ANNA UNIVERSITY, CHENNAI
UNIVERSITY DEPARTMENTS
B.E PRINTING AND PACKAGING TECHNOLOGY
REGULATIONS – 2019
CHOICE BASED CREDIT SYSTEM

THE VISION OF THE DEPARTMENT OF PRINTING TECHNOLOGY:
To achieve excellence in imparting knowledge based skill-sets emphasizing professionalism, research and ethics to meet the challenges of the future trends and emerging needs of Printing and Packaging industry.

THE MISSION OF THE DEPARTMENT OF PRINTING TECHNOLOGY:
- To evolve into a Centre of Excellence in Printing, Packaging and Publishing education, training and research.
- To provide reliable technology services for fulfilling the dynamic needs of industry and society.
- To impart knowledge, promote innovation and develop life skills.
- To produce competent engineers and lifelong learners.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):
Printing Technology graduates are expected after graduation to the following (PEOs):
1. Have expertise in the field of printing, packaging & allied areas
2. Have successful career with high ethical standards to meet the industrial & societal needs.
3. Adapt to evolving technologies through life-long learning.
4. Practice profession with good communication and leadership skills.
5. Contribute to technology development through academic research and industrial practices.

PROGRAMME OUTCOMES (POs):

Engineering Graduates will be able to:

PO#	Graduate Attributes	Programme Outcomes
1	Engineering knowledge	Apply knowledge of mathematics, basic science and engineering science.
2	Problem analysis	Identify, formulate and solve Printing, Packaging and Publishing problems.
3	Design/development of solutions	Design a system or process to suit the needs.
4	Conduct investigations of complex problems	Conduct experiments & collect, analyze and interpret the data.
5	Modern tool usage	Apply various tools and techniques for effective production.
6	The Engineer and society	Conduct themselves to uphold the professional and social obligations.
7	Environment and sustainability	Design the product and system with environmental consciousness and sustainable development.
8	Ethics	Uphold ethical values in industry, business and society.
9	Individual and team work	Be an effective team player using individual attributes.
10	Communication	Acquire proficiency in oral and written communication.

11	Project management and finance	Implement cost effective and improved system.
12	Life-long learning	Pursue professional development and learning as a life-long activity.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

1. To develop professionals of high learning capabilities to cater to the needs of contemporary and emerging trends in the printing and packaging industry.
2. To enable the industry to advance further with the help of qualified personnel.

Program Educational Objectives	**Programme Outcomes**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	√	√	√	√	√		√				√	√
2	√	√	√	√	√	√	√	√	√	√	√	√
3	√	√	√	√	√		√					√
4						√	√	√	√	√	√	√
5	√	√	√	√	√		√		√			√

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES													
			PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
YEAR 1	**SEM 1**	Technical English												
		Engineering Mathematics - I												
		Engineering Physics												
		Engineering Chemistry												
		Engineering Graphics												
		Basic Sciences Laboratory												
		Workshop Practices Laboratory	✓	✓	✓	✓								
	SEM 2	Professional Communication												
		Engineering Mathematics - II												
		Problem Solving and Python Programming	✓	✓	✓	✓	✓			✓	✓			✓
		Basics of Electrical and Electronics Engineering	✓	✓	✓	✓	✓							
		Engineering Mechanics	✓		✓									
		Chemistry for Printing Technology	✓				✓							
		Problem Solving and Python Programming Laboratory	✓	✓	✓	✓	✓			✓	✓			✓
		Electrical and Electronics Engineering Laboratory	✓	✓	✓	✓					✓		✓	

		Transform Techniques and Partial Differential Equations												
	SEM 3	Mechanics of Materials	✓	✓	✓	✓	✓				✓			
		Fundamentals of Printing and Packaging Technology	✓	✓	✓	✓	✓				✓		✓	✓
		Pre-press and Imaging Technology	✓	✓	✓	✓	✓							✓
YEAR 2		Digital Prepress Laboratory I	✓	✓	✓	✓	✓				✓	✓		✓
		Materials Testing Laboratory	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	SEM 4	Total Quality Management	✓	✓		✓	✓						✓	✓
		Colour Reproduction	✓	✓	✓	✓	✓							✓
		Flexography and Converting Process	✓	✓	✓		✓	✓	✓				✓	
		Mechatronics	✓	✓	✓		✓				✓			
		Paper and Board Technology	✓	✓	✓	✓	✓		✓				✓	✓
		Offset Printing Technology	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
		Printing Machine Laboratory	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
		Digital Prepress Laboratory II	✓	✓	✓	✓	✓				✓	✓	✓	✓

	SEM 5	Costing and Estimating for Printing and Packaging	✓	✓	✓	✓	✓						✓	✓
		Packaging Materials	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓
		Inks and Coatings	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
		Package Design Laboratory	✓	✓	✓		✓	✓	✓			✓		
		Printing and Packaging Quality Control Laboratory	✓	✓	✓	✓							✓	
		Industrial Training/ Internship	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
YEAR 3	SEM 6	Environmental Sciences	✓	✓		✓	✓			✓		✓		
		Packaging Techniques and Processes	✓	✓	✓	✓			✓				✓	✓
		Print Finishing	✓	✓	✓	✓	✓		✓		✓	✓		✓
		Gravure and Screen Printing	✓	✓	✓	✓								
		Colour Reproduction and Management Laboratory	✓	✓	✓	✓	✓				✓	✓		✓
		Print Finishing Laboratory	✓	✓	✓		✓	✓		✓	✓	✓	✓	

YEAR 4	**SEM 7**	Electronic Publishing	✓	✓	✓	✓	✓				✓	✓	✓	✓
		Print Operations Management	✓	✓	✓	✓	✓	✓					✓	✓
		Digital Printing	✓	✓				✓	✓				✓	
		Crossmedia Publishing Laboratory	✓	✓	✓		✓				✓	✓	✓	✓
		Project I	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	SEM 8	Project II	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

ANNA UNIVERSITY, CHENNAI
UNIVERSITY DEPARTMENTS
B.E. PRINTING AND PACKAGING TECHNOLOGY
REGULATIONS – 2019
CHOICE BASED CREDIT SYSTEM
CURRICULA AND SYLLABI FOR I - VIII SEMESTERS

