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 Printing Technology 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. 8137/2024/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. 3482/2024/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 Printing Technology 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 Printing Technology programme (2024 onward) and forwarded the corrected Curriculum and the Syllabus approved by the Board of Studies in Mechanical Engineering (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 Printing Technology 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 Printing Technology 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 Printing Technology 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 – Printing Technology

(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)	25
4	Professional Core Courses (PCC)	77
5	Professional Elective Courses	9
6	Open Elective Courses	9
7	Internship, Seminar, Project work & Viva Voce	12
8	Mandatory Non-credit Courses (P/F) with grade	---
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	20	23	22	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	Engineering Mechanics	3	4
TOTAL CREDITS			**25**

Professional Core courses (PCC)			
Sl. No	**Title**	**Semester**	**Credit**
1	Paper & Ink	3	4
2	Graphic Arts Techniques	3	4
3	Computer Programming in C	3	4
4	Offset Technology	4	4
5	Screen Printing &Gravure	4	4
6	Printing Material Science	4	4
7	Graphic Design & Electronics Composition	4	3
8	Strength of Materials	4	3
9	Packaging Technology	5	4
10	Flexography	5	4
11	Designing & Planning for Media Production	5	4
12	Concepts of Electrical &Electronics in Printing	5	3
13	Machine Dynamics	5	3
14	Post Production Technology	6	4
15	Digital Printing &Pre-Press	6	3
16	Tone & Color Analysis	6	3
17	Design of Machine Element	6	3
18	Advancement in Printing Technology	7	4
19	Quality Control &Standardization	7	3
20	Printing Machinery &Maintenance	7	3
21	Print Management, Costing & Estimating	8	3
22	Security Printing	8	3
TOTAL CREDITS			**77**

Internship, Seminar, Project work and 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 skills & Professional Ethics	3	0
4	Constitution of India	4	0
TOTAL CREDITS			**0**

Laboratory sessions with Mini Project			
Sl. No	**Title**	**Semester**	**Credit**
1	Printing Software Lab	3	1
2	Pre-production Lab	3	1
3	Print Production Lab	4	1
4	Machine Drawing Lab	4	1
5	Packaging Technology Lab	5	1
6	Screen Printing &Flexography Lab	5	1
7	Post Production Lab	6	1

8	Mini Project	6	1
9	Quality Control Lab	7	1
10	Tone & Color AnalysisLab	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 is permitted for Minor at the **beginning of fourth semester**.
c) Total credits required to award B. Tech with Minor is **184** (173 + 11).
d) The 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** forgetting '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 engineeringand 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 Printing Technology, with Honours."**

The details of the students eligible for conferring the Honours Degree must be sent to the university by the principal, with the details of his/her marks up to 7^{th} semester and the number of value-added courses and credits earned before the commencement of the 8^{th} 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 PT24 807 (P)**.** The first two letter code refers to the department offering the course. PT stands for Printing Technology. The next two digits represent the year in which the syllabus isimplemented, 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 belongsto 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 subjects 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 PRINTING TECHNOLOGY COURSE								
Subject Code	**Subject Name**	**Hours/Week**			**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 PRINTING TECHNOLOGY COURSE								
Subject Code	**Subject Name**	**Hours/Week**			**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
BP24 208	Basics of Printing Technology	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 PRINTING TECHNOLOGY COURSE								
Subject Code	**Subject**	**Hours/Week**			**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
EN24 302	Engineering Mechanics	3	1	0	50	100	3	4
PT24 303	Computer Programming in C	2	0	2	50	100	3	4
PT24 304	Paper & Ink	4	0	0	50	100	3	4
PT24 305	Graphic Arts Techniques	4	0	0	50	100	3	3
EN24 306	Life skills & Professional Ethics	3	1	0	100	-	-	0
PT24 307(P)	Printing Software Lab	0	0	3	50	100	3	1
PT24 308(P)	Pre-production Lab	0	0	3	50	100	3	1
	Total	**19**	**3**	**8**	**450**	**700**		**21**
		30						

SCHEME OF 4th SEMESTER B. Tech PRINTING TECHNOLOGY COURSE								
Subject Code	**Subject**	**Hours/Week**			**Marks**		**Duration of End Semester Examination**	**Credits**
		L	T	P	**Internal**	**End semester**		
PT24 401	Offset Technology	4	0	0	50	100	3	4
PT24 402	Screen printing &Gravure	4	0	0	50	100	3	4
PT24 403	Printing Material Science	4	0	0	50	100	3	4
PT24 404	Graphic Design & Electronics Composition	4	0	0	50	100	3	3
PT24 405	Strength of Materials	3	1	0	50	100	3	3
EN24 406	Constitution of India	3	1	0	100	-	-	0
PT24 407	Minor Course*	3	0	0	50	100	3	3
PT24 408(P)	Print Production Lab	0	0	3	50	100	3	1
PT24 409(P)	Machine Drawing Lab	0	0	3	50	100	3	1
	Total	**20**	**2**	**8**	**450**	**700**		**20**
		30						
Special Time Table will be allotted for Minor Course								

SCHEME OF 5th SEMESTER B. Tech PRINTING TECHNOLOGY COURSE								
Subject Code	**Subject**	**Hours/Week**			**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
PT24 502	Packaging Technology	4	0	0	50	100	3	4
PT24 503	Designing & Planning for Media Production	3	1	0	50	100	3	4
PT24 504	Flexography	4	0	0	50	100	3	4
PT24 505	Concepts of Electrical & Electronics in Printing	3	1	0	50	100	3	3
PT24 506	Machine Dynamics	3	1	0	50	100	3	3
PT24 507	Minor Course*	3	0	0	50	100	3	3
PT24 508(P)	Packaging Technology Lab	0	0	3	50	100	3	1
PT24 509(P)	Screen Printing &Flexography Lab	0	0	3	50	100	3	1
	Total	**20**	**3**	**7**	**400**	**800**		**23**
		30						
**** Special Time Table will be allotted for Minor Course***								

SCHEME OF 6th SEMESTER B.Tech PRINTING TECHNOLOGY COURSE								
Subject Code	**Subject**	**Hours/Week**			**Marks**		**Duration of End Semester Examination**	**Credits**
		L	T	P	**Internal**	**End semester**		
PT24 601	Post Production Technology	4	0	0	50	100	3	4
PT24 602	Digital Printing &Pre-Press	4	0	0	50	100	3	3
PT24 603	Tone & Color Analysis	4	0	0	50	100	3	3
PT24 604	Design of Machine Element	4	0	0	50	100	3	3
PT24 605	Professional Elective I	3	1	0	50	100	3	3
PT24 606	Open Elective I	3	1	0	50	100	3	3
PT24 607	Minor Course*	3	0	0	50	100	3	3
PT24 608(P)	Post Production Lab	0	0	3	50	100	3	1
PT24 609(P)	Mini Project	0	0	3	100	-	-	1
PT24 610(P)	Internship	0	0	0	100	-	-	1
	Total	**22**	**2**	**6**	**550**	**700**		**22**
		30						
**** Special Time Table will be allotted for Minor Course***								

Professional Elective I		**Open Elective I**	
PT24 605(A)	Industrial Psychology	PT24 606(A)	Industrial Management & Entrepreneurship
PT24 605(B)	Mechanics of Printing	PT24 606(B)	Reliability Engineering
PT24 605(C)	Computer Graphics	PT24 606(C)	Engineering Accountancy
PT24 605(D)	Web Publishing	PT24 606(D)	Mass Communication
PT24 605(E)	Entrepreneurship Management	PT24 606(E)	Safety Engineering & Management
PT24 605(F)	Advance Graphics Technology	PT24 606(F)	Education Technology & Society

OPEN ELECTIVE:

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

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 Printing or allied 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 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 get a pass the internship is 50, Mark distributionis as follows:

Attendance	**: 10**
Coordinator	**: 20**
Technical content of the report	**: 30**
Presentation	**: 40**

SCHEME OF 7th SEMESTER B.Tech PRINTING TECHNOLOGY COURSE								
Subject Code	**Subject**	**Hours/Week**			**Marks**		**Duration of End Semester Examination**	**Credits**
		L	T	P	**Internal**	**End semester**		
PT24 701	Advancement in Printing Technology	3	0	1	50	100	3	4
PT24 702	Quality Control & Standardization	4	0	0	50	100	3	3
PT24 703	Printing Machinery & Maintenance	3	0	1	50	100	3	3
PT24 704	Professional Elective II	3	1	0	50	100	3	3
PT24 705	Open Elective II	3	1	0	50	100	3	3
PT24 706(P)	Quality Control Lab	0	0	3	50	100	3	1
PT24 707(P)	Tone & Color Analysis Lab	0	0	3	50	100	3	1
PT24 708(P)	Project phase I	0	0	4	100	-	-	2
PT24 709(P)	Project in Minor*	0	0	3	100	-	-	2
	Total	**16**	**2**	**12**	**450**	**700**		**20**
		30						
**** Special Time Table will be allotted for Minor Course***								

Professional Elective II		**Open Elective II**	
PT24 704(A)	Printronics	PT24 705(A)	Business Data Analytics
PT24 704(B)	Multimedia	PT24 705(B)	Industrial Safety
PT24 704(C)	Scanners & Systems	PT24 705(C)	Operations Research
PT24 704(D)	Book Publishing	PT24 705(D)	Cost Management of Engineering Projects
PT24 704(E)	Packaging Laws and Regulation	PT24 705(E)	Composite Materials
PT24 704(F)	Analysis of Printing Ink	PT24 705(F)	Waste to Energy

PROJECT PHASE I:

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

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

The objective of project work is to enable the student to take up investigative study in the broad field which can be of interdisciplinary in nature, either fully theoretical/simulation/practical orinvolving 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 a research work and supporting them for making it a reality. This initiative is expected to provide a good base for the student(s) in taking up a research & development project.

