB.
- Identify various subsystems of electronic systems like PA Systems.

Internal Continuous Assessment (Maximum Marks - 50)

60% - Laboratory practical, record and viva voice

30% - Tests

10% - Attendance and Regularity in the lab

End Semester Practical Examination (Maximum Marks-100)

50% - Procedure, Conducting experiment and performance

40% - Viva voce

10% - Fair record

SEMESTER - 3

EN24 301	ENGINEERING MATHEMATICS III	3-1-0-4

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To provide a quick overview of the concepts and results in complex function that may be useful in engineering.
- To introduce the concepts and results in complex differentiation and integration that may be useful in engineering.
- To introduce the concepts of linear algebra.
- To introduce the concept of partial differential equations.
- To formulate physical problems using partial differential equations.

SYLLABUS:

Module I: 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 II: 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.

Module III: Linear Algebra **(12 hours)**

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

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

Introduction- Solutions of equations of the form $F(p,q) = 0$, $F(x,p,q) = 0$, $F(z,p,q) = 0$, $F_1(x,p) = F_2(y,q)$, Clairaut's form - $z = px + qy + F(p,q)$, Lagrange's form - $Pp + Qq = R$. Classification of Linear PDE's.

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

Derivation of one dimensional wave equation - solution of one dimensional wave equation- Derivation of one dimensional heat equation- solution of one dimensional heat equation.

COURSE OUTCOMES:

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

- Analyze given complex function is analytic and find its series development.
- Describe the basic properties of complex integration.
- Develop the essential tool of linear algebra in a comprehensive manner.
- Use mathematical tools for the solution of partial differential equations that models physical processes.
- Model and analyze partial differential equations in a wide range of physical phenomena, which has got applications across all branches of engineering.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers,36th Edition ,2010.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics,Laxmi Publications Reprint ,2008.

REFERENCE BOOKS:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition,Pearson Reprint,2002
2. Erwin Kreyszig, Advanced engineering mathematics, 9th Edition, John Wiley & sons 2006.
3. R.D.Sharma, Rittu Jain, Theory and Problems of Linear Algebra, Dreamtech Press, 2019.

Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2).

30% - 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 **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.

CS24 302	DATA STRUCTURES AND ALGORITHMS	3-1-0-4

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To learn efficient data storage mechanisms for easy access.
- Familiarize with various linked list operations
- To get a clear understanding of linear data structures.
- To get a clear understanding of non-linear data structures.
- To study various searching and sorting techniques.

SYLLABUS:

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

Introduction and overview of data structures- Linear data structures – Non-linear data structures – Algorithms - Complexity of algorithms – Time complexity - Space complexity - Asymptotic notations - Complexity calculation of simple algorithms - Recursion: Recursive algorithms – Analysis of recursive algorithms

Module II: Arrays and Searching **(12 hours)**

Arrays – Representation - Sparse matrix, Stacks, Queues - Circular Queues, Priority Queues, Double Ended Queues, Evaluation of expressions - Linear Search and Binary Search

Module III: Linked List **(12 hours)**

Singly Linked List - Operations on Linked List - Insertion and the deletion at the beginning, at the end and at the specific location - Doubly Linked List - Insertion and the deletion at the beginning, at the end and after a given node - Circular Linked List - Insertion and the deletion at the beginning and

at the end - Stacks and Queues using Linked List - Conversion of infix to postfix, Evaluation of postfix expression

Module IV: Tree and Graphs **(9 hours)**

Trees – Basic terminologies- Definition and concepts- Representation of binary tree –- Binary tree traversals – pre-order, inorder and postorder – Types of binary trees – Binary search tree.

Graphs – Graph terminologies -Representation of graph - Graph traversals – DFS, BFS – Dijkstra's and Floyd's algorithm, Minimum spanning tree – Kruskal's algorithm, Prim's algorithm.

Module V: Sorting and Hashing **(10 hours)**

Sorting- Basic terminologies- Sorting techniques – Bubble sort – Insertion sort – Selection sort – Quick sort – Heap sort – Merge sort

Hashing - Hashing techniques, Collision resolution, Overflow handling, Hashing functions – Mid square, Division, Folding, Digit analysis

COURSE OUTCOMES:

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

- 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 BOOK:

1. 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, second Edition.
2. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, Universities Press, Fundamentals of Data Structures in C, 2nd edition.
3. Aho A. V., J. E. Hopcroft and J. D. Ullman, Data Structures and Algorithms, Pearson Publication.

4. Anany Levitin, Introduction to the Design and Analysis of Algorithms, Pearson, 3rd edition.
5. E. Balagurusamy, "Data Structures Using C", Tata McGraw Hill, 2013.
6. Adam Drozdek, Thomson, Data structures and algorithms in C++, 3rd Edition.
7. R.L. Kruse, "Data Structure and Program Design", Prentice Hall, Second Edition.

Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2)

30% - Assignments (minimum 2) such as homework, problem solving, group discussions, quizzes, literature survey, seminar, term-project etc.

10% - 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.

CS24 303	SOFTWARE ENGINEERING	3-1-0-4

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.
- To introduce various testing methods
- To describe different software maintenance methods

SYLLABUS:

Module I: **(12 hours)**

Introduction to Software Engineering: Basic concepts- Software Life Cycles Models - Classical Waterfall Model, Iterative Waterfall Model, Prototyping Model, Incremental Development Model, Evolutionary Model, Rapid application Development(RAD), Agile development models, Spiral model, Comparison of Different lifecycle models.

Module II: **(11 hours)**

Software project management - Responsibilities of software project manager, Project planning, Project estimation techniques, COCOMO model, scheduling, Organisation and team structures, Staffing, Risk management, Software organisation management.

Module III: **(10 hours)**

Requirement analysis and specifications - Requirement gathering and analysis, Software requirement specification Software design - Overview of the design process, How to characterize a good software design, Cohesion and Coupling. Function oriented software design - Overview of SA/SD, Structured Analysis, Structured Design

Module IV: **(10 hours)**

Coding - Coding standards and guidelines, Code review , Software documentation **Testing** - Basic concepts and terminology, verification and validation, Testing activities, Unit testing, Black box testing, White box testing, Integration testing, System testing, Some general issues associated with testing.

Module V: **(10 hours)**

Software Maintenance - Characteristics of software maintenance, Software reverse engineering, Software maintenance process models, Estimation of maintenance cost.

COURSE OUTCOMES:

At the end of the course, the student should 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 BOOK:

1. Rajib Mall, Fundamentals of Software Engineering, 5th Edition.

REFERENCE BOOKS:

1. Ian Sommerville, Software Engineering, University of Lancaster, Pearson Education, Seventh edition, 2004.
2. K. K.Aggarwal and Yogesh Singh, Software Engineering, New age International Publishers, Second edition, 2005.
3. Roger S. Pressman, Software Engineering : A practitioner's approach, McGraw Hill publication, Eighth edition, 2014
4. S.A. Kelkar, Software Project Management: A concise study, PHI, Third edition, 2012.

Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2).

30% - 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.

CS24 304	COMPUTER ORGANIZATION & ARCHITECTURE	3-1-0-3

PREREQUISITES: NIL

COURSE OBJECTIVES:

- Gain knowledge about the fundamental hardware components of a computer system.
- To understand basic processing units, input/ output organization and pipelining concept
- Explore the memory hierarchy, including cache memory, main memory, virtual memory and secondary storage.
- Study the logic design of processors.
- Learn about binary arithmetic, and how arithmetic operations are performed in computer systems.

SYLLABUS:

Module I: **(10 hours)**

Basic Structure of computers: functional units - basic operational concepts - bus structures. Memory locations and addresses - memory operations - Instructions and instruction sequencing - addressing modes.

Basic processing unit: fundamental concepts – instruction cycle – execution of a complete instruction - single bus and multiple bus organization

Module II: **(11 hours)**

Numbers, Arithmetic Operation and Characters. **Arithmetic:** Addition and subtraction of signed numbers - Design of fast adders - Multiplication of positive numbers - Signed operand multiplication - Integer division.

Module III: **(11 hours)**

The Memory system: Basic concepts – Memory Hierarchy - Semiconductor RAM memories, Internal organization of memory chips, Static memories, Asynchronous DRAM, Synchronous DRAM - Read Only Memories - Cache memories, mapping functions - Virtual memory - Secondary storage

Module IV: **(11 hours)**

Processor logic design: Processor organization - Arithmetic logic unit - Design of arithmetic circuit - design of logic circuit - Design of arithmetic logic unit - Status register - Design of shifter - processor unit - Design of accumulator.

Module V: **(10 hours)**

Input / Output organization: Accessing of I/O devices - Interrupts, Interrupt hardware -Direct memory access. **Pipelining:** Basic concepts - Data hazards - Instruction hazards – Control hazards

COURSE OUTCOMES:

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

- Recognize and express the relevance of basic components, I/O organization and pipelining schemes in a digital computer
- Explain the types of memory systems and mapping functions used in memory systems.
- Illustrate the design of the Arithmetic Logic Unit and explain the usage of registers in it.
- Explain the implementation aspects of arithmetic algorithms in a digital computer.

TEXT BOOKS:

1. Hamacher C. V., Computer Organization – International Edition -5th Edition, McGraw Hill, New York, 2011
2. Mano M. M., Digital Logic & Computer Design, PHI, 2004.