SEMESTER I

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	Periods per Week			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	HS5151	Technical English	HSMC	4	0	0	4	4
2	MA5158	Engineering Mathematics - I	BSC	3	1	0	4	4
3	PH5151	Engineering Physics	BSC	3	0	0	3	3
4	CY5151	Engineering Chemistry	BSC	3	0	0	3	3
5	GE5151	Engineering Graphics	ESC	1	0	4	5	3
PRACTICAL								
6	BS5161	Basic Sciences Laboratory	BSC	0	0	4	4	2
7	GE5162	Workshop Practices Laboratory	ESC	0	0	4	4	2
			TOTAL	**14**	**1**	**12**	**27**	**21**

SEMESTER II

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	Periods per Week			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	HS5251	Professional Communication	HSMC	4	0	0	4	4
2	MA5252	Engineering Mathematics - II	BSC	3	1	0	4	4
3	GE5153	Problem Solving and Python Programming	ESC	3	0	0	3	3
4	EE5251	Basics of Electrical and Electronics Engineering	ESC	3	0	0	3	3
5	GE5152	Engineering Mechanics	ESC	3	1	0	4	4
6	CY5201	Chemistry for Printing Technology	BSC	3	0	0	3	3
PRACTICAL								
7	GE5161	Problem Solving and Python Programming Laboratory	ESC	0	0	4	4	2
8	EE5261	Electrical and Electronics Engineering Laboratory	ESC	0	0	4	4	2
			TOTAL	**19**	**2**	**8**	**29**	**25**

SEMESTER III

S. NO	COURSE CODE	COURSE TITLE	CATEGORY	Periods per Week			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.		Elective – Humanities I	HSMC	3	0	0	3	3
2.	MA5355	Transform Techniques and Partial Differential Equations	BSC	3	1	0	4	4
3.	ML5352	Mechanics of Materials	ESC	3	0	0	3	3
4.	PT5301	Fundamentals of Printing and Packaging Technology	PCC	3	0	0	3	3
5.	PT5302	Pre-press and Imaging Technology	PCC	3	0	0	3	3
PRACTICAL								
6.	PT5311	Digital Prepress Laboratory I	PCC	0	0	4	4	2
7.	ML5312	Materials Testing Laboratory	PCC	0	0	4	4	2
			TOTAL	**15**	**1**	**8**	**24**	**20**

SEMESTER IV

S.No	COURSE CODE	COURSE TITLE	CATEGORY	Periods per Week			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1		Elective – Humanities II	HSMC	3	0	0	3	3
2	PT5401	Colour Reproduction	PCC	3	0	0	3	3
3	PT5402	Flexography and Converting Process	PCC	3	0	0	3	3
4	ME5752	Mechatronics	ESC	3	0	0	3	3
5	PT5403	Paper and Board Technology	PCC	3	0	0	3	3
6	PT5404	Offset Printing Technology	PCC	3	0	0	3	3
PRACTICAL								
7	PT5411	Printing Machine Laboratory	PCC	0	0	4	4	2
8	PT5412	Digital Prepress Laboratory II	PCC	0	0	4	4	2
			TOTAL	**18**	**0**	**8**	**26**	**22**

SEMESTER V

S.No	COURSE CODE	COURSE TITLE	CATEGORY	Periods per Week			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	GE5451	Total Quality Management	HSMC	3	0	0	3	3
2.	PT5501	Costing and Estimating for Printing and Packaging	PCC	3	0	0	3	3
3.	PT5502	Packaging Materials	PCC	3	0	0	3	3
4.	PT5503	Inks and Coatings	PCC	3	0	0	3	3
5.		Professional Elective I	PEC	3	0	0	3	3
6.		Audit Course – I*	AC	3	0	0	3	0
PRACTICAL								
7.	PT5511	Package Design Laboratory	PCC	0	0	4	4	2
8.	PT5512	Printing and Packaging Quality Control Laboratory	PCC	0	0	4	4	2
9.	PT5513	Industrial Training/Internship**	EEC	0	0	4	4	2
			TOTAL	**18**	**0**	**12**	**30**	**21**

*Audit course is optional.

** The students will undergo industrial training / Internship during previous vacation

SEMESTER VI

S.No	COURSE CODE	COURSE TITLE	CATEGORY	Periods per Week			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	GE5251	Environmental Sciences	BSC	3	0	0	3	3
2.	PT5601	Packaging Techniques and Processes	PCC	3	0	0	3	3
3.	PT5602	Print Finishing	PCC	3	0	0	3	3
4.	PT5603	Gravure and Screen Printing	PCC	3	0	0	3	3
5.		Professional Elective II	PEC	3	0	0	3	3
6.		Open Elective I	OEC	3	0	0	3	3
7.		Audit Course – II*	AC	3	0	0	3	0
PRACTICAL								
8.	PT5611	Colour Reproduction and Management Laboratory	PCC	0	0	4	4	2
9.	PT5612	Print Finishing Laboratory	PCC	0	0	4	4	2
			TOTAL	**21**	**0**	**8**	**29**	**22**

*Audit course is optional.

SEMESTER VII

S.No	COURSE CODE	COURSE TITLE	CATEGORY	Periods per Week			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	PT5701	Electronic Publishing	PCC	3	0	0	3	3
2.	PT5702	Print Operations Management	PCC	3	0	0	3	3
3.	PT5703	Digital Printing	PCC	3	0	0	3	3
4.		Professional Elective III	PEC	3	0	0	3	3
5.		Professional Elective IV	PEC	3	0	0	3	3
6.		Open Elective II	OEC	3	0	0	3	3
PRACTICAL								
7.	PT5711	Crossmedia Publishing Laboratory	PCC	0	0	4	4	2
8.	PT5712	Project I	EEC	0	0	6	6	3
			TOTAL	**18**	**0**	**10**	**28**	**23**

SEMESTER VIII

S.No	COURSE CODE	COURSE TITLE	CATEGORY	Periods per Week			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1		Professional Elective V	PEC	3	0	0	3	3
2		Professional Elective VI	PEC	3	0	0	3	3
PRACTICAL								
3	PT5811	Project II	EEC	0	0	16	16	8
			TOTAL	**6**	**0**	**16**	**22**	**14**
							TOTAL CREDITS	**168**

HUMANITIES AND SOCIAL SCIENCES (HSMC) – MANAGEMENT AND OTHERS

Sl. No	Course Code	Course Title	Periods per week			Credits	Semester
			L	T	P		
1.	HS5151	Technical English	4	0	0	4	1
2.	HS5251	Professional Communication	3	1	0	4	2
3.	GE5451	Total Quality Management	3	0	0	3	3

HSMC– ELECTIVES – HUMANITIES I (ODD SEMESTER)