Faculty 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 team work.
- Working out a preliminary approach to the problem relating to the assigned topic.
- Block level design documentation.
- Conducting preliminary Analysis/Modelling/ Simulation/ Experiment/ Design/ Feasibility.
- Preparing a written report on the Study conducted for presentation to the department.

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 PRINTING TECHNOLOGY COURSE								
Subject Code	**Subject**	**Hours/Week**			**Marks**		**Duration of End Semester examination**	**Credits**
		L	T	P	**Internal**	**End semester**		
PT24 801	Print Management, Costing & Estimating	3	1	0	50	100	3	4
PT24 802	Security Printing	4	0	0	50	100	3	3
PT24 803	Professional Elective III	3	1	0	50	100	3	3
PT24 804	Open Elective III	3	1	0	50	100	3	3
PT24 805(P)	Seminar	0	0	6	100	-	-	2
PT24 806(P)	Project Phase II	0	0	8	100	-	-	4
PT24 807(P)	Viva Voce	0	0	0	-	100	-	3
	Total	**13**	**3**	**14**	**400**	**500**		**22**
		30						

Professional Elective III		**Open Elective III**	
PT24 803 (A)	E- Publishing	PT24 804 (A)	Newspaper and Periodical Publishing
PT24 803 (B)	Electronic Packaging	PT24 804 (B)	Packaging Management
PT24 803 (C)	Publishing Science	PT24 804 (C)	On Demand Printing
PT24 803 (D)	Printing Measurements and Control Instruments	PT24 804 (D)	Fundamentals of Electronic Media
PT24 803 (E)	Health care Packaging	PT24 804 (E)	Visual and Mass Communication
PT24 803 (F)	Display and Signage	PT24 804 (F)	Industrial Safety Engineering

SEMINAR:

To encourage and motivate the students to read and collect recent and reliable information from their area of interest confined to the relevant discipline from technical publications including peer reviewed journals, conference, books, project reports etc., prepare a report based on a central theme and present it before a peer audience. A faculty member can guide maximum of five students of his area of interest to have better interaction and creative support in guiding the seminar. Each student shall present the seminar for about 20 minutes duration on the selected topic. The report and the presentation shall be evaluated by a team of internal members comprising three senior faculty members based on style of presentation, technical content, adequacy of references, depth of knowledge and overall quality of the report.

Total marks: 100, minimum marks required to pass the seminar is 50, split-up of the marks areas 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 assignedtopic/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 Printing Technology** can opt to study thecourses listed below:

MINOR BASKET				
SEMESTER	**BASKET A**		**BASKET B**	
	Specialization – PACKAGING TECHNOLOGY		**Specialization – PRE PRESS**	
	Subject Code	**Subject Name**	**Subject Code**	**Subject Name**
S4	PT24 407A	Fundamentals of Printing & Packaging Technology	PT24 407B	Pre-press& Imaging Technology
S5	PT24 507A	Packaging Materials	PT24 507B	Prepress Repro Technique
S6	PT24 607A	Packaging Techniques & Process	PT24 607B	Color Reproduction
S7	PT24 709A(P)	Project in Minor	PT24 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 (75points) by the endof 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 fromthem 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 importantCollege 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 - **30points** • Second Prize- **25points** • Third Prize- **20points**	Technical Fest can also be considered	
CA9	Placed within three in State/National level Sports/Games	30	• First Prize- **30points** • Second Prize - **25points** • Third Prize - **20points**		

(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		Seminars • Workshop can be considered	4 SEM.
SA2	Attended National/International Conference	30		• Seminars • Workshop • STTPs conducted at IITs/NITs/Universities can be considered	4 SEM.
SA3	Published /got an Award for a technical paper	30/40	•Publication- **30 points** •Awards - **40 points**		
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 1 month course duration can be considered	

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 acquaint 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 and 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 and company,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:

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 Schrödinger wave equation - Time independent Schrödinger 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 & Echo - Reverberation time - Sabine's formula (no derivation), Factors affecting architectural acoustics and their remedies.

Practical Work:

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. Physics for Engineers- M.R.Seenivasan- New Age Publishers 1996 Edition.
2. Beiser A, Concepts of Modern Physics, McGraw Hill India Ltd.
3. Brijlal and Subramanyam, A Text Book of Optics, S.Chand & Co.
4. Mehta V K, Principles of Electronics, S.Chand & Co.
5. Rajendran V and Marikani A, Physics I, Tata McGraw Hill Co Ltd.
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 and Tandon, Engineering Physics , Oxford India.
3. Dominic and Nahari, A Text Book of Engineering Physics, Owl Books Publishers
4. Hecht E, Optics, Pearson Education.
5. Mehta N, Applied Physics for Engineers, PHILtd.
6. Palais J. C, Fiber Optic Communications, Pearson Education.
7. Pandey B. K and Chathurvedi S, Engineering Physics, Cengage Learning.
8. Philip J, A Text Book of Engineering Physics, Educational Publishers.
9. Premlet B, Engineering Physics, McGraw Hill India Ltd.
10. Sarin A and Rewal A, Engineering Physics, Wiley India Pvt Ltd.
11. Sears and Zemansky, University Physics, Pearson.
12. Vasudeva A. S, A Text Book of Engineering Physics, S. Chand &Co.
13. Kakani A. S, A Text Book of Electronics, New Age International (p) publishers 2000 Edition.
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: Scope of civil engineering (10 hours)

Overview of Civil Engineering - Civil Engineering contributions to the welfare of Society – Specialized sub-disciplines in Civil Engineering –Structural, Construction, Geotechnical, Environmental, Transportation and Water Resources Engineering- Introduction to types of buildings as per NBC - 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 working and 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. and Dalal ,Building Construction, K. B.,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.,Basic Mechanical Engineering,Pentex Books, 9th Edition,2018
7. Balachandran, P.Basic Mechanical Engineering, Owl Books

REFERENCE BOOKS:

1. T.P Kanetkar and 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. And J.W Chipman Remote sensing and Image interpretation by 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. and Shipway, P., An Introduction to Mechanical Engineering Part I -CRC Press
8. Roy and 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 & 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 and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. John.K.C, Engineering graphics, PHI Learning Pvt, Ltd. 2009.

Internal Continuous Assessment (Maximum Marks-50)

60% - Assignments (minimum10 drawing sheets, 2 from each module) plus 2 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 Publishing, 2022.
2. F.T. Wood,Remedial English Grammar. Macmillan.2007
3. William Zinsser On Writing Well.. Harper Resource Book. 2001
4. Liz Hamp-Lyons and Ben Heasly Study Writing.. Cambridge University Press. 2006.
5. Sanjay Kumar and Pushpa Lata Communication Skills.. Oxford University Press. 2011.

6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.
7. William Stallings,Data and Computer Communications 8th edition,pearson education.

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.
- Analyze 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 Educational, 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 & 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.
14. Introduction to welding processes (e.g., MIG, TIG, stick welding) Hands-on project: Welding a small assembly.
15. 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.

EVALUATION SCHEME:

Internal Continuous Assessment (Maximum Marks-50)

60% - Laboratory practical, record and Viva voce

30% - Tests

10% - Attendance and regularity in the lab

Semester End Practical Examination (Maximum Marks-100)

70% - Procedure, conducting experiment, result, tabulation, 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

1. 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
2. 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.
3. Help students to generate a wide range of creative solutions to address the identified problems, fostering creativity and divergent thinking.
4. Develop essential interpersonal skills necessary for successful collaboration in diverse team settings.
5. 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:

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, Differentional 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 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. L. S. Brown and Thomas A. Holme, Chemistry for Engineering Students, Cengage Learning
10. Janice Gorzynski Smith, Organic Chemistry, McGraw-Hill publications
11. , J, Dhanpat Engineering Chemistry Rai Publishers
12. , P. Rath Engineering Chemistry, Cengage Learning
13. M.J. Shultz Engineering Chemistry, , Cengage Learning, New Delhi
14. , R. Mukhopadhyay and S. Datta Engineering Chemistry, New Age International Publishers
15. S. S. Dara and S. S. Umare A textbook of Engineering Chemistry, , 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, wave form 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 & 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, 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.

BP24 208	BASICS OF PRINTING TECHNOLOGY	2-1-2-4

COURSE OBJECTIVES:

- To understand about a firm and solid foundation in Printing Engineering with strong analytical skills.
- Stay updated on current trends and innovations in the printing industry to adapt to market changes and enhance competitiveness.
- To equip students with the necessary skills, knowledge and practical experience to excel in the field of printing materials and pursue careers in print production, graphic design, marketing, advertising, publishing and related industries.
- Learn prepress procedures, including file preparation, image editing, file formats and proofing methods to ensure print readiness and minimize errors during production.
- Understand color theory, color systems (CMYK, RGB), color calibration, and color reproduction techniques to achieve accurate and consistent color results in print materials.