REFERENCE BOOKS:

1. Patterson D.A. and J. L. Hennessy, Computer Organization and Design, 5/e, Morgan Kaufmann Publishers, 2013.
2. William Stallings, Computer Organization and Architecture: Designing for Performance, Pearson, 9/e, 2013.
3. Rajaraman V. and T. Radhakrishnan, Computer Organization and Architecture, Prentice Hall, 2011

Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2).

30% -Assignments (minimum 2) such as homework, 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 **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.

CS24 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 get a brief idea about combinational logic circuits.
- To get a brief idea about sequential logic circuits.
- To familiarize with shift registers.

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

Addition, subtraction, multiplication and division of binary numbers - Addition and subtraction of BCD, Octal and Hexadecimal numbers - Introduction to floating point numbers.

Module II: Boolean algebra (9 hours)

Postulates of Boolean algebra - Basic theorems and Properties of Boolean Algebra - Boolean Functions - Canonical and standard forms - Simplification of Boolean Functions- Using Karnaugh-Map Method (upto five variables), Don’t care conditions, Product of sums using basic and universal gates.

Module III: Combinational Logic **(10 hours)**

Design Procedure & Implementation of combinational logic circuits - Binary adders and subtractors, Binary Parallel adder, Carry look ahead adder, BCD adder, Code converter, Magnitude comparator, Decoder, Demultiplexer, Encoder, Multiplexer, Parity generator/ Checker.

Module IV: Sequential logic circuits **(11 hours)**

Flip-flops – SR, JK, T and D - Triggering of flip-flops- Master slave flip- flops - Excitation table and characteristic equation.

Registers: Registers with parallel load.

Counters: Asynchronous counters- Binary and BCD counters, timing sequences and state diagrams. Synchronous counters- Binary Up- down counter, BCD counter.

Module V: **(10 hours)**

Shift registers – Serial In Serial Out, Serial In Parallel Out, Bidirectional Shift Register with Parallel load - Ring counter - Johnson counter- Timing sequences and state diagrams.

Programmable logic devices: Memory decoding - Error detection and correction – RAM – ROM - Programmable Logic Array (PLA) - Implementation of simple circuits using 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, MorganKaufmann 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 HillEducation, 2015.
5. Charles H Roth,Jr, Lizy Kurian John, Digital System Design using VHDL,2/e, Cengage Learning.

Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2).

30% -Assignments (minimum 2) such as homework, 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 **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.

EN24 306	LIFE SKILLS & PROFESSIONAL ETHICS	3-1-0-0

PRE-REQUISITES: Nil

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 and to inculcate critical thinking process.

- To prepare them on problem solving skills and to understand team dynamics and effectiveness.
- 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 2: (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 and Right brain, Convergent and Divergent Thinking, Critical reading and 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 3: (10 hours)

Introduction to Groups and Teams: Team Composition, Managing Team Performance, Importance of Group, Stages of Group, Group Cycle, Group Problem Solving, Achieving Group Consensus, Group dynamics techniques, Group Vs team, Team dynamics, Managing Team Performance &

Managing Conflict in Teams. Working Together in Teams, Team Decision-Making, Team culture and power, Team leader development.

MODULE 4: **(10 hours)**

Morals, Values and Ethics, Integrity: Work Ethics, Service learning, Civic virtue, Respect for others, Living Peacefully. Senses of 'Engineering Ethics', variety of moral issues, 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.

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 5: **(10 hours)**

Introduction, a framework for considering leadership: Entrepreneurial and moral leadership, vision, people selection and development, cultural dimensions of leadership, Growing as a leader, turn around 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:

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

- Define and identify different life skills required in personal and professional life.
- Make effective presentations, face group discussions and debate.
- Critically think about a particular problem and solve them.
- Work in group and teams.
- Become an effective leader.

TEXT BOOK:

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

Internal Continuous Assessment (Maximum Marks-100)

50% - Group discussion

50% - Presentation skills

CS24 307(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 Algorithms
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

CS24 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.
- To apply Boolean laws to simplify digital circuits
- To understand the operation of various logic gates and digital ICs
- To understand the operation of digital displays, flip flops and counters
- To design and understand different combinational logic circuits.

SYLLABUS:

List of Exercises / Experiments

(Minimum 8 experiments are mandatory)

1. Familiarization of logic gates and digital trainer kit
2. Implement various gates using universal gates
3. Combinational circuits: Adder, Subtractor
4. Code converters: binary to gray,gray to binary
5. Multiplexer and Demultiplexer using gates
6. Study of Flip Flops using gates and Flip Flop.
7. Asynchronous counters.
8. Ring and Johnson counter.
9. Synchronous counters – Design.
10. Shift Registers – Right, Left, Serial, Parallel.