Sl. No	Course Code	Course Title	Periods per week			Credits
			Lecture	Tutorial	Practical	
1.	HU5171	Language and Communication	3	0	0	3
2.	HU5172	Values and Ethics	3	0	0	3
3.	HU5173	Human Relations at Work	3	0	0	3
4.	HU5174	Psychological Process	3	0	0	3
5.	HU5175	Education, Technology and Society	3	0	0	3
6.	HU5176	Philosophy	3	0	0	3
7.	HU5177	Applications of Psychology in Everyday Life	3	0	0	3

HSMC– ELECTIVES – HUMANITIES II (EVEN SEMESTER)

Sl. No	Course Code	Course Title	Periods per week			Credits
			Lecture	Tutorial	Practical	
1.	HU5271	Gender Culture and Development	3	0	0	3
2.	HU5272	Ethics and Holistic Life	3	0	0	3
3.	HU5273	Law and Engineering	3	0	0	3
4.	HU5274	Film Appreciation	3	0	0	3
5.	HU5275	Fundamentals of Language and Linguistics	3	0	0	3
6.	HU5276	Understanding Society and Culture through Literature	3	0	0	3

BASIC SCIENCE COURSE [BSC]

Sl. No	Course Code	Course Title	Periods per week			Credits	Semester
			L	T	P		
1.	MA5158	Engineering Mathematics - I	3	1	0	4	1
2.	PH5151	Engineering Physics	3	0	0	3	1
3.	CY5151	Engineering Chemistry	3	0	0	3	1
4.	BS5161	Basic Sciences Laboratory	0	0	4	2	1
5.	MA5252	Engineering Mathematics - II	3	1	0	4	2
6.	CY5201	Chemistry for Printing Technology	3	0	0	3	2
7.	MA5355	Transform Techniques and Partial Differential Equations	3	1	0	4	3
8.	GE5251	Environmental Sciences	3	0	0	3	6

ENGINEERING SCIENCE COURSE [ESC]

Sl. No	Course Code	Course Title	Periods per week			Credits	Semester
			Lecture	Tutorial	Practical		
1.	GE5151	Engineering Graphics	1	0	4	3	1
2.	GE5162	Workshop Practices Laboratory	0	0	4	2	1
3.	GE5153	Problem Solving and Python programming	3	0	0	3	2
4.	EE5251	Basics of Electrical and Electronics Engineering	3	0	0	3	2
5.	GE5152	Engineering Mechanics	3	0	0	3	2
6.	EE5261	Electrical and Electronics Engineering Laboratory	0	0	4	2	2
7.	GE5161	Problem Solving and Python Programming Laboratory	0	0	4	2	2
8.	ML5352	Mechanics of Materials	3	0	0	3	2
9.	ME5752	Mechatronics	3	0	0	3	4

PROFESSIONAL CORE COURSES [PCC]

Sl. No.	Course Code	Course Title	Periods per week			Credits	Semester
			L	T	P		
1.	PT5301	Fundamentals of Printing and Packaging Technology	3	0	0	3	3
2.	PT5302	Pre-press and Imaging Technology	3	0	0	3	3
3.	PT5311	Digital Prepress Laboratory I	0	0	4	2	3
4.	ML5312	Materials Testing Laboratory	0	0	4	2	3
5.	PT5401	Colour Reproduction	3	0	0	3	4
6.	PT5402	Flexography and Converting Process	3	0	0	3	4
7.	PT5403	Paper and Board Technology	3	0	0	3	4

8.	PT5404	Offset Printing Technology	3	0	0	3	4
9.	PT5411	Printing Machine Laboratory	0	0	4	2	4
10.	PT5512	Digital Prepress Laboratory II	0	0	4	2	4
11.	PT5501	Costing and Estimating for Printing and Packaging	3	0	0	3	5
12.	PT5502	Packaging Materials	3	0	0	3	5
13.	PT5503	Inks and Coatings	3	0	0	3	5
14.	PT5511	Package Design Laboratory	0	0	4	2	5
15.	PT5512	Printing and Packaging Quality Control Laboratory	0	0	4	2	5
16.	PT5601	Packaging Techniques and Processes	3	0	0	3	6
17.	PT5602	Print Finishing	3	0	0	3	6
18.	PT5603	Gravure and Screen Printing	3	0	0	3	6
19.	PT5611	Colour Reproduction and Management Laboratory	0	0	4	2	6
20.	PT5612	Print Finishing Laboratory	0	0	4	2	6
21.	PT5701	Electronic Publishing	3	0	0	3	7
22.	PT5702	Print Operations Management	3	0	0	3	7
23.	PT5703	Digital Printing	3	0	0	3	7
24.	PT5711	Crossmedia Publishing Laboratory	0	0	4	2	7

PROFESSIONAL ELECTIVE COURSES

SEMESTER V, ELECTIVE I

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	PT5001	Colour Management System	PEC	3	0	0	3	3
2.	PT5002	Display and Signage Printing	PEC	3	0	0	3	3
3.	PT5003	Newspaper and Periodical Publishing	PEC	3	0	0	3	3
4.	MF5071	Processing of Plastics	PEC	3	0	0	3	3

SEMESTER VI, ELECTIVE II

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	PT5004	Web Offset Printing Technology	PEC	3	0	0	3	3
2.	PT5005	Digital Media Management	PEC	3	0	0	3	3
3.	PT5006	3D Printing	PEC	3	0	0	3	3
4.	IE5076	Safety Engineering and Management	PEC	3	0	0	3	3
5.	GE5076	Professional Ethics in Engineering	PEC	3	0	0	3	3

SEMESTER VII, ELECTIVE III

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	PT5007	Digital Data Handling	PEC	3	0	0	3	3
2.	PT5008	Printing Machine Design	PEC	3	0	0	3	3
3.	PT5009	Book Publishing	PEC	3	0	0	3	3
4.	ME5076	Marketing Management	PEC	3	0	0	3	3
5.	PT5010	Advertising Techniques	PEC	3	0	0	3	3

SEMESTER VII, ELECTIVE IV

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	PT5011	Quality Control in Printing and Packaging	PEC	3	0	0	3	3
2.	PT5012	Visual Communication	PEC	3	0	0	3	3
3.	PT5013	Healthcare Packaging	PEC	3	0	0	3	3
4.	IE5653	Reliability Engineering	PEC	3	0	0	3	3
5.	PT5014	Printed Electronics	PEC	3	0	0	3	3