SYLLABUS:

Module I **(9 hours)**

Printing (Origin and development): definition, brief history, developments, Influence in human development, Classification of Printing: conventional (with Master) and non-Impact printing (without Master); Relief, Intaglio, Planography, Screen Printing. Print production work flow: idea and concept, creative production. Industrial Production:

prepress, produce printing plates; Printing: select the apt printing process; Finishing and binding: foiling, varnishing, lamination cut to size, die-cutting, perforation and punching, folding, creasing, binding, glue binding, roleof printing in packaging applications.

Logistics: distribution of the printed product to the end user. Division of Printing Industry: printing industry and allied industry, printing industry. Allied industries: trade shops or production houses, supplies, sales and service, equipment, related areas.

Module II **(7 hours)**

Print Media: Books, Magazines, Brochures, Newspapers, Other Printed media, Future of printing. Size of the Printing Industry: Govt Sector, Private Sector, National& Abroad, Job Opportunities and Entrepreneurship: Govt Sector, Private Sector, National & Abroad. Publishing, Book Publishing, Different types of publishers, House style, Copy Editing, Proof Reading, Proof reading marks, Different types of proof, Parts of book, e-publishing, Outsourcing.

Module III: **(9 hours)**

Printing Materials: Paper and other substrates used in printing. Ink and Toners. Plates and cylinders used in different printing process. Digital printing: Introduction, various, digital printing technologies & brief introduction to digital inks & substrates. Introduction to digital imaging, types of digital printing, advantage of digital printing. Application of internet in printing industry.

Module IV **(7 hours)**

Images for printing: types of originals, line original, tone original, rastor images, vector images, resolution, DPI, PPI, LPI; Image input methods; scanner, types of scanners; Image

manipulation: cropping, scaling; advantages of image editing software; Image formats: JPEG,GIF, PDF, TIFF, EPS, PSD, PS, ZIP/RAR.

Module V **(7 hours)**

Colours for printing: light and colour, electromagnetic spectrum, wavelength of different colours, colour theory, additive colours, subtractive colours RGB and CMYK, colour psychology, warm colour, cool colour, neutral colour, hue, saturation, value, colour printing process; Introduction to Offset Printing: principle of offset printing, four units of an offset press, cylinder configuration: Web Offset: Advantage of offset printing.

COURSE OUTCOMES*:*

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

- Understand the origin & development of Printing.
- Explain the classifications of Printing industry.
- Know the basic ideas of computers for printing.
- Define the basic working principles of Printing.
- Acquire the knowledge of colors in Printing.

TEXT BOOKS:

1. J Michael Adams , Printing Technology Fifth Edition.
2. C S Misra ,Technology of Offset Printing.
3. Sudhir Guptha ,Handbook of Printing Processes Technologies &Industries.
4. Modern Packaging Technology, EIRI board of consultants and engineers.

REFERENCE BOOKS:

1. Klipphan, Helmut ,Handbook of Print Media, Technologies and Production Methods (Ed.).
2. Hand book of Packaging Technology, By ERI Board of consultants and Engineers.
3. Speirs , Hugh M , Introduction to Prepress design , color scanning, typesetting, fonts reproduction, .

EVALUATION SCHEME:

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 shallbe THREE questions from each module with total FIFTEEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions

5x10 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.-Protiens - 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–cardiac rhythm & rate – normal & abnormal. Heart sounds & murmurs. Einthoven triangle. Electroencephalogram (EEG): structure of brain,Wave form, 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 Micro shock. 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 and 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 – Teachers 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 and its conservation - 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, 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 AND ELECTRONICS ENGINEERING WORKSHOP	0-0-4-2

COURSE OBJECTIVES:

- To learn how to use and maintain electrical tools and equipment.
- 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 .

Semester End 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, Manish Goyal, A text book of Engineering Mathematics,Laxmi Publications Reprint ,2008.

REFERENCE BOOKS:

1. G.B. Thomas, 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 Dream Tech 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% - 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 302	ENGINEERING MECHANICS	3-1-0-4

PRE-REQUISITES: Nil

COURSE OBJECTIVES:

- To acquaint with the general approach of solving engineering problems.
- To illustrate the application of the theory learned in Mechanics in practical engineering problems.
- To lay clear fundamentals to core Engineering Subjects.
- To develop analytical skills to formulate and solve engineering problems.
- To understand the concept of motion of particles and rigid bodies.

SYLLABUS:

Module I: **(12 hours)**

Introduction to engineering mechanics - units - dimensions - vector and scalar quantities - laws of mechanics - elements of vector algebra - equivalent force systems - resultant of a force system - simplest resultant of special force systems - distributed force systems. Equilibrium of concurrent forces in a plane - free body diagrams - free bodies involving interior sections – equilibrium of forces in a plane - static indeterminacy.

Module II: **(10 hours)**

Friction – laws of friction – coefficient of friction – cone of friction – angle of friction – angle of repose – wedge friction – ladder Friction - simple contact friction problems. Introduction to structural mechanics - trusses - analysis of simple trusses - method of joints – method of sections

Module III: **(10 hours)**

First moment and centroid– centroid of wires – centroid of areas - theorems of Pappus-Guldinus – problems on centroid – centroid of composite areas.

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

Module IV: **(10 hours)**

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

Module V: **(10 hours)**

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

COURSE OUTCOMES:

At the end of the course students will be able to

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

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.

PT24 303	COMPUTER PROGRAMMING IN C	2-0-2-4

PRE-REQUISITE*:* Nil

COURSE OBJECTIVES*:*

- To impart the basic concepts of computer and Information Technology.
- To understand various steps in program development.
- To understand various concepts in arrays and user defined functions.
- To know about the file operations in c programming.
- To develop skill in problem solving concepts through learning C programming in practical approach

SYLLABUS:

Module I: (11 hours)

Introduction to Computers: A simple model of a computer - hardware and software, characteristics of computers, Computer generations and classification**,** Input-Output devices, **Computer memory:** Hierarchy of memory, Read Only Memory, RAM, Different types of storage devices, Processor concepts - System Software & Application software, **Operating System** - Definition and functions, **Computer Languages** - Machine language, assembly language and high level language, **Translators** - Compiler, Interpreter and Assembler, Flowchart and Algorithm, Development of algorithms for simple problems.

Module II: **(12 hours)**

Basic elements of C -. **Structure of C program** – Character set, Tokens, Identifiers in C, Variables and Data Types,Constants, Input and Output functions - printf and scanf, Preprocessor directives- Header files- Library functions - Operators and Expressions - Arithmetic Operators, Relational and Logical Operators, Conditional operator, size of operator, Assignment operators and Bitwise Operators, Operator Precedence –

Control Flow Statements: If Statement, Switch Statement,While Loop, Do While Loop, For Loop, Break and Continue statements.(Simple programs covering control flow)

Module III: (**10 hours)**

Arrays - Introduction to Arrays - Declaration, Initialization – 1 dimensional array and 2dimensional array, Defining and processing arrays - application of arrays, Linear search program, bubble sort program, **Structure** - Declaration, definition and initialization of structures, **Union**, simple programs covering arrays, structure and union.

Module IV: **(10 hours)**

String operations - Basics - operations-length, compare, copy, concatenate, **Functions** - Declaring, defining, and accessing functions – parameter passing methods – passing arrays to functions - Recursion**, Storage classes** – extern, auto, register and static- Simple programs using functions, recursion and strings.

Module V: **(9 hours)**

Basics of Pointers - Declaration and initialization of pointer variables - accessing data through pointers, NULL pointer,array access using pointers, simple examples.

Files - Concept of a file - File Operations - In built file handling functions (rewind() ,fseek(), ftell(),feof(), fread(), fwrite()), simple programs covering pointers and files.

COURSE OUTCOME:

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

- Understand functionalities of digital computers and different kinds of software's.
- Identify appropriate C language constructs to solve problems.

- Design and implement applications using arrays, structures and strings.
- Analyse problems, identify subtasks and implement them as functions.
- Develop and implement applications in C using pointers and learn the basic concepts of file system

TEXT BOOKS:

1. P. Norton, Peter Norton's Introduction to Computers, Tata McGraw Hill, New Delhi.
2. E. Balaguruswamy, Programming in ANSI C, 3rd ed., Tata McGraw Hill, New Delhi, 2004
3. Rajaraman V , Computer basics programming in C, PHI

REFERENCE BOOKS:

1. B. Gottfried, Programming with C, 2nd ed, Tata McGraw Hill, NewDelhi, 2006
2. B. W. Kernighan, and D. M. Ritchie, The C Programming Language,Prentice Hall of India, New Delhi, 1988
3. K. N. King. C Programming: A Modern Approach, 2nd ed., W. W.Norton & Company, 2008
4. S. Kochan, Programming in C, CBS publishers & distributors

Internal Continuous Assessment (Maximum Marks-50)

40% - Test-1 (For Theory)

40% - Test-2 (For Lab, Internal Examination)

10% - Fair Record

10% - Attendance and regularity

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.