COURSE OUTCOMES:

Upon 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.

End Semester Practical Examination (Maximum Marks-100)

70% - Procedure and tabulation form, Conducting experiment, results and inference

20% - Viva voce

10% - Fair record

SEMESTER - 4

CS24 401	DISCRETE COMPUTATIONAL STRUCTURES	3-1-0-4

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To familiarize with Relations, types of relations and Functions that is essential in most branches of Engineering.
- To introduce the idea of Logic that is fundamental to the application of valid arguments in propositional and predicate Calculus problems.
- To develop the idea of group theory.
- To describe fundamental concepts in Ring theory.
- To lay clear fundamentals to finite fields.

SYLLABUS:

Module I: Set, Relations, Functions **(10 hours)**

Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets.

Module II: Logic **(11 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 III: Group Theory **(11 hours)**

Definition and elementary properties, Cyclic groups, Homomorphisms and Isomorphisms, Groups, Subgroups, Permutation Groups, Cosets and Lagrange's theorem, Normal Subgroups.

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 polynomials and finite fields-The ring Zn.

COURSE OUTCOMES:

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

- Apply the properties of relations and functions.
- Verify correctness of an argument using propositional logic, predicate logic and truth tables.
- Use tools for group theory.
- Use tools for rings and modular arithmetic.
- Acquire the knowledge of finite fields.

TEXT BOOKS:

1. Ralph p Grimaldi, Discrete and Combinatorial Mathematics
2. Liu. C. L., & Mohapatra, D. P, Elements of Discrete Mathematics. Tata McGraw-Hill, 2008
3. Kolman B & Busby R C, Discrete and Mathematical Structures for Computer Science**.**

REFERENCE BOOKS:

1. Thomas Koshy, Discrete Mathematics with applications Erwin Kreyszig, Advanced engineering mathematics, 9th Edition, John Wiley & sons, 2006
2. Singh, S.B., Discrete Mathematics, Khanna Book applications Publishing Company, New Delhi.
3. Rosen, K. H. (2019). Discrete Mathematics and Its Applications, 8th Edition
4. Huth, M., & Ryan, M. (2004). Logic in Computer Science: Modelling and Reasoning about Systems (2nd ed.). Cambridge University Press.
5. Cohen, D. I. A. (1978). Basic techniques of combinatorial theory. John Wiley.
6. Niven. I., Zuckerman, H. S., & Montgomery, H. L. (1991). An introduction to the theory of numbers. John Wiley & Sons.
7. Sarkar, Discrete Mathematics and Its Applications, Oxford Press.

Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2).

30% - 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 **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.

CS24 402	DIGITAL DATA COMMUNICATION	3-1-0-4

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.
- To know about the different multi-access protocols.

SYLLABUS:

Module I: **(10 hours)**

Data Communications- Components, Data flow, **Networks** – Criteria, Physical structure, Network Models, **Protocols and Standards- OSI model** - Layers in OSI model, Addressing- **Data and Signals**– Analog and Digital – Periodic analog signals- Digital signals-**Transmission Impairments-** Attenuation, Delay distortion, Noise - **Transmission Media-** Guided media & Unguided media

Module II: **(11 hours)**

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- A**nalog to Analog**-Amplitude Modulation, Frequency Modulation, Phase Modulation

Module III: **(12 hours)**

Error detection and correction-Types of errors- Block Coding – Hamming Distance, **Linear block codes** - Simple Parity-Check Code, Hamming Codes, **Cyclic codes -** Cyclic Redundancy Check, **Multiplexing-**Frequency Division Multiplexing**,** Wave Division Multiplexing, Time Division Multiplexing, **Spread spectrum**- Direct Sequence Spread Spectrum (DSSS), Frequency Hopping Spread Spectrum (FHSS)

Module IV: **(12 hours)**

Switching- Circuit-switched networks – Three Phases, Structure of Circuit Switch, **Datagram networks** – Routing table, **Virtual-circuit networks**- Addressing, Three phases, **Protocol for noiseless channels** – Stop and wait protocol– **Noisy channels** - Stop and wait ARQ, Go-back N ARQ, Selective Repeat ARQ – **High-level Data Link Control** – 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 should 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.
- Analyzing 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, First 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)

60% - Tests (minimum 2).

30% - 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 **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.

CS24 403	PROGRAMMING IN PYTHON	3-1-0-4

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To learn the syntax and semantics of the Python programming language.
- To solve problems using Python conditionals and loops.
- To use Python data structures such as lists, tuples, dictionaries etc to represent complex data.