SEMESTER VIII, ELECTIVE V

S.No	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	PT5015	Security Printing	PEC	3	0	0	3	3
2.	PT5016	Mass Communication	PEC	3	0	0	3	3
3.	PT5017	Packaging Applications	PEC	3	0	0	3	3
4.	MF5072	Sustainable Manufacturing	PEC	3	0	0	3	3
5.	PT5018	Speciality Printing	PEC	3	0	0	3	3

SEMESTER VIII, ELECTIVE VI

S.No	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	PT5019	Package Design and Standards	PEC	3	0	0	3	3
2.	PT5020	Creativity and Innovation in Printing and Packaging	PEC	3	0	0	3	3
3.	PT5021	Printing and Packaging Machinery Maintenance	PEC	3	0	0	3	3
4.	ME5075	Entrepreneurship Development	PEC	3	0	0	3	3

AUDIT COURSES (AC)

Registration for any of these courses is optional to students

Sl. No	Course Code	Course Title	Periods per week			Total Contact Periods	Credits
			L	T	P		
1.	AD5091	Constitution of India	3	0	0	3	0
2.	AD5092	Value Education	3	0	0	3	0
3.	AD5093	Pedagogy Studies	3	0	0	3	0
4.	AD5094	Stress Management by Yoga	3	0	0	3	0
5.	AD5095	Personality Development Through Life Enlightenment Skills	3	0	0	3	0
6.	AD5096	Unnat Bharat Abhiyan	3	0	0	3	0
7.	AD5097	Essence of Indian Knowledge Tradition	3	0	0	3	0
8.	AD5098	Sanga Tamil Literature Appreciation	3	0	0	3	0

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

Sl. No.	Course Code	Course Title	Periods per week			Credits	Semester
			Lecture	Tutorial	Practical		
1	PT5513	Industrial Training/ Internship*	0	0	4	2	4
2	PT5712	Project I	0	0	6	3	7
3	PT5811	Project II	0	0	16	8	8

B.E. Printing and Packaging Technology										
Sl. No.	**Subject Area**	I	II	III	IV	V	VI	VII	VIII	**Credits**
1	HSMC	4	4	3	3	3	0	0	0	17
2	BSC	12	7	4	0	0	3	0	0	26
3	ESC	5	14	5	3	0	0	0	0	27
4	PCC	0	0	8	16	13	13	11	0	61
5	PEC	0	0	0	0	3	3	6	6	18
6	OEC	0	0	0	0	0	3	3	0	6
7	EEC	0	0	0	0	2	0	3	8	13
8	AC	0	0	0	0	0	0	0	0	0
	Total	**21**	**25**	**20**	**22**	**21**	**22**	**23**	**14**	**168**

HS5151 TECHNICAL ENGLISH L T P C
4 0 0 4

COURSE OBJECTIVES:

The first semester English course entitled 'Technical English' aims to,

- Familiarise first year students of engineering and technology with the fundamental aspects of technical English.
- Develop all the four language skills by giving sufficient practice in the use of the skills in real life contexts.
- Enhance the linguistic and communicative competence of first year engineering and technology students.

UNIT I INTRODUCING ONESELF 12

Listening: Listening and filling a form, listening to speeches by specialists from various branches of engineering and completing activities such as answering questions, identifying the main ideas of the listening text, style of the speaker (tone and tenor) – **Speaking**: Introducing oneself –introducing friend/ family - **Reading:** Descriptive passages (from newspapers / magazines)- **Writing**: Writing a paragraph (native place, school life)- **Grammar:** Simple present, present continuous – **Vocabulary Development**: One word substitution

UNIT II DIALOGUE WRITING 12

Listening: Listening to conversations (asking for and giving directions) –**Speaking:** making conversation using (asking for directions, making an enquiry), Role plays-dialogues- **Reading:** Reading a print interview and answering comprehension questions-**Writing**: Writing a checklist, Dialogue writing- **Grammar**: Simple past – question formation (Wh- questions, Yes or No questions, Tag questions)- **Vocabulary Development**: Stress shift, lexical items related to the theme of the given unit.

UNIT III FORMAL LETTER WRITING 12

Listening: Listening to speeches by famous people and identifying the central message of the speech – answering multiple-choice questions)-**Speaking:** Giving short talks on a given topic-**Reading:** Reading motivational essays on famous engineers and technologists (answering open-ended and closed questions)- **Writing:** Writing formal letters/ emails (Complaint letters)-**Grammar**: Future Tense forms of verbs, subject and verb agreement-**Vocabulary Development**: Collocations – Fixed expressions

UNIT IV WRITING COMPLAINT LETTERS 12

Listening: Listening to short talks (5 minutes duration and fill a table, gap-filling exercise) note taking/note making- **Speaking:** Small group discussion, giving recommendations-**Reading:** Reading problem – solution articles/essays drawn from various sources- **Writing:** Making recommendations – Writing a letter/ sending an email to the Editor- note making- **Grammar:** Modals – Phrasal verbs – cause and effect sentences- **Vocabulary Development**: Connectives, use of cohesive devices in writing, technical vocabulary.

UNIT V WRITING DEFINITIONS AND PRODUCT DESCRIPTION 12

Listening: Listening to a product description (labeling and gap filling) exercises- **Speaking:** Describing a product and comparing and contrasting it with other products- **Reading**: Reading graphical material for comparison (advertisements)-**Writing:** Writing Definitions (short and long) – compare and contrast paragraphs- **Grammar:** Adjectives – Degrees of comparison - compound nouns- **Vocabulary Development**: Use of discourse markers – suffixes (adjectival endings).

TOTAL : 45 PERIODS

LEARNING OUTCOMES

At the end of the course the students will have gained,

- Exposure to basic aspects of technical English.
- The confidence to communicate effectively I various academic situations.
- Learnt the use of basic features of Technical English.

TEXT BOOK:

1. Revised Edition of 'English for Engineers and Technologists' Volume 1 published by Orient Black Swan Limited 2019.

ASSESSMENT PATTERN

- Assessments will assess all the four skills through both pen and paper and computer based tests.
- Assessments can be pen and paper based, quizzes.

MA5158	ENGINEERING MATHEMATI CS – I	L	T	P	C
	(Common to all branches of B.E. / B.Tech. Programmes in I Semester)	**3**	**1**	**0**	**4**

COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

UNIT I MATRICES 12

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of eigenvalues and eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

UNIT II DIFFERENTIAL CALCULUS 12

Limit of function – One sided limit – Limit Laws – Continuity – left and right continuity – types of discontinuities – Intermediate Value Theorem – Derivatives of a function - Differentiation rules – Chain rule – Implicit differentiation – logarithmic differentiation – Maxima and minima – Mean value theorem – (Optional: Polar coordinate system – Differentiation in polar coordinates).