PT24 304	PAPER & INK	4-0-0-4

PRE-REQUISITE: Nil

COURSE OBJECTIVES:

- To know the basic idea of paper & recycled paper.
- To study the classification & properties of Paper.
- To give a fair idea about components for printing ink.
- To know about drying mechanism.
- To study about testing of Paper & Printing Inks.

SYLLABUS:

Module I: **(9 Hours)**

Introduction to Paper-Raw materials- Nature of paper- cellulose, fibers, non-fibers and additives. Stages of paper making- Debarking, chipping, Screening, Pulping, Washing, Refining, Stock preparation. Pulp Additives –water, sizing agents, fillers and Coloring materials. Paper making machines-different sections, finishing operations, coating, board making-furnish, manufacture and finishing.

Module II: **(9 Hours)**

Recycled paper- Introduction recycling process, fiber preparation- screening, centrifugal cleaning, flotation, washing, deinking plant functions, continuous drum pulper, pre-screening and cleaning, primary flotation, cleaning, fine screening, thickening, disperging, brightness control, post flotation, light weight cleaning, washing, thickening and storage. Properties of paper for offset, flexography, gravure, screen and other printing processes.

Module III: **(10 Hours)**

Printing ink- Colorants: Pigment classifications, preparations. Inorganic: white and colored, carbon black, metallic, ultramine and fluorescent. Organic: Diarylide yellow, hansa yellow, rodamine, lithol, rubine toner, phalocyanine blue and green and alkali blue, benzidine orange, toluidine red and lake red. Dyestuffs: classification, preparation and properties and uses, acid, basics, solvents and disperse dyes.

Oils: classification, preparation and properties and uses of drying semi - drying and non-drying oils. Resins: natural: rosin and its derivatives, Gum Arabic, synthetic resins: epoxy resins, acrylic resins and varnishes. Solvents: aliphatic and aromatic hydro carbon, alcohol, esters, glycols & ketones. Additives- properties and applications Driers, waxes, antioxidants, plasticizers, wetting agents, deforming agents and anti- skinning agents.

Module IV: (10 Hours)

Paste inks: single roll mill, roll mill, triple roll mill, twin horizontal mixer, zarm stirrer- liquid inks: ball mill, bead mill, and attritor. Flow chart for ink manufacturing, weighting, mixing, grinding, testing and packing. Special inks and drying mechanism: heat sets, quick sets, gloss, magnetic and water based inks, Radiation curable inks-IR, UV & EB, Raw materials to constitute the inks and the equipment's used for drying. Different types of ink drying mechanism. Ink problems-related to major printing processes-causes and remedies.

Module V: (14 Hours)

Paper properties & Testers -Physical properties, Strength properties, optical properties, chemical properties and printing properties. Optical Property Testers – Brightness meters, gloss meters, opacimeters, Printability property testers – Absorbency testers, Dynamic property testers, expansimeters, coefficient-of-friction testers, Hydrostatic testers, linting testers, moisture meters, picking testers, relative humidity testers. End use property testers – Abrasion testers, adhesion testers, adhesive testers, basic weight testers, book strength testers, bursting strengths testers, compression testers, crush resistance testers, folding endurance testers, micrometers, puncture testers, roll coating testers, stiffness testers, tearing strength testers, tensile strength testers, wet strength testers, wick resistance testers

Properties of Ink and Ink testers – Introduction-Viscosity, tack, color, gloss, rub resistance, length, dry characteristics, and finess of grind. Working property testers – colorimeters & spectrophotometers, dispersion testers, drying time testers, drying time tester, film applicators, Ink film thickness gauges, film thickness gauge accessories, fineness-of-grind testers, Mixing scales, tack testers, tack tester accessories, viscometers, rotational viscometers, viscometer accessories, viscosity control instruments, viscosity cups, viscosity tubes, weight-per-gallon cups.

COURSE OUTCOME:

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

- Know the basic idea of Paper and its preparation.
- Acquire the knowledge of recycling of papers.
- Apply the suitable components for making printing ink.
- Explain the suitable drying mechanism of ink and special inks used in printing.
- Identify the Paper and Ink properties and its testing

TEXT BOOKS:

1. Adams J.M, Faux.D.D and Rieber L.J, Printing Technology,Delmar Publishers, NewYork
2. R.H. Leach, The Printing Ink Manual, fifth edition, Chapman & Hall, London.
3. Claudia G Thompson "Recycled Papers" The M I T Press, Cambridge (1992).
4. Robert F Reed, What the Printer should know about inks, GATF
5. Eves Ian "Paper" Blueprint, London (1991) .
6. Finley Charles "Printing Paper and Inks" Delmar Publishers, New York (1997).

REFERENCE BOOKS:

1. Clifwool, A Manual for Flexographic inks, Fishbum Printing ink co. Ltd
2. Fonald E Tood, Printing inks, Pira International, United Kingdom
3. R.J. McGill, " Measurement and control in paper making", Adam Hilger Ltd.
4. D.Venkateswaralu, Paper for printing and packaging. SS Graphics

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 **10 x 5 marks= 50 marks**
Candidates have to answer TEN questions out of FIFTEEN. There shall be THREE questions from each module with total FIFTEEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions

5 x 10 marks= 50 marks

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

PT24 305	GRAPHIC ARTS TECHNIQUES	4-0-0-3

PRE-REQUISITES: Nil

COURSE OBJECTIVES

- To impart the basic idea of printing industry and Printing processes.
- To know about the camera mechanism & digital photography in printing.
- To understand about layout preparations.
- Identify the working of negative and positive lithographic plates.
- To obtain knowledge about Printing materials.

SYLLABUS:

Module I: **(10 hours)**

Types of process camera-Mechanical and optical principles–lens-focal length-image formation-lens aberrations-factors governing design and layout of studio-illumination, reflection and transmission – film processing–-Diffusion Transfer- Reciprocity failure-intermittency effect-contact photography.

Module II: **(10 Hours)**

Digital photography - Origins of digital photography, image scanning with digital cameras, demands on the resolution, special features of the digital camera – tone value quantization, focal length and lenses, aspect ratio, link-up to a computer. Digital photography and color management

Module III: **(8 Hours)**

Planning layout and Film assembly -Basic steps involved in planning a layout, Factors to be considered while planning a layout, positive & negative film assembly, Planning of multicolor work, imposition consideration for sheet fed & web fed press.

Module IV: **(12 Hours)**

Planographic plates- The plate base- cross section of an aluminum plate, cross section of a plastic plate. Anodized aluminum, plate washes. Paper plates, paper aluminum laminates, plastic plates. Light sensitive coatings, Sensitivity of coatings to light of different wave lengths, Light sources for plate making

Module V: **(12 Hours)**

Negative working plate-additive pre-sensitized plates, subtractive diazo PS plates, photopolymer pre- sensitized plates, Aqueous developable plates, Wipe-on plates. Multimetal plates -Producing a multimetal plate. Types- bimetallic, trimetallic. Diffusion transfer plates, electrostatic plates. Positive working lithographic plates- presensitized plates, Baking of Positive plates – photo direct plates. laser exposed plates, deep etch plates and their purposes. Waterless plates.

COURSE OUTCOMES

At the end of the course students will be able to

- Know the basic idea of processes Camera and its parts.
- Acquire the knowledge of digital photography in printing.
- Explain the basic principles of layout preparation.
- Differentiate the printing plates and its types.
- Work with negative and positive lithographic plates.

TEXT BOOKS:

1. Nelson R Eldred, Chemistry for the Graphic arts, GATF, USA, 1992.
2. Prakash Shetty, Science and Technology of Printing Materials, MJP Publishers, Chennai, 2008.

3. Adams J.M, Faux,D.D and Rieber L.J, Printing Technology, Delmar Publishers, NewYork
4. Heigh. M. Speir, Introduction in Printing Technology

REFERENCE BOOKS:

1. Hand book of Modern halftone photography, perfect graphic arts, USA
2. Jack Eggleston, Sensitometry for photographers, focal Press, London
3. Woddiff Thomas , J R.SPSE handbook of photographic science and engineering, John Wiley &Son
4. Puri B.R, Sharm L.R and Pathania M.S, Principals of PhysicalChemistry, Vishal Publishing Co,Jalandhar, 2002.
5. Anthony Bristow, Advances in Printing Sciences and Technology, Vol. 24-J.
6. A.S. Porter.- Lithographic Press Work
7. Kipphan, Helmut Handbook of Print Media, Technologies and Production Methods.

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 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.

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 I: **(14 hours)**

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

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

Group discussion: Differences between group discussion and debate; Ensuring success in group discussions.

Presentation skills: Oral presentation and public speaking skills; business presentations, Technology-based Communication: Netiquettes: effective e-mail messages; power-point presentation; enhancing editing skills using computer software.