SYLLABUS:

Module I: Introduction to Python (12 hours)

Data types, variables, keywords, expressions and statements, evaluation of expressions, Operators and operands, operator precedence, indentation, comments, debugging. **Python Program Flow Control: Conditional statements in Python** - if, if…else, elif. **Loops in Python** - for, while, for...else, while...else. **Control statements in Python** - pass, continue, break. (Simple programs covering Python basics and control flow)

Module II: Python Functions, Modules and Packages (10 hours)

Functions - Function definition, calling functions, parameters and arguments, the return statement, type conversion and coercion, composition of functions, Lambda function, built-in functions and mathematical functions, user-defined functions, Recursion, **Modules** - Built-in modules, creating modules, import statement. **Packages in Python** - Importing modules from a package.

Module III: Strings and lists (12 hours)

Strings: String traversal, string slices and comparison with examples, The string module, character classification. **List and Set – List:** List values, accessing elements, list membership, Lists and for loops, List operations, List slices, List deletion. **Tuples:** Mutability and tuples, tuple assignment, tuple operations, manipulation on tuples. **Dictionaries:** Operations and methods.

Module IV: **Python Files and Exceptions (9 hours)**

Python file handling, open, write, read text files, writing variables, Directories in Python, Pickling, Exception Handling.

Module V: Python Object Oriented Programming (9 hours)

Introduction to classes and objects - class definition, attributes, instances, sameness, instances as arguments and return values. Constructor, class attributes and destructors, inheritance.

COURSE OUTCOMES:

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

- Write programs using Python and learn its execution environment
- Apply programs to implement various computational tasks which requires loops and conditional statements
- Write programs using functions and packages
- Apply programs to implement the concept of file handling using Python
- Design object oriented programs to implement daily life problems and their solutions

TEXT BOOKS:

1. Allen Downey, Jeffrey Elkner, Chris Meyers, " How to think like a Computer Scientist - Learning with Python", Green Tea Press, First edition, 2002.
2. Mark Lutz,"Learning Python: Powerful Object-Oriented Programming" , O"Reilly Media Inc.,5th edition,2013.

REFERENCE BOOKS:

1. Kenneth A. Lambert, B. L. Juneja, "Fundamentals of Python", Cengage Learning India Pvt. Ltd., 2015.
2. Mark Summerfield,"Programming in Python 3: A Complete Introduction to the Python Language", Pearson Education, 2nd,2018.
3. S.A.Kulkarni, "Problem Solving and PYTHON Programming", 2nd edition, Yes Dee Publishing Pvt Ltd, 2018
4. Yashavant Kanetkar ,Aditya Kanetkar ,"Let Us Python ",BPB Publications, 1st Edition, 2019
5. Allen Downey, "Learning with Python", Dreamtec Press, 1st Edition, 2015

Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2)

30% - 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 **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.

CS24 404	FOUNDATION OF DATA SCIENCE	3-1-0-3

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- Building the fundamentals of data science
- To introduce fundamental ideas to process data.
- To introduce and discuss techniques for applying hypotheses and data into actionable predictions.
- Gaining practical experience in programming tools for data science.
- Empowering students with tools and techniques used in data science.

Module I:Introduction (10 hours)

Data Science: Benefits and uses – Facets of data – Data science process: Overview – Defining research goals – Retrieving data – Data preparation – Exploratory data analysis – Build the model– Presenting findings and building applications – Data Mining – Data Warehousing – Basic statistical descriptions of data

Module II: Data Describing (10 hours)

Types of data – Types of variables - Describing data with tables and graphs –Describing data with averages – Describing variability – Normal distributions and Standard (z) Scores

Module III: Describing Relationship **(11 hours)**

Correlation –Scatter plots – Correlation coefficient for quantitative data – Computational formula for correlation coefficient – Regression –Regression line – Least Squares Regression Line – Standard error of estimate – Interpretation of r2 –Multiple regression equations –Regression towards the mean.

Module IV: Python Libraries for Data Wrangling **(10 hours)**

Basics of Numpy arrays –Aggregations –Computations on arrays –Comparisons, Masks, Boolean logic – Fancy indexing – Structured arrays – Data manipulation with Pandas – Data indexing and selection – Operating on data – Missing data – Hierarchical indexing – Combining datasets – Aggregation and grouping – Pivot tables.

Module V: Data Visualization **(11 hours)**

Importing Matplotlib – Line plots – Scatter plots – Visualizing errors – Density and contour plots – Histograms – Legends – Colors – Subplots – Text and annotation – Customization – Three dimensional plotting – Geographic data with Basemap – Visualization with Seaborn.

COURSE OUTCOMES:

At the end of the course, the student should 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. 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.

REFERENCE 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, Sage Publications, 2017.