UNIT III FUNCTIONS OF SEVERAL VARIABLES 12

Partial derivatives – Homogeneous functions and Euler's theorem – Total derivative – Differentiation of implicit functions – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Errors and approximations – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT IV INTEGRAL CALCULUS 12

Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT V MULTIPLE INTEGRALS 12

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.

TOTAL :60 PERIODS

COURSE OUTCOMES:

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

- Use the matrix algebra methods for solving practical problems.
- Apply differential calculus tools in solving various application problems.
- Able to use differential calculus ideas on several variable functions.
- Apply different methods of integration in solving practical problems.
- Apply multiple integral ideas in solving areas, volumes and other practical problems.

TEXT BOOKS:

1. Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, 44th Edition, New Delhi, 2017.
2. James Stewart, "Calculus with Early Transcendental Functions", Cengage Learning, 6th Edition, New Delhi,2013.
3. Joel Hass, Christopher Heil and Maurice D.Weir, "Thomas' Calculus", Pearson, 14th Edition, New Delhi, 2018.
4. Narayanan S. and Manicavachagom Pillai T. K., “Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.

REFERENCES:

1. Bali N., Goyal M. and Watkins C., “Advanced Engineering Mathematics”, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), 7th Edition, New Delhi, 2009.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2015.
3. Greenberg M.D., “Advanced Engineering Mathematics”, Pearson Education2nd Edition, 5th Reprint, Delhi, 2009.
4. Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”,Narosa Publications, 5th Edition, New Delhi, 2017.
5. Peter V.O’Neil, “Advanced Engineering Mathematics”, Cengage Learning India Pvt., Ltd, 7th Edition, New Delhi , 2012.
6. Ramana B.V., “Higher Engineering Mathematics”, Tata McGraw Hill Co. Ltd., 11th Reprint, New Delhi, 2010.

PH5151	**ENGINEERING PHYSICS**	**L T P C**
	(Common to all branches of B.E / B.Tech programmes)	**3 0 0 3**

COURSE OBJECTIVES:

- To make the students in understanding the importance of mechanics.
- To equip the students on the knowledge of electromagnetic waves.
- To introduce the basics of oscillations, optics and lasers.
- To enable the students in understanding the importance of quantum physics.
- To elucidate the application of quantum mechanics towards the formation of energy bands in crystalline materials.

UNIT I MECHANICS 9

Moment of inertia (M.I) - Radius of gyration - Theorems of M .I - M.I of circular disc, solid cylinder , hollow cylinder , solid sphere and hollow sphere - K.E of a rotating body – M.I of a diatomic molecule – Rotational energy state of a rigid diatomic molecule - centre of mass – conservation of linear momentum – Relation between Torque and angular momentum - Torsional pendulum.

UNIT II ELECTROMAGNETIC WAVES 9

Gauss's law – Faraday's law - Ampere's law - The Maxwell's equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - polarization - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, waves from localized sources, momentum and radiation pressure - Cell-phone reception. Reflection and transmission of electromagnetic waves from a non-conducting medium-vacuum interface for normal incidence.

UNIT III OSCILLATIONS, OPTICS AND LASERS 9

Simple harmonic motion - resonance - waves on a string - standing waves - traveling waves - Energy transfer of a wave - sound waves - Doppler effect - reflection and refraction of light waves - total internal reflection - interference - interferometers - air wedge experiment. Theory of laser - characteristics - Spontaneous and stimulated emission - Einstein's coefficients - population inversion - Nd-YAG laser, CO_2 laser, semiconductor laser - applications.

UNIT IV BASIC QUANTUM MECHANICS 9

Photons and light waves - Electrons and matter waves - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization - Particle in a infinite potential well - Normalization, probabilities and the correspondence principle.

UNIT V APPLIED QUANTUM MECHANICS 9

The harmonic oscillator - Barrier penetration and quantum tunneling - Tunneling microscope - Resonant diode - Finite potential wells - particle in a three dimensional box - Bloch's theorem for particles in a periodic potential, Kronig-Penney model and origin of energy bands.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After completion of this course, the students should able to

- Understanding the importance of mechanics.
- Express the knowledge of electromagnetic waves.
- Know the basics of oscillations, optics and lasers.
- Understanding the importance of quantum physics.
- Apply quantum mechanical principles towards the formation of energy bands in crystalline materials.

TEXT BOOKS

1. D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education, 2017.
2. D.Halliday, R.Resnick and J.Walker. Principles of Physics. John Wiley & Sons, 2015.
3. N.Garcia, A.Damask and S.Schwarz. Physics for Computer Science Students. Springer- Verlag, 2012.

REFERENCES

1. R.Wolfson. Essential University Physics. Volume 1 & 2. Pearson, 2016.
2. D.J.Griffiths. Introduction to Electrodynamics. Pearson Education, 2015
3. K.Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications. Springer, 2012.

CY5151 **ENGINEERING CHEMISTRY** **L T P C**
(COMMON TO ALL BRANCHES) **3 0 0 3**

COURSE OBJECTIVES:

- To introduce the basic concepts of polymers, their properties and some of the important applications.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.
- To facilitate the understanding of the laws of photochemistry, photoprocesses and instrumentation & applications of spectroscopic techniques.
- To familiarize the operating principles and applications of energy conversion, its processes and storage devices.
- To inculcate sound understanding of water quality parameters and water treatment techniques.

UNIT I POLYMER CHEMISTRY 9

Introduction: Functionality-degree of polymerization. Classification of polymers- natural and synthetic, thermoplastic and thermosetting. Types and mechanism of polymerization: addition (free radical, cationic, anionic and living); condensation and copolymerization. Properties of polymers: Tg, tacticity, molecular weight-weight average, number average and polydispersity index. Techniques of polymerization: Bulk, emulsion, solution and suspension. Structure, Properties and uses of: PE, PVC, PC, PTFE, PP, Nylon 6, Nylon 66, Bakelite, Epoxy; Conducting polymers – polyaniline and polypyrrole.

UNIT II NANOCHEMISTRY 9

Basics-distinction between molecules, nanomaterials and bulk materials; size-dependent properties. Types –nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Characterization - Scanning Electron Microscope and Transmission Electron Microscope - Principle and instrumentation (block diagram). Properties (optical, electrical, mechanical and magnetic) and Applications of nanomaterials - medicine, agriculture, electronics and catalysis.

UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY 9

Photochemistry: Laws of photochemistry - Grotthuss-Draper law, Stark-Einstein law and Lambert-Beer Law (derivation and problems). Photo physical processes – Jablonski diagram. Chemiluminescence, photo-sensitization and photoquenching – mechanism and examples. Spectroscopy: Electromagnetic spectrum - absorption of radiation - electronic, vibrational and rotational transitions. Width and intensities of spectral lines. Atomic absorption spectroscopy, UV-Vis and IR spectroscopy- principles, instrumentation (Block diagram) and applications.

UNIT IV ENERGY CONVERSIONS AND STORAGE 9

Nuclear fission - controlled nuclear fission - nuclear fusion - differences between nuclear fission and fusion - nuclear chain reactions - nuclear energy - light water nuclear power plant – fast breeder reactor. Solar energy conversion - solar cells. Wind energy. Batteries - types of batteries – primary battery (dry cell), secondary battery (lead acid, nickel-cadmium and lithium-ion-battery). Fuel cells – H_2-O_2 and microbial fuel cell. Explosives – classification, examples: TNT, RDX, Dynamite; Rocket fuels and propellants – definition and uses.

UNIT V WATER TECHNOLOGY 9

Water – sources and impurities – water quality parameters: colour, odour, pH, hardness, alkalinity, TDS, COD and BOD. Boiler feed water – requirement – troubles (scale & sludge, caustic embrittlement, boiler corrosion and priming & foaming. Internal conditioning – phosphate, calgon and carbonate treatment. External conditioning - zeolite (permutit) and ion exchange demineralization. Municipal water treatment process – primary (screening, sedimentation and coagulation), secondary (activated sludge process and trickling filter process) and tertiary (ozonolysis, UV treatment, chlorination, reverse osmosis).

TOTAL: 45 PERIODS

COURSE OUTCOMES:

- To recognize and apply basic knowledge on different types of polymeric materials, their general preparation methods and applications to futuristic material fabrication needs.
- To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
- To identify and apply suitable spectroscopic technique for material analysis and study different forms of photochemical reactions.
- To recognize different forms of energy resources and apply them for suitable applications in energy sectors.
- To demonstrate the knowledge of water and their quality in using at different industries.

TEXT BOOKS:

1. Jain P. C. & Monica Jain., "Engineering Chemistry", 16th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2015.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2012.
3. S.S.Dara, "A text book of Engineering Chemistry", Chand Publications, 2014.

REFERENCES:

1. Schdeva M V, "Basics of Nano Chemistry", Anmol Publications Pvt Ltd
2. B.Sivasankar, "Instrumental Methods of Analysis", Oxford University Press. 2012.
3. Friedrich Emich, "Engineering Chemistry", Scientific International Ltd.
4. V RGowariker, N V Viswanathan and Jayadev Sreedhar, "Polymer Science" New AGE International Publishers, 2009.

GE5151 ENGINEERING GRAPHICS L T P C
1 0 4 3

COURSE OBJECTIVES:

The main learning objective of this course is to prepare the students for:

1. Drawing free hand sketches of basic geometrical shapes and multiple views of objects.
2. Drawing orthographic projections of lines and planes.
3. Drawing orthographic projections of solids.
4. Drawing development of the surfaces of objects.
5. Drawing isometric and perspective views of simple solids.

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION) 1

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREE HANDSKETCHING 14

Basic Geometrical constructions, Curves used in engineering practices-Conics – Construction of ellipse, parabola and hyperbola by different methods – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles – Representation of Three-Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES 15

Orthographic projection- principles-Principle planes-First angle projection-Projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes-Determination of true lengths and true inclinations by rotating line method and trapezoidal method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS 15

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to both the principal planes by rotating object method and auxiliary plane method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 15

Sectioning of solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 12

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-Prisms pyramids and cylinders by visual ray method and vanishing point method.

COMPUTER AIDED DRAFTING (DEMONSTRATION ONLY) 3

Introduction to drafting packages and demonstration of their use

TOTAL (L: 15 + P: 60)=75 PERIODS

COURSE OUTCOMES:

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

1. Draw free hand sketching of basic geometrical shapes and multiple views of objects.
2. Draw orthographic projections of lines and planes
3. Draw orthographic projections of solids
4. Draw development of the surfaces of objects
5. Draw isometric and perspective views of simple solids.

TEXT BOOKS:

1. Bhatt, N. D.,Panchal V M and Pramod R. Ingle, “Engineering Drawing”, Charotar Publishing House, 53rd Edition, 2014.
2. Parthasarathy, N. S. and Vela Murali, “Engineering Drawing”, Oxford University Press, 2015

REFERENCES:

1. Agrawal, B. and Agrawal C.M., “Engineering Drawing”, Tata McGraw, N.Delhi, 2008.
2. Gopalakrishna, K. R., “Engineering Drawing”, Subhas Stores, Bangalore, 2007.
3. Natarajan, K. V., “A text book of Engineering Graphics”, 28thEd., Dhanalakshmi Publishers, Chennai, 2015.
4. Shah, M. B., and Rana, B. C., “Engineering Drawing”, Pearson, 2ndEd., 2009.
5. Venugopal, K. and Prabhu Raja, V., “Engineering Graphics”, New Age,2008.

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only.
4. The students will be permitted to use appropriate scale to fit solution within A3 size.
5. The examination will be conducted in appropriate sessions on the same day.

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	0.9				0.9					0.6		0.6	0.6	0.9	0.6
2	0.9									0.6		0.6	0.6	0.6	
3	0.9				0.9					0.6		0.6	0.6	0.6	
4	0.9		0.6		0.9					0.6		0.6	0.6	0.6	
5	0.9		0.9		0.9					0.6		0.6	0.6	0.6	

BS5161 **BASIC SCIENCES LABORATORY** **L T P C**

(Common to all branches of B.E. / B.Tech Programmes) **0 0 4 2**

PHYSICS LABORATORY: (Any Seven Experiments)

COURSE OBJECTIVES:

- To inculcate experimental skills to test basic understanding of physics of materials including properties of matter, thermal and optical properties.
- To induce the students to familiarize with experimental determination of velocity of ultrasonic waves and band gap determination.