Module II: **(8 hours)**

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

Critical thinking Vs Creative thinking: Functions of Left Brain 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 III: **(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 IV: **(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 V: **(10hours)**

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. ShaliniVerma, "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

PT24 307 (P)	PRINTING SOFTWARE LAB	0-0-3-1

PRE-REQUISITES: Nil

COURSE OBJECTIVES:

- To Develop a concept in designing.
- Acquire knowledge in skills in print ready files for production
- To become familiar with application used for layout, prepress & color management.
- Learn how to optimize printing workflow using software tools.
- To develop skills in designing software like Adobe In Design & Adobe photo shop

SYLLABUS:

List of Experiments

(A minimum of 8 experiments must be conducted)

1. Familiarization with key board.
2. M.S word- justification works, column work, single column double column, fonts & type stylechanging, copy, cut &paste command, word act.
3. Adobe photo shop-familiarizing and practice with photo shop tools
4. Adobe photo shop- design a work using layers and masking, picture editing, scanning the image,converting image formats, resizing the image and picture &text manipulation
5. Corel draw- working principle designing and practicing.
6. Corel draw- working principle designing and practicing.
7. Adobe In Design-design a work.

8. Adobe Illustrator- working principle, designing &practicing
9. QuarkXPress - working principle, designing &practicing.
10. Comparing various outputs –Dot matrix, Inkjet printer, Laser printer, Digital printer.

COURSE OUTCOMES:

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

- Become Familiar with industry standard printing software tools and application.
- Gained knowledge in print-ready files.
- Manage the preparations of books and journals.
- Handle the Adobe illustrator, Corel draw and the Quark express software's
- Manage the preparations of books and journals.

EVALUATION SCHEME:

Internal Continuous Assessment (Maximum Marks-50)

60% - Laboratory practical, record and Viva voce

30% - Tests

10% - Attendance and regularity in the lab

Semester End Practical Examination (Maximum Marks-100)

70% - Procedure, conducting experiment, result, tabulation, and inference

20% - Viva voce

10% - Fair record

PT24 308 (P)	PRE-PRODUCTION LAB	0-0-3-1

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To be equipped with Planning layout.
- To understand about film assembly.
- To know about key sheet.
- Work with different type of platemaking process.
- To develop color stripping technique.

SYLLABUS:

List of Experiments

(A minimum of 8 experiments must be conducted)

1. Layout of facilities and workflow of Plate making department.
2. Layout Preparation, Study of Leading edge, Margin and registration Process.
3. Terminology for impositions, Layout for sheet and half sheet work
4. Key sheet Preparation for Sheetfed and Web-offset works.
5. Sheet work impositions- 4-page layout, 8-page layout, 16-page layout, 32-page layout.
6. Half Sheet work impositions-4-page layout,8-page layout,16-page layout,32-page layout.
7. Color stripping methods.
8. Page makeup- folders and Pamphlets.
9. Page makeup- Newspaper and Bookwork.
10. Preparation of Pre sensitized plates.
11. Page imposition using imposition software's.
12. Study of effect of exposure and development factors on quality of the plate.

COURSE OUTCOMES:

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

- Understand the workflow of plate preparation.
- Draw the layout sheets for printing.
- Prepare the key-sheets for sheetfed and web-offset printing.
- Explain the stripping process in printing.
- Handle the plate preparation using traditional way as well as using software.

EVALUATION SCHEME:

Internal Continuous Assessment (Maximum Marks-50)

60% - Laboratory practical, record and Viva voce

30% - Tests

10% - Attendance and regularity in the lab

Semester End Practical Examination (Maximum Marks-100)

70% - Procedure, conducting experiment, result, tabulation, and inference

20% - Viva voce

10% - Fair record

SEMESTER-4

PT24 401	OFFSET TECHNOLOGY	4-0-0-4

PRE-REQUISITES: Concepts of Printing Technology.

COURSE OBJECTIVES:

- To Identify the Basics of offset Printing process;
- Helps to understand about working principle of the sheetfed press as well as the infeed unit.
- To acquire the settings of Dampening system in the Printing.
- To know about inking systems in the Printing.
- To know about the principles of web offset printing systems.

SYLLABUS:

Module I: **(10 hours)**

Principles of lithography & offset printing. sheetfed offset and web offset, duplicators, single color and multi color, Direct imaging presses. Various press configurations- Inline presses, stack, blanket to blanket, common impression cylinder. Offset -Advantages &limitations.

Sheetfed offset - Units of offset presses- Infeed, registration, printing & delivery units. Feedersystem - Types of feeders-single sheet & stream feeding. Feeder head components-pile table, pile height, air blast nozzles, forwarding pick up sucker, rear pickup suckers, separator brushes& fingers. Sheet control devices-conveyor assemblies, conveyor tape, hold down rods. Sheet separation system-friction, pneumatic.

Module II: **(10 Hours)**

Sheet detectors- No sheet detectors, early or fast detectors, cross sheet detectors, double sheet detectors. Sheet detector mechanisms-mechanical types, electromechanically type, pneumatic type. sheet registration unit- registration devices-front lay, side lay-push &pull type.

In feed section –sheet insertion system-tumbler gripper, rotary gripper, swing arm gripper, pin type gripper, spring gripper-compression spring &tension spring. Plate cylinder-cylindrical design, cylinder driving body, cylinder gap, plate clamping, plate punching, bearer contact cylinder, bearer gap cylinder Introduction to impression cylinder. Transfer cylinder, chain transfer, single drum transfer, three drum transfer. Delivery unit-skeleton wheels, Transfer drum,Delivery cylinder. types of delivery systems.

Module III: (12 Hours)

Dampening system-introduction, fountain roller, dampening feed roller, dampening solution composition, alcohols, use of alcohols, alcohol substitutes, storage of alcohol, PH of dampening solution, conductivity of dampening solution. Different types of dampening system- levy flap dampening systems, continuous flow dampening systems, brush dampening using flick blades, - inker feed systems, plate feed systems, Spray-bar dampening systems. Critical metering nip, Reverse slip nip. Damper setting.

Inking unit-introduction –ink duct, ink fountain, ink feed roller, oscillating roller, reciprocating rollers, form rollers, Intermediate rollers. Dwell time, ductor shock. Ink film thickness. Drum type inking system. Blanket- types of blanket. Blanket thickness. Blanket hardness. Pre make ready, make ready. Multicolor sheet fed press-transfer roller-three & five-cylinder system. Color sequence in two color and multi color operations. Printability and runnability, Wet on wet printing. Wet on dry printing.

Module IV: (10 Hours)

Web offset -Introduction, plate cylinder, Blanket cylinder. Infeed - Single- roll stand, multiple roll stand, dancer roller, Lug air shaft, continuous roll feeding devices. Flying Pasters-splicing sequence on flying paster. Zero speed splicer-splicing sequence on a zero-speed paster. Preparing a splice. Splice template, infeed operation. Dryers-introduction, function, setting of quick set ink, setting of heat set ink. Types of dryers, removal of solvent-ladder air from web, putting a controlled ripple in the web. Chill rolls-Introduction, function, types of roll system. The evolution of chill roll design, chill roll plumbing, Average web temperature after chilling, side-to-side temperature variation after chilling

Module V: **(10 Hours)**

Folders-Introduction, folding principles, parts of folder, combination folder, ribbon folder, double-former folder, the mechanics of folding process of jaw fold, chopper fold mechanisms. Operation of collect cylinder, press folders, double former pre-folder, flow folders, insert folders. Inline finishing -gluers, Pattern perforating and numbering units, ink agitators, plate scanners, scanning densitometer, Perfectors, cut off controls, stroboscope, synchroscope. Press room safety. Printing unit problems. Inking unit problems. Paper problems. Blanket troubles.

COURSE OUTCOMES:

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

- Identify the Basics of offset Printing process;
- Analyze working principle of the sheetfed press as well as the infeed unit.
- Apply the principles of Dampening system in the Printing.
- Handle the Inking systems in the Printing.
- Acquire the Principles of web offset printing systems.

TEXT BOOKS:

1. Dejdas L.P and Destree T.M, Sheetfed Offset Press Operating, GATF, USA, 1998
2. A S Porter, Manual for Lithographic Press Operation.
3. David B.Crouse, Robert J Schneider,Jr, Web offset press operating.
4. C.S.Mishra ,Offset M/C II.
5. A.S .Porter, Manual for Lithography press operator

REFERENCE BOOKS:

1. Crowhurst L, Small Offset: Press and Ioeration, GATF,USA,1982
2. GATF Staff, Solving Sheetfed Offset Press Problems, GATF, USA, 1994
3. Crouse D.B and Schneider R J, Web offset Operating, GATF,USA,1989
4. GATF Staff, Solving Web Offset problems, GATF,USA, 1990

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 questionsfrom 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.

PT24 402	**Screen printing &Gravure**	**4-0-0-4**

PRE-REQUISITES: Nil

COURSE OBJECTIVES:

The main objective to give the course of Screen printing & Gravure is

- To introduce the principles of gravure printing process and cylinder preparation techniques.
- To gain knowledge on components of gravure printing machines.
- To understand the principles of screen-printing process and stencil preparation method.
- To learn about the types of screen-printing machines.
- To know about the print problems & quality control techniques in gravure and screen-printing process.

SYLLABUS:

Module I: (10 hours)

History of Screening Printing. Screens – multifilament, mono filaments, selecting mesh material, stretching screen fabric to frame, screen preparation, screen reclamation – Trouble shooting clogged screens. Care and storage of screens.,Image transfer – The squeegee, Squeegee considerations, squeegee preparation, hardness categories of squeegee blades, Variety of blade shape and application. On contact printing, Off contact printing. Stencils – knife cut stencils, photo stencils – Indirect stencil systems, Direct photo stencil systems, capillary systems, Direct/Indirect photo stencil systems.