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, Wiley Publications, 2015.

Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2)

30% - Assignments (minimum 2) such as homework, problem solving, group discussions, quizzes, literature survey, seminar, term-project etc.

10% - 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.

CS24 405	OBJECT ORIENTED PROGRAMMING USING JAVA	3-1-0-4

PRE-REQUISITES: NIL

COURSE 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.
- To familiarize the concept of object and classes.
- To familiarize the concept of multithreading concepts.
- To familiarize the graphical user interface.

SYLLABUS:

Module I: **(10 hours)**

Fundamentals of procedural languages - Need for 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, Applet context, JAR Files.

Module V: **(7 hours)**

Graphical User Interface And Database Support of Java: Swings fundamentals - Swing Key features, Model View Controller (MVC), Swing controls, Components and Containers, Swing packages, Event Handling in Swings, Swing Layout Managers, Exploring Swings –Jframe, Jlabel, The Swing Buttons, Jtextfield. Java Database Connectivity (JDBC) - JDBC overview, Creating and Executing Queries – Create Table, Delete, Insert, Select.

COURSE OUTCOMES:

At the end of the course, the student should 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 aJava‖,, 2nd Ed, O'Reilly Media Inc.
6. Mahesh P. Matha - Core Java, A Comprehensive Study, 1st Ed,PHI Learning-2011.

Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2)

30% - Assignments (minimum 2) such as homework, problem solving, group discussions, quizzes, literature survey, seminar, term-project etc.

10% - 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.

EN24 406	CONSTITUTION OF INDIA	3-1-0-0

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To realise the significance of constitution of India to students from all walks of life
- Help them to understand the basic concepts of Indian constitution.
- To identify the importance of fundamental rights as well as fundamental duties.
- To understand the functioning of Union, State and Local Governments in Indian federal system.
- To learn procedure and effects of emergency, composition and activities of election commission and amendment procedure.

SYLLABUS:

Module I: **(12 hours)**

Historical background – Constituent assembly of India – Philosophical foundations of the Indian constitution – Preamble – Fundamental rights – Directive principles of state policy – Fundamental duties – Citizenship – Constitutional remedies for citizens.

Module II: **(10 hours)**

Union Government – Structures of the Union Government and functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial review.

Module III: **(10 hours)**

State Government – Structure and functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.

Module IV: **(10 hours)**

Local Administration - District administration- Municipal corporation- Zila Panchayat, Election Commission - Role and functioning - Chief election commissioner - State election commission

Module V: **(10 hours)**

Types of emergency-grounds-procedure- duration and effects. Amendment of the constitution-meaning- procedure and limitations.

COURSE OUTCOMES:

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

- Understand the emergence and evolution of Indian constitution.
- Understand the structure and composition of Indian constitution.
- Analyze federalism in the Indian context.
- Analyze the three organs of the state in the contemporary scenario.
- Evaluate the Indian Political scenario amidst the emerging challenges.

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, 14th edition , 2017

REFERENCE BOOKS:

1. Ethics and Politics of the Indian Constitution Rajeev Bhargava Oxford University Press, New Delhi, 2008
2. The Constitution of India B.L. Fadia Sahitya Bhawan; New edition.
3. J N Pandey, The constitutional law of India, Central Law agency, Allahabad, 5 e, 2019
4. M V Pylee, India‘s Constitution, S Chand and company, New Delhi, 16e, 2016

Internal Continuous Assessment (Maximum Marks-100)

60% - Tests (minimum 2).

30% -Assignments (minimum 2) such as homework, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Regularity in the class.

CS24 407A	PYTHON FOR MACHINE LEARNING	3-0-0-3

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To provide learners an insight into Python programming
- Develop programming skills to manage the development of software systems.
- To covers programming environment, important instructions, data representations, intermediate level features
- To understand object oriented programming and file data processing of Python.
- To provide foundation to develop web applications, machine learning, and Artificial Intelligence-based applications and tools, Data science and Data visualization applications.

SYLLABUS:

Module I: **(11 hours)**

Getting Started with Python Programming - Running code in the interactive shell, Editing, Saving, and Running a script - Basic coding skills - Working with data types, Numeric data types and Character sets, Keywords, Variables and Assignment statement, Operators, Expressions, Type conversions. Input, Processing, and Output. Formatting output - Detecting and correcting syntax errors. Using built in functions and modules in math module.

Module II: **(10 hours)**

Control statements - Selection structure (if-else, switch-case), Iteration structure(for, while), Testing the control statements, Lazy evaluation. Functions - Hiding redundancy and complexity, Arguments and return values, Variable scopes and parameter passing, Named arguments, Main function, Working with recursion, Lambda functions.