LIST OF EXPERIMENTS:

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of disc
2. Non-uniform bending - Determination of Young's modulus
3. Uniform bending – Determination of Young's modulus
4. Lee's disc Determination of thermal conductivity of a bad conductor
5. Potentiometer-Determination of thermo e.m.f of a thermocouple
6. Laser- Determination of the wave length of the laser using grating
7. Air wedge - Determination of thickness of a thin sheet/wire
8. a) Optical fibre -Determination of Numerical Aperture and acceptance angle
   b) Compact disc- Determination of width of the groove using laser.
9. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
10. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
11. Post office box -Determination of Band gap of a semiconductor.
12. Spectrometer- Determination of wavelength using gating.
13. Photoelectric effect
14. Michelson Interferometer.
15. Estimation of laser parameters.
16. Melde's string experiment

TOTAL: 30 PERIODS

COURSE OUTCOMES:

Upon completion of the course, the students will be able

- To determine various moduli of elasticity and also various thermal and optical properties of materials.
- To determine the velocity of ultrasonic waves, band gap determination and viscosity of liquids

CHEMISTRY LABORATORY: (Minimum of 8 experiments to be conducted)

COURSE OBJECTIVES:

- To inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.
- To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.
- To demonstrate the analysis of metals and polymers by spectroscopy and viscometry methods.

LIST OF EXPERIMENTS:

1. Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler‟s method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by Iodometry.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline / thiocyanate method).
10. Estimation of sodium and potassium present in water using flame photometer.
11. Determination of molecular weight of polyvinylalcohol using Ostwald viscometer.
12. Pseudo first order kinetics-ester hydrolysis.
13. Corrosion experiment-weight loss method.
14. Phase change in a solid.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

- To analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO.
- To determine the amount of metal ions through volumetric and spectroscopic techniques
- To determine the molecular weight of polymers by viscometric method.
- To quantitatively analyse the impurities in solution by electroanalytical techniques
- To design and analyse the kinetics of reactions and corrosion of metals

TEXT BOOKS:

1. Laboratory Manual- Department of Chemistry, CEGC, Anna University (2014).
2. Vogel‟s Textbook of Quantitative Chemical Analysis (8^{th} edition, 2014).

GE5162	WORKSHOP PRACTICES LABORATORY	L	T	P	C
	(Common to all Branches of B.E. / B.Tech. Programmes)	0	0	4	2

COURSE OBJECTIVES: The main learning objective of this course is to provide hands on training to the students in:

1. Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planing; making joints in wood materials used in common household wood work.
2. Wiring various electrical joints in common household electrical wire work.
3. Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.
4. Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

GROUP – A (CIVIL & ELECTRICAL)

PART I CIVIL ENGINEERING PRACTICES 15

PLUMBING WORK:

a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.
b) Preparing plumbing line sketches.
c) Laying pipe connection to the suction side of a pump
d) Laying pipe connection to the delivery side of a pump.
e) Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK:

a) Sawing,
b) Planing and
c) Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.

Wood Work Study:

a) Studying joints in door panels and wooden furniture
b) Studying common industrial trusses using models.

PART II ELECTRICAL ENGINEERING PRACTICES 15

WIRING WORK:

a) Wiring Switches, Fuse, Indicator and Lamp etc. such as in basic household,
b) Wiring Stair case light.
c) Wiring tube – light.
d) Preparing wiring diagrams for a given situation.

Wiring Study:

a) Studying an Iron-Box wiring.
b) Studying a Fan Regulator wiring.
c) Studying an Emergency Lamp wiring.

GROUP – B (MECHANICAL AND ELECTRONICS)

PART III MECHANICAL ENGINEERING PRACTICES 15

WELDING WORK:

a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.
b) Practicing gas welding.

BASIC MACHINING WORK:

a) (simple)Turning.
b) (simple)Drilling.
c) (simple)Tapping.

ASSEMBLY WORK:

a) Assembling a centrifugal pump.
b) Assembling a household mixer.
c) Assembling an air conditioner.

SHEET METAL WORK:

a) Making of a square tray

FOUNDRY WORK:

a) Demonstrating basic foundry operations.

PART IV ELECTRONIC ENGINEERING PRACTICES 15

SOLDERING WORK:

a) Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK:

a) Assembling and testing electronic components on a small PCB.

ELECTRONIC EQUIPMENT STUDY:

a) Studying a FM radio.
b) Studying an electronic telephone.

TOTAL (P: 60) = 60 PERIODS

COURSE OUTCOMES:

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

1. Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.
2. Wire various electrical joints in common household electrical wire work.
3. Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.
4. Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	0.6	0.3											0.3	0.3	
2		0.6	0.6											0.6	
3		0.6	0.3										0.6	0.6	
4		0.6	0.6	0.3										0.6	

HS5251 PROFESSIONAL COMMUNICATION L T P C
4 0 0 4

COURSE OBJECTIVES

The course entitles 'Professional Communication aims to,

- Improve the relevant language skills necessary for professional communication.
- Develop linguistic and strategic competence in workplace context.
- Enhance language proficiency and thereby the employability of budding engineers and technologists.

UNIT I TECHNICAL COMMUNICATION 12

Listening: Listening to telephone conversations (intent of the speaker and note taking exercises)- Speaking: Role play exercises based on workplace contexts, introducing oneself- Reading: Reading the interview of an achiever and completing exercises (skimming, scanning and predicting)- Writing: Writing a short biography of an achiever based on given hints- Grammar: Asking and answering questions, punctuation in writing, prepositional phrases- Vocabulary Development: use of adjectives.

UNIT II SUMMARY WRITING 12

Listening: Listening to talks/lectures both general and technical and summarizing the main points- Speaking: Participating in debates- Reading: Reading technical essays/ articles and answering comprehension questions-Writing: Summary writing-Grammar: Participle forms, relative clauses- Vocabulary Development: Use of compound words, abbreviations and acronyms.

UNIT III PROCESS DESCRIPTION 12

Listening: Listening to a process description and drawing a flowchart-Speaking: Participating in Group Discussions, giving instructions- Reading: Reading instruction manuals- Writing: Writing process descriptions- Writing instructions- Grammar: Use of imperatives, active and passive voice, sequence words- Vocabulary Development: Technical jargon

UNIT IV REPORT WRITING 12

Listening: Listening to a presentation and completing gap-filling exercises- Speaking: Making formal presentations- Reading: Reading and interpreting charts/tables and diagrams- Writing: Interpreting charts/tables and diagrams, writing a report- Grammar: Direct into indirect speech, use of phrases- Vocabulary Development: reporting words

UNIT V WRITING JOB APPLICATIONS 12

Listening: Listening to a job interview and completing gap=filling exercises- Speaking: Mock interview, telephone interviews- Reading: Reading a job interview, SOP, company profile and completing comprehension exercises- Writing: job applications and resumes and SOPs-Grammar: Present perfect and continuous tenses- Vocabulary Development: Technical vocabulary.