Screen ink uniqueness – U.V. inks.

Module II (10 hours)

Screen Printing machines -Manual Printing m/c, Semi-automatic Screen Printing m/c, Automatic Screen Printing m/c, Flat bet hinged frame, Flat bed vertical lift, Cylinder-bed presses, Container printing m/c, Rotary Screen Printing m/c, Carousel m/c. Special Machine configurations. Basic registration techniques. Method of halftone preparation for screen printing. Drying methods – Evaporation, Oxidation, Penetration, Polymerization. Drying Equipment's – Drying racks, wicket dryers, Jet dryers, Infrared dryers, Ultraviolet dryers.Application- Paper and Paper board, Wood, Textiles, Plastics, Metals, Ceramics and glass. Specialized Areas – Printed circuit boards of screen printing.

Module III: (10 hours)

History of gravure, Gravure products and markets – Publication gravure – gravure packagingand converting – product gravure. Gravure Screens. Gravure cylinder preparation – Diffusion etch– Direct Transfer-Electromechanical process – Laser cutting. Electronic engraving systems today. Chemical engraving methods and equipment's – cell configurations – advantages and disadvantages. Cylinder correction methods – Re-etching electro mechanical engravings, Color balance etches, spot plating. Well formation – variables, basic types.

Cylinder construction and preparation – Cylinder design, types. Balancing the cylinder. Copper plating and polishing, Re-use of cylinders.

Module IV: **(10 hours)**

Doctor blade – Doctor blade assembly – Blade angles. Blade distance from Nip, Blade edge, Blade mounting. Doctor Blade wear –Fatigue, Corrosion, Abrasive, Adhesive wear, Doctor blade materials, Doctor blade holder configurations, Blade setting procedures, Preparing bladefor use, Doctor blade problems. Gravure Impression Roller –function, Roller covering, Roller pressure, Cylinder diameter, Roller design & configuration. Balance –static & dynamic. Roller setting. New developments. Storage of impression rollers, Impression roller problems. Impression mechanisms – mechanical, hydraulic, pneumatic.

Module V: **(12 hours)**

Gravure printing unit and Press configurations – Other gravure presses – Intaglio plate printing, offset gravure and flexo gravure. Gravure with flexo units. Gravure units as other equipment. Gravure roller coating. Gravure Ink Dryers – Need for ink dryers, Drying water based inks, Dryers functioning, Dryer limitations, supply air valves, balancing the dryer, filters & dampers, roller condition vital. Heat Sources – steam, electric and gas, combination gas / oil, thermic oil, waste heat from incinerators. Solvent Recovery Methods. Paper substrates – Roto newspapers, Coated papers, Gravure packaging paper substrates – properties. Label stock, Paper board. Non Paper substrates – surface preparation, plastics – properties. Metalized films – Aluminium foil, Foil laminations. Gravure advantages, limitations. Future of Gravure Printing Industry.

COURSE OUTCOMES:

At the end of the course students will be able to

- Summarize the characteristics of gravure printing process and discuss about the methods of cylinder engraving.
- Explain the components and operation of the different types of gravure presses
- Analyze the process characteristics of screen-printing technology and relate print quality with the selection of printing components.
- Compare the stencil preparation techniques and select the type of screen-printing pressbased on the application requirements.
- Know about the print problems & quality control techniques in gravure and screen-printing process.

TEXT BOOKS:

1. Babette Magee “Screen printing Primer”, GATF, Pennsylvania (1985).
2. Stephens, John Screen Process Printing: A Practical Guide Paperback – (1987)
3. Gravure: - Process and Technology, GAA
4. Michel Adams, David D Faux Printing Technology, 3rd Edition-

REFERENCE BOOKS:

1. Samuel B.H. “Screen Printing - Contemporary Approach” Delmar publisher,New York (1997).
2. Herbert L.W. “Gravure and flexographic Printing Presses” Converting Technology Co, USA (1985).
3. Ray Blair and Thomas M.D. “Gravure Process and Technology” GAA, USA (1991).
4. Harry and Smith “Modern Gravure Technology, A Literature Review” PiraInternational, UK (1994).

Internal Continuous Assessment (MaximumMarks-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 questionsfrom 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.

PT24 403	PRINTING MATERIAL SCIENCE	4-0-0-4

PRE-REQUISITES: Concepts of Printing Technology

COURSE OBJECTIVES:

- This paper gives a basic knowledge about the characteristics and importance of various Materials used in Printing & Printing allied industries.
- To familiarize the Polymers used in the printing industry.
- To acquire the knowledge of the Printing ink and its constituents.
- To assess the Papers and Boards used in Printing Industry.
- To understand the plastic and metallic substances used in theprinting industry.

SYLLABUS:

Module I: (10 Hours)

Printing Materials- Introduction. Colloids- Types of Colloidal Systems, characteristics and properties, Colloid materials and application in printing industry- Gelatin, Gumarabic, Egg albumin, Cellulose gum, Casein glue, Fish glue. Light sensitive coating dichromate colloids, Diazo compounds. Sensitivity of coating to light. Dye-sensitized photo polymerization, dark reaction, post exposure, safe lights, reciprocity law. Action of light sources on coatings, stabilities of coatings.

Module II : (11 Hours)

Polymers and their applications in Printing and Packaging: Addition polymers: Polyolifins, Polyvinyls, polystyrenes. Condensation polymers: Polyeters, Polymides, Phenolics, Gluptal urethane. Synthetic rubbers: Buna-N, Butyls, Neoprene, Thiokal- applications in Printing. Photo Polymerization and Flexo-graphic plates: Solid photopolymer,Liquid photo-polymer plates. photopolymers

Module III: **(9 Hours)**

Printing Inks-Concepts of ingredients in printing inks and Properties. Vehicles, Pigments, Additives in Printing Inks. Adhesives- ingredients of an adhesive, Types of adhesives. Dyes-classifications. Pigments-Types, Properties. Varnishes-Types, Constituents, Applications of Synthetic Varnishes. Lacquers- Constituents, Applications in printing Industry.

Module IV: **(10 Hours)**

Types of Paper and paper for different printing processes: Ground wood paper, coated and commercial paper, labels and packing papers, publishing papers, business and writing paper, twin wire formed paper. **Paper Boards:** Types- Solid bleached sulfate, coated unbleached board, recycled paper board, outside wax laminated paper board, corrugated board and other boards. Suitability of paper boards to various printing processes.

Module V: **(12 Hours)**

Plasticizers-Plastics: Types, Properties. Preparation and applications. Elastomers. Laminated plastics. Plastic substrates-Types-PE, PP, PVC, PET, PS, Polyester and Cellophane. Properties, Testing and suitability of plastics to various printing processes.

Metallic substrates-Types: Aluminum, Gold, Silver, Tin, Copper, lead, Nickel, Alloys of Aluminum, Stainless steel and other metals. Properties and their uses. Graining of lithoplates-purpose & methods. Physical and chemical properties and their use in printing technology. Etching of litho-plates. Hydrophobic and hydrophilic surfaces, water and ink interaction.

COURSE OUTCOME:

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

- Identify the basic knowledge about the characteristics and importance of various Materials used in Printing & Printing alliedindustries.
- Familiarize the Polymers used in the printing industry.
- Acquire the knowledge of the Printing ink and its constituents.
- Asses the Papers and Boards used in Printing Industry.

- Understand the plastic and metallic substances used in theprinting industry.

TEXT BOOKS:

1. Nelson R Eldred, Chemistry for the Graphic arts, GATF, USA, 1992.
2. Prakash Shetty, Science and Technology of Printing Materials, MJP Publishers, Chennai, 2008.
3. Adams J.M, Faux,D.D and Rieber L.J, Printing Technology, Delmar Publishers, NewYork.
4. Heigh. M. Speir, Introduction in Printing Technology.
5. Bob Thomson, Printing Materials Science and Technology, PIRA
6. W.H. Bureau, "What the printer should know about the paper", GATF

REFERENCE BOOKS:

1. Hand book of Modern halftone photography, perfect graphic arts, USA
2. Jack Eggleston, Sensitometry for photographers, focal Press, London
3. Woddiff Thomas , JR.SPSE handbook of photographic science and engineering,John Wiley & Son
4. Puri B.R, Sharm L.R and Pathania M.S, Principals of Physical Chemistry, Vishal Publishing Co, Jalandhar, 2002.
5. Anthony Bristow, Advances in Printing Sciences and Technology, Vol. 24-J.
6. A.S. Porter.- Lithographic Press Work
7. Handbook of printing and production-Michael Bernard, John Peacock.
8. Heigh. M. Speir Introduction in Printing Technology
9. J.P. Casey, Pulp and paper chemistry and chemical technology.
10. R.J. McGill, " Measurement and control in paper making", Adam Hilger Ltd.
11. D.Venkateswaralu, Paper for printing and packaging. SS Graphics .
12. Vasudeva, A. S., A Text Book of Engineering Physics, S. Chand &Co
13. Kakani A.S,A Text Book of Electronics, New Age International(p)publishers 2000Edition

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 questionsfrom 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.