Module III: **(10 hours)**

Lists - Basic list Operations and functions, List of lists, Searching and sorting list, List comprehension. Work with tuples - Dictionaries - Dictionary functions, dictionary literals, adding and removing keys, accessing and replacing values, traversing dictionaries, reverse lookup.

Module IV: **(10 hours)**

Design with classes - Objects and Classes, Methods, Instance Variables, Constructor, Accessors and Mutators. Structuring classes with Inheritance and Polymorphism. Abstract Classes. Exceptions - Handle a single exception, multiple exception.

Module V: **(11 hours)**

Introduction to file I/O - Reading and writing text files, Manipulating binary files. NumPy - Basics, Creating arrays, Arithmetic, Slicing, Matrix operations, Random numbers. Plotting and visualization. Matplotlib - Basic plot, ticks, Labels, and Legends. Working with CSV files. – Pandas - Reading, Manipulating, and Processing data.

COURSE OUTCOMES:

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

- Write, test and debug Python programs
- Illustrate uses of conditional (if, if-else, if-elif-else and switch-case) and iterative (while and for) statements in Python programs
- Develop programs by utilizing the modules Lists, Tuples, Sets and Dictionaries in Python
- Implement Object oriented programs with exception handling
- Write programs in Python to process data stored in files by utilizing the modules Numpy, Matplotlib, and Pandas

TEXT BOOKS:

1. Kenneth A Lambert., Fundamentals of Python : First Programs, 2/e, Cengage Publishing, 2016.
2. Wes McKinney, Python for Data Analysis, 2/e, Shroff / O'Reilly Publishers, 2017.

REFERENCE BOOKS:

1. Allen B. Downey, Think Python: How to Think Like a Computer Scientist, 2/e, Schroff, 2016.
2. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016.

3. David M.Baezly, Python Essential Reference. Addison-Wesley Professional; 4/e, 2009.
4. Charles Severance. Python for Informatics: Exploring Information.

Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2).

30% -Assignments (minimum 2) such as homework, 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 **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.

CS24 407B	OBJECT ORIENTED PROGRAMMING	3-0-0-3

PREREQUISITES: NIL

COURSE OBJECTIVES:

- To understand object-oriented concepts.
- To provide students with a strong foundation in the Java programming language.
- To understand conditions and operators in Java.
- To understand the concepts of inheritance.
- To familiarize multithreading concepts.

SYLLABUS:

Module I: Introduction (10 hours)

Introduction: Approaches to Software Design - Functional Oriented Design, Object Oriented Design, Case Study of Automated Fire Alarm System

Introduction to Java - Java programming Environment and Runtime Environment, Development Platforms - Standard, Enterprise. Java Virtual Machine (JVM), Java compiler, Bytecode, Java applet, Java Buzzwords, Java program structure.

Module II: Core Java Fundamentals: (10 hours)

Primitive Data types - Integers, Floating Point Types, and Characters, Boolean - Literals, Type Conversion and Casting, Variables, Arrays, Strings, Vector class.

Operators - Arithmetic Operators, Bitwise Operators, Relational Operators, Boolean Logical Operators, Assignment Operator, Conditional (Ternary) Operator, Operator Precedence.

Control Statements - Selection Statements, Iteration Statements and Jump Statements.

Object Oriented Programming in Java - Class Fundamentals, Declaring Objects, Object Reference, Introduction to Methods, Constructors, this Keyword, Method Overloading, Using Objects as Parameters, Returning Objects, Recursion.

Module III: More features of Java (11 hours)

Inheritance - Super class, Sub class, The keyword super, protected members, Calling order of constructors, Method overriding, the object class, Abstract classes and methods, Using final with inheritance.

Packages and interfaces - Defining package, CLASSPATH, Access protection, importing packages, interfaces.

Exception Handling - Checked exceptions, unchecked exceptions, try block and catch clause, multiple catch clauses, nested try statements, throw, throws and finally

Module IV: Advanced features of Java (11 hours)

Input/Output - I/O Basics, Reading Console Input, Writing Console Output, PrintWriter Class, Object Streams and Serialization, Reading and Writing Files.

Java Library - String Handling – String Constructors, String Length, Special String Operations - Character Extraction, String Comparison, Searching Strings, Modifying Strings, Using valueOf(), Comparison of StringBuffer and String

Module V: Event Handling and Multithreaded Programming (10 hours)

Event handling - Event handling mechanisms, Delegation event model, Event classes, Sources of events, Event listener Interfaces, Using the delegation model.

Multithreaded programming - The Java thread model, Main Thread, Creating thread, Creating multiple threads, Suspending, Resuming and stopping threads.