TOTAL : 60 PERIODS

LEARNING OUTCOMES

At the end of the second semester the learners should be able to,

- Read and comprehend technical texts effortlessly.
- Write reports of a technical kind.
- Speak with confidence in interviews and thereby gain employability

TEXT BOOK:

1. Revised Edition of ‘English for Engineers and Technologists’ Volume 1 published by Orient Black Swan Limited 2019.

ASSESSMENT PATTERN

- Assessments will assess all the four skills through both pen and paper and computer based tests.
- Assessments can be pen and paper based, quizzes.

MA5252	ENGINEERING MATHEMATICS – II (Common to all branches of B.E. / B.Tech. Programmes in II Semester)	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

- To acquaint the students with the concepts of vector calculus which naturally arises in many engineering problems.
- To develop an understanding of the standard techniques of complex variable theory in particular analytic function and its mapping property.
- To familiarize the students with complex integration techniques and contour integration techniques which can be used in real integrals.
- To acquaint the students with Differential Equations which are significantly used in Engineering problems.
- To make the students appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT I VECTOR CALCULUS 12

Gradient and directional derivative – Divergence and Curl – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green's theorem, Stoke's theorem and Gauss divergence theorem – Verification and application in evaluating line, surface and volume integrals.

UNIT II ANALYTIC FUNCTION 12

Analytic functions – Necessary and sufficient conditions for analyticity - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions - Bilinear transformation $w = c + z,\ az,\ 1/z,\ z^2$.

UNIT III COMPLEX INTEGRATION 12

Line integral - Cauchy's integral theorem – Cauchy's integral formula – Taylor's and Laurent's series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour with no pole on real axis.

UNIT IV DIFFERENTIAL EQUATIONS 12

Method of variation of parameters – Method of undetermined coefficients – Homogenous equations of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients.

UNIT V LAPLACE TRANSFORMS 12

Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems – Transforms of derivatives and integrals – Initial and Final Value Theorems – Inverse Transforms – Convolution Theorem – Transform of periodic functions – Application to solution of linear ordinary differential equations with constant coefficients.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

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

- Calculate grad, div and curl and use Gauss, Stokes and Greens theorems to simplify calculations of integrals.
- Construct analytic functions and use their conformal mapping property in application problems.
- Evaluate real and complex integrals using the Cauchy's integral formula and residue theorem.
- Apply various methods of solving differential equation which arise in many application problems.
- Apply Laplace transform methods for solving linear differential equations.

TEXT BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2015.
2. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, 44th Edition, New Delhi, 2017.

REFERENCES:

1. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), 7th Edition, New Delhi, 2009.
2. Glyn James, "Advanced Modern Engineering Mathematics", Pearson Education, 4th Edition, New Delhi, 2011.
3. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, 5th Edition, New Delhi, 2017.
4. Peter V.O'Neil, "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, 7th Edition, New Delhi, 2012.
5. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., 11th Reprint, New Delhi, 2010.

GE5153 PROBLEM SOLVING AND PYTHON PROGRAMMING L T P C
3 0 0 3

COURSE OBJECTIVES:

- To know the basics of algorithmic problem solving.
- To develop Python programs with conditionals and loops.
- To define Python functions and use function calls.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python.

UNIT I INTRODUCTION TO COMPUTING AND PROBLEM SOLVING 9

Fundamentals of Computing – Computing Devices – Identification of Computational Problems – Pseudocodes and Flowcharts – Instructions – Algorithms – Building Blocks of Algorithms – Introduction to Python Programming – Python Interpreter and Interactive Mode – Variables and Identifiers – Arithmetic Operators– Values and Types – Statements.

SUGGESTED ACTIVITIES:

- Developing Pseudocodes and flowcharts for real life activities such as railway ticket booking using IRCTC, admission process to undergraduate course, academic schedules during a semester etc.
- Developing algorithms for basic mathematical expressions using arithmetic operations.
- Installing Python.
- Simple programs on print statements, arithmetic operations.

SUGGESTED EVALUATION METHODS:

- Assignments on pseudocodes and flowcharts.
- Tutorials on Python programs.

UNIT II CONDITIONALS AND FUNCTIONS 9

Operators – Boolean Values – Operator Precedence – Expression – Conditionals: If-Else Constructs – Loop Structures/Iterative Statements – While Loop – For Loop – Break Statement – Function Call and Returning Values – Parameter Passing – Local and Global Scope – Recursive Functions.

SUGGESTED ACTIVITIES:

- Simple Python program implementation using Operators, Conditionals, Iterative Constructs and Functions.
- Implementation of a simple calculator.
- Developing simple applications like calendar, phone directory, to-do lists etc.
- Flow charts for GCD, Exponent Functions, Fibonacci Series using conditionals and iterative statements.
- External learning - Recursion vs. Iteration.

SUGGESTED EVALUATION METHODS:

- Tutorials on the above activities.
- Group discussion on external learning.

UNIT III SIMPLE DATA STRUCTURES IN PYTHON 10

Introduction to Data Structures – List – Adding Items to a List – Finding and Updating an Item – Nested Lists – Cloning Lists – Looping Through a List – Sorting a List – List Concatenation – List Slices – List Methods – List Loop – Mutability – Aliasing – Tuples: Creation, Accessing, Updating, Deleting Elements in a Tuple, Tuple Assignment, Tuple as Return Value, Nested Tuples, Basic Tuple Operations – Sets.

SUGGESTED ACTIVITIES:

- Implementing python program using lists, tuples, sets for the following scenario:
  Simple sorting techniques
  Student Examination Report
  Billing Scheme during shopping.
- External learning - List vs. Tuple vs. Set – Implementing any application using all the three data structures.

SUGGESTED EVALUATION METHODS:

- Tutorials on the above activities.
- Group Discussion on external learning component.

UNIT IV STRINGS, DICTIONARIES, MODULES 10

Strings: Introduction, Indexing, Traversing, Concatenating, Appending, Multiplying, Formatting, Slicing, Comparing, Iterating – Basic Built-In String Functions – Dictionary: Creating, Accessing, Adding Items, Modifying, Deleting, Sorting, Looping, Nested Dictionaries Built-in Dictionary Function – Finding Key and Value in a Dictionary – Modules