PT24 404	GRAPHIC DESIGN AND ELECTRONICS COMPOSITION	4-0-0-3

PRE-REQUISITES: Concepts of Printing Technology

COURSE OBJECTIVES:

- To impart the basic concept of Color.
- To study the design principle and typography.
- To study the Desktop software's for pre-press jobs.
- Correct the mistakes in a copy using different proofing stages.
- To know about handle different composition software.

SYLLABUS:

Module I: **(10 hours)**

Color: Understanding color, -eyes and visual sense, structure and functioning of human eye, electromagnetic response, Cones and rods, temporal properties, Perceived color.

Color & color theory – Additive & subtractive -Terms to describe color, - color separation technique.GATF, color triangles & color circle, color spaces, color matching, color original, method ofcolor measurement, color Gamut.

Module II: (10 hours)

Printers measurement systems-Word spacing material, Line spacing material Composing a line of type- Centering a line of type, straight composition, storing the form Basic typographic forms – Spacing, word spacing, letter spacing, mark up, copy fitting Casting up,Casting off - word count method, character count method, en-count method, calculations.

Module III: (11 hours)

Differentiate Vector file formats and raster file formats. PDF: PDF- history, importance, advantages.PDF writer and Adobe Distiller. PDF in print industrPDF and post script differences and similarities. Setting of a digital document - Art box, trim box, bleed box, media box. Trimming marks, cutting marks, quality control patches, registration marks etc. RIP (raster image processer): definition, function, hardware and software. Stages of RIP. Data transfer: Data transfer definition. Print data exchange. Data exchange standards (PDF, PDF-X series). Introduction to page description language. Names of page description language. Postscript language.

Module IV: (11 hours)

Copy for printing –verbal copy, copy marking, copy fitting: - Digital copy fitting, Traditional method. Digital copy fitting- Shrink the page to fit, Reword the text, Reduce the font size, Space between paragraph, Space between lines, Inter character spacing, White space management. Traditional method:- text matter, calculation. Proofing stages, proof correction marks, correction of type set matter. Text transferring data – capture device, telecommunications, modems, ISDN. Typesetting commands - code syntax, menu driven systems. General rules for Page makeup. Page makeup of book work, newspapers, magazines, pamphlets.

Module V: **(10 hours)**

Composition Software - Automatic Page Make up, Text and graphics Integration, Page display, WYSIWYG. Post Script (PS): Introduction. PostScript Fundamentals-Structure, code, the user space, Encapsulated PS, Images, color Adobe acrobat. Page make-up software for desk top publishing - Word processing – heavy duty program, medium duty programs, light duty program, Graphic programs Optical Character Recognition (OCR) software, Different File formats- their features, and uses in printing - JPEG/JPG, TIFF, PNG, GIF,BMP, PDF, JDF, EPS, PSD, CRD, DOC/DOCX, PPT/PPTX. Creating/saving in different file formats with different application programs (eg, PSD - Photoshop, CDR - Corel draw, DOCX - MS Word etc).

COURSE OUTCOMES:

At the end of the course students will be able to

- Know about the basics of color and visual system.
- Calculate with printers' measurement system.
- Understand the principles of design.
- Correct the mistakes in a copy using different proofing stages.
- Handle different composition software.

TEXT BOOKS:

1. Speirs Hugh "Introduction to Prepress" Pira International, UK(1998).
2. David Bergsland "Printing in a Digital World " Delmar Publishing, Albany (1997)
3. Kleper M.L "Illustrated hand book of desk top publishing and type setting"Wind Crest, Pennsylvania. (1990)
4. N N Sarkar Art & Print production
5. Deborah L Stevenson Hand book of printing process

REFERENCE BOOKS:

1. Sohick (Cd)- Fundamentals of Copy & Layout- A.C. Book (Ac)
2. Craig- Production for the Graphic Designer
3. Muray (Ray)- How to brief designs & buy print
4. David A.Akar & John G. Myers.- Advertisement management
5. Arthur Robinson, Randall Sale & J.K. Morrison- Elements of Cartography.
6. Leon O Chus & Pen Min Lin C.A.- Copy Preparation

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 questionsfrom 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.

PT24 405	STRENGTH OF MATERIALS	3-1-0-3

PRE-REQUISITE: Nil

COURSE OBJECTIVES:

- To impart knowledge on common building materials and methods ofconstruction
- To enable the students to calculate stresses and strains generated in objects due to different kinds of forces**.**
- To provide the basic concepts and principles of strength of materials and to give an ability to analyze a given problem in a simple manner.
- To give an ability to calculate stresses and deformations of objects under external forces.
- Acquaint students with methods of calculating stress and strains due to torsion in shaft.

.

SYLLABUS

Module-I: (8 Hours)

General Introduction to Civil Engineering. Surveying principles and objectives- leveling definition principles –

Building materials –bricks/blocks, cement, concrete, steel - properties and types. Buildingconstruction - masonry, cement mortar, PCC and RCC

Foundations; Bearing capacity of soil; Functions of foundations, Types - shallow and deep.

Module-II: (10 Hours)

Introduction to analysis of deformable bodies- Stress – stresses due to normal, shear and bearing loads– strength design of simple members. Material behavior – uniaxial tension test –stress-strain diagrams concepts of orthotropy, anisotropy– Hooke's law for linearly elastic isotropic material under axial and shear deformation. Deformation in axially loaded bars – thermal effects – statically indeterminate problems – principle of superposition.

Module-III: **(10 Hours)**

Definition of stress and strain at a point (introduction to stress and strain tensors and its components only) – Poisson's ratio – biaxial and triaxial deformations – Bulk modulus - Relations between elastic constants. Shear force and bending moment diagrams by direct approach.Differential equations between loads, shear force and bending moment. Shear forceand bending moment diagrams.

Module-IV: **(10 Hours)**

Deflection of beams: Moment-curvature relation – assumptions and limitations - double integration method – Macaulay's method - superposition techniques – moment area method and conjugate beam ideas for simple cases. Stresses in beams: Pure bending – flexure formula. for beams assumptions and limitations – section modulus - flexural rigidity - economic sections.beam of uniform strength.

Module-V **(10 Hours)**

Torsion: Shafts -solid and hollow - torsion theory of elastic circular bars – assumptions and limitations– polar modulus - torsional rigidity shaft design for torsional load.

Theory of columns: Buckling theory –Euler's formula for long columns – assumptions and limitations– effect of end conditions - slenderness ratio – Rankin's formula for intermediate columns**.**

COURSE OUTCOMES*:*

On completion of the course the students will be able to

- Demonstrate basic knowledge on principles of surveying, common building materials and methods of construction.
- Apply theory of elasticity including strain/displacement and Hooke's law relationships.
- Determine shear force, bending moment, stresses and deflection in beams for basic types of loading.
- Calculate torsional stress in solid and hollow circular shafts.
- Calculate critical load and stress during column buckling.

TEXT BOOKS:

1. Rattan, Strength of Materials, 2e McGraw Hill Education India, 2011
2. Mechanics of Materials, R C Hibbeler, Prentice Hall Publication.
3. R. K. Bansal, Mechanics of solids, Laxmi Publications, 2004

REFERENCE BOOKS:

1. Timoshenko, Strength of Materials, Vol I and Vol II, CBS Publishers & Distributors, New Delhi.
2. S. Jose, Sudhi Mary Kurian, Mechanics of Solids, Pentagon, 2015
3. F. Beer, E. R. Johnston, J. T. DeWolf, Mechanics of Materials, Tata McGraw Hill, 2011
4. E. P. Popov, T. A. Balan, Engineering Mechanics of Solids, Pearson Education,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 questionsfrom 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 realize 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 federalsystem.
- To learn procedure and effects of emergency, composition and activities of electioncommission 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:

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

- To understand the emergence and evolution of Indian Constitution.
- To understand the structure and composition of Indian Constitution.
- To understand and analyse federalism in the Indian context.
- To understand and analyse the three organs of the state in the contemporary scenario.
- To understand and 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, 14e, 2017

REFERENCE BOOKS:

1. Ethics and Politics of the Indian Constitution Rajeev Bhargava Oxford UniversityPress, 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, 51e, 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, problem solving, group discussions, quiz,literature survey, seminar, term-project etc.

10% - Attendance and regularity in the class

PT24 407A	Fundamentals of Printing & Packaging Technology	3-0-0-3

PRE-REQUISITES: Nil

COURSE OBJECTIVES:

- To learn about the history of Printing and Packaging Technology
- To understand the principles of design
- To be familiar with various printing processes
- To acquire knowledge on the basics of packaging.
- To learn various stages in printing and packaging workflow.

SYLLABUS

Module-I: **(12 Hours)**

Introduction – History, Evolution of Printing Technology; Need and importance of Printing in human history ; Technological Developments; History of Packaging, Materials used in Ancient Era, Modern Packaging Industry, Recent Developments in Printing and Packaging Technology.

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

Basic concepts of designing, Creativity, Steps in creativity; Typography; Visual ingredients of graphic design; Design consideration; Symbols and logos. Layout – purpose & advantages; layout styles; layout components; stages in preparing a layout; Marking-up; Dummy, Designing For Media, Case studies.

Module-III: **(10 Hours)**

Types of process – Letterpress, Offset, Gravure, Flexography, Screen printing, Digital Printing Processes; Overview on image carrier preparation and finishing operations for different types of printing process.