COURSE OUTCOMES:

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

- Write Java programs using the object-oriented concepts.
- Utilize datatypes, operators, control statements, built in packages & interfaces, Input Output Streams and Files in Java to develop programs.
- Write application programs in Java using multithreading and database connectivity.
- Write Graphical User Interface based application programs by utilizing event handling features and Swing in Java.

TEXT BOOKS:

1. Herbert Schildt, Java: The Complete Reference, 8/e, Tata McGraw Hill, 2011.
2. Rajib Mall, Fundamentals of Software Engineering, 4th edition, PHI, 2014.
3. Paul Deitel, Harvey Deitel, Java How to Program, Early Objects 11th Edition, Pearson, 2018.

REFERENCE BOOKS:

1. Y. Daniel Liang, Introduction to Java Programming, 7/e, Pearson, 2013.
2. Nageswararao R., Core Java: An Integrated Approach, Dreamtech Press, 2008.
3. Flanagan D., Java in A Nutshell, 5/e, O'Reilly, 2005.
4. Barclay K., J. Savage, Object Oriented Design with UML and Java, Elsevier, 2004.
5. Sierra K., Head First Java, 2/e, O'Reilly, 2005.
6. Balagurusamy E., Programming JAVA a Primer, 5/e, McGraw Hill, 2014.

Internal Continuous Assessment (Maximum Marks-50)

60% - Tests (minimum 2).

30% -Assignments (minimum 2) such as homework, group discussions, quiz, literature survey, seminar, term-project etc.

10% - Regularity in the class.

University Examination Pattern (Maximum Total 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.

CS24 408(P)	OPEN SOURCE SOFTWARE LAB	0-0-3-1

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- Familiarize students with fundamental Linux commands, enabling them to navigate the Linux operating system efficiently.
- To provide hands-on experience with advanced Linux commands.
- To understand the basics of Python programming
- Introduce students to GIT, facilitating collaborative software development practices and repository management.
- Foster a culture of open source software development by encouraging students to actively contribute to open source projects and leverage community-driven resources for innovation and problem-solving.

SYLLABUS:

List of Exercises / Experiments

(Minimum of 6 mandatory)

1. Getting started with **Linux basic commands** for directory operations, displaying directory structure in tree format etc.
2. Linux commands for operations such as redirection, pipes, filters, job control, changing ownership/permissions of files/links/directory.
3. **Advanced Linux commands** curl, wget, ftp, ssh and grep
4. **Shell Programming**:

   Write shell script to show various system configuration like

   - Currently logged user and his login name

- Your current shell
- Your home directory
- Your operating system type
- Your current path setting
- Your current working directory
- Number of users currently logged in

5. Write shell script to show various system configurations like
    - your OS and version, release number, kernel version
    - all available shells
    - computer CPU information like processor type, speed etc
    - memory information
    - hard disk information like size of hard-disk , cache memory , model etc
    - File system (Mounted)
6. Write a shell script to implement a menu driven calculator with following functions
    - Addition
    - Subtraction
    - Multiplication
    - Division
    - Modulus
7. **Python program** to implement the following concepts:
    - Program like factorial of a number, power of a number, minimum and maximum elements in a set etc. to understand the concept of decision making ,iteration ,and control structures.
    - Functions: user defined functions, built-in functions, function calls, math functions, parameter passing, and recursion.
    - Strings: traversal, searching, comparisons.
    - Creation and maintenance of List, Tuples, Dictionaries.
    - Creating, opening, reading, copying, writing and closing file.
8. **Version Control System setup and usage using GIT.** Try the following features.
    - Creating a repository
    - Checking out a repository

- Adding content to the repository
- Committing the data to a repository
- Updating the local copy
- Comparing different revisions
- Revert
- Conflicts and a conflict Resolution

COURSE OUTCOMES:

The students will be able to:

- Demonstrate proficiency in utilizing basic Linux commands for file management, directory navigation, and system administration tasks.
- Apply advanced Linux commands effectively to perform complex system operations, network configuration, and user administration.
- Develop competence in shell programming and Python programming by creating scripts to automate repetitive tasks and manipulate data.
- Utilize GIT repository management techniques to initiate and facilitate collaborative software development practices.
- Evaluate and troubleshoot Linux-based systems through practical experimentation, enhancing overall proficiency in open-source software environments.

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

CS24 409(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.
- To understand the concepts of inheritance and polymorphism
- To create graphical user interface using swing and awt
- To understand the concepts of file handling
- To understand the database connectivity using JDBC-ODBC drivers

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, Interface
4. Abstract class, Interface, Inner classes, wrapper classes, cloning, reflection.
5. Packages.
6. Exception handling and Java threads.
7. Files handling
8. Java Applets.
9. awt & swing.
10. 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