Module-IV: **(10 Hours)**

Packaging – Types, Functions; Packaging Materials; Package Design Considerations; Packaging Applications – Food, Healthcare, Industrial and FMCG Products ; Environmental and Sustainability issues

Module-V **(10 Hours)**

Relationship between designer, customer and printer; selection and co-ordination of production process; selection and specification of ink, paper and other materials; Package development Process – Specifications, Package Designers Checklist, Managing Package function, Package Design and Marketing studies

COURSE OUTCOMES:

At the end of the course students will be able to

- Explain the history and evolution of Printing and Packaging technology
- Create layouts and designs for various printing and packaging products.
- Identify the key characteristics of each printing process.
- Comprehend the basics of packaging technology.
- Manage production in printing and packaging industry

TEXT BOOKS:

1. Helmutt Kipphan, Handbook of Print Media, Springer, Heidelberg, 2000
2. Walter Soroka, Fundamentals of Packaging Technology, Institute of packaging professionals, Fifth Edition, 2014.

REFERENCE BOOKS:

1. Pamela Mortimer, Document Design Primer, GATF, 2003
2. Poppy Evans and Mark A.Thomas, Exploring the Elements of Design, Delmar Publishers, 2004

3. Robin McAllister, Design for Production, Delmar Publishers, 1997
4. T. M. Adams, D.D. Faux and L. T. Ricber, Printing Technology, Delmar Publications Inc., 1996
5. Aaris Sherin, Irina Lee, Poppy Evans, The Graphic Design Reference & Specification Book, Rockport Publishers, 2013

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 questionsfrom 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.

PT24 407B	Pre-press& Imaging Technology	3-0-0-3

PRE-REQUISITES: Nil

COURSE OBJECTIVES:

- To introduce the techniques in text encoding, representation and storage.
- To learn the file formats and processing of text, graphics and image in prepress.
- To comprehend the stages in digital prepress workflow.
- To explain the various halftoning techniques.
- To understand the working principle of imaging and output devices in prepress.

SYLLABUS

Module-I: (10 Hours)

Text encoding - ASCII, Unicode; Text compression; Typeface - Anatomy, Taxonomy, Measurement, Classification, Typeface family; Type spacing; Font - Types, Design, Metrics; Font engine and rasterization - Hinting, Antialiasing, subpixel rendering; Font embedding; Font management; Web fonts; Typography; Typesetting; Copy editing; Proof reading; ISO standards.

Module-II: (10 Hours)

Originals for reproduction; Raster and vector images; Digital Image acquisition; Image sensors - PMT, CCD, CMOS; Scanner - Working Principle, Types; Digital Camera - Working Principle, types; Image acquisition factors - Dynamic range, Resolution, Tone value quantization, Storage, Compression Techniques, File formats; Digital Image Processing.

Module-III: (10 Hours)

Page layout - Components, software; Postscript; PDF; Pre-flighting, Trapping, Proofing, Imposition - Job planning considerations, Imposition schemes, Imposition sheet, Allowances, Software; Raster image processors - structure, functions; Workflow management, Archiving, Versioning, Digital Asset Management; Management Information Systems - CIP4, JDF;

Module-IV: (12 Hours)

Halftone - Need, Screen ruling, Dot shape, Screen angle, Rosette, Moire, Transferable tonal range, Tone value sum, Tone value increase; Screening process - Conventional, Amplitude modulation, Frequency modulation, Intensity modulation, Hybrid screening; Digital Halftoning - Thresholding, Dithering, Clustered dots, Dispersed dots, Error diffusion; Quality - Resolution, Gray levels; Digital Screening technologies - Rational Tangent, Supercell, Irrational**.**

Module-V (10 Hours)

Laser sources - Types, Selection; Modulation - Direct, Acousto-optic, Electro-Optic, Spatial; Lens and lens aberrations; Platesetters - Principle, Types; Densitometry - Optical density, Neugebauer, Murray Davies equations;

Densitometer, Dotmeter - Components, Working principle; Quality control in platemaking; ISO standards

COURSE OUTCOMES:

At the end of the course students will be able to

- Apply typographic principles in graphic design and solve problems in font handling.
- Summarize the working principle of image acquisition devices and factors affecting image quality
- Create imposition schemes and determine the job sequence, software and hardware requirements in prepress workflow
- Explain the need for halftoning, compare the digital halftoning and screening technologies and choose appropriate settings in RIP.
- Describe the components and construction of imaging devices, measuring devices and apply quality standards in prepress.

TEXT BOOKS:

1. Helmut Kipphan, Handbook of Print Media, Springer-Verlag, 2001.
2. Kaj Johansson, Peter Lundberg, Robert Ryberg, A Guide to Graphic Print Production, Wiley,3rd edition,2011

REFERENCE BOOKS:

1. Daniel L. Lau, Gonzalo R. Arce, Modern Digital Halftoning, CRC Press, Second Edition, 2001.
2. Gerald F. Marshall and Glenn E. Stutz, Handbook of Optical and Laser Scanning, CRC Press, 2004.
3. Phil Green, Understanding digital colour, Blueprint, 1995.

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 questionsfrom 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.

PT24 408 (P)	PRINT PRODUCTION LAB	0-0-3-1

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

- To know about settings of infeed system.
- Demonstrate proficiency in operating offset printing machine.
- Understand the principles and fundamentals of web offset printing press.
- To Select appropriate printing materials, substrate &consumables.
- To identify & troubleshoot common printing issues.

SYLLABUS:

List of Experiments

(A minimum of 8 experiments must be conducted**)**

1. Familiarization of printing equipment's, conventional methods of printing.
2. Understanding different chemicals for offset printing process.
3. Process color printing in offset machine.
4. Setting the feeder board, lays and delivery of sheet fed offset machine.
5. Mounting of plate and blanket.
6. Setting of inking system.

7. Setting of dampening system.
8. Roller and cylinder pressure setting.
9. Taking single color print from sheet fed offset machine.
10. Taking multi color print from sheet fed offset machine.
11. Preparation of imposition for web offset printing and newspaper.
12. Study of pre-make ready &make-ready operations of web offset machine.
13. To obtain single color print from web offset machine.
14. To obtain multi color print from web offset machine.

COURSE OUTCOMES:
At the end of the course students will be able to

- Identify the process colors and its combinations used in Printing.
- Identify and handle the infeed unit of the Sheet fed machine.
- Manage the Inking and dampening system of the Printing Machine.
- Take printout of a single-color copy.
- Handle the Web-Offset machine

Internal Continuous Assessment (Maximum Marks-50)

60% - Laboratory practical, record and Viva voce

30% - Tests

10% - Attendance and regularity in the lab

Semester End Examination (Maximum Marks-100)

70% - Procedure, conducting experiment, result, tabulation, and inference

20% - Viva voce

10% - Fair record

PT24 409 (P)	MACHINE DRAWING LAB	0-0-3-1

PRE-REQUISITES: Engineering Graphics

COURSE OBJECTIVES:

- This section helps the students to practice part drawings, production drawing,
- To draw line drawing of printing machines.
- To developing drawing skills.
- To assembly drawing.

SYLLABUS:

List of Drawings
(A minimum of 12 drawing sheet must be completed)

Module-1

Introduction to Fasteners: -

a. Screwed fasteners, Bolts and foundation Bolts.
b. Welded joints
c. Rivets & riveted joints.

Module-II

Introduction to power transmission systems: -

a. Couplings
b. Pulleys
c. Keys
d. Bearings: - Journal, Roller

Module-III

Assembly Drawings

a. Lathe Parts: - Tail Stock, Tool Post, and Carriage.
b. Valves – Stop valves, Safety valves
c. Miscellaneous Machine Elements- C-clamp, Bench-vice, Screw jack, Machine vice

Module-IV

Drawings of Printing Machines

a. Simple exercises using Auto CAD
b. Line Drawing exercise of various machines

COURSE OUTCOMES*:*

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

- Acquire the knowledge of various standards and specifications about standard machine components.
- Make drawings of assemblies with the help of part drawings given.
- Ability to select, configure and synthesize mechanical components into assemblies.
- Draw machine parts using software.

TEXT BOOKS:

1. N.D. Bhatt and Panchal, Machine Drawing, Charator Publishing House.
2. K.L. Narayana, P. Kannaiah& K. Venkata Reddy, Machine Drawing, New Age Publishers,2009
3. GautamPohit& Gautam Ghosh, Machine Drawing with AUTO CAD, Pearson Education, New Delhi.
4. K.C. John, Machine Drawing, Jet Publications, Thrissur.

REFERENCE BOOKS

1. N.D. Junnarkar, Machine Drawing, Pearson Education, New Delhi.
2. P.I. Vargheese, Machine Drawing, VIP Publishers, Thrissur.
3. E. Radhakrishnan Fundamentals of Engineering Thermodynamics, PHI,2005.
4. M.A Achuthan, Engineering Thermodynamics, PHI, 2004.
5. Holman J.P, Thermodynamics, McGraw Hill, 2004.

Internal Continuous Assessment (Maximum Marks-50)

60% - Drawing Sheet

30% -Test

10% - Attendance and regularity in the class

Semester End Examination (Maximum Marks-100)

70% - Procedure, conducting experiment, result, tabulation, and inference

20% - Viva voce

10% - Fair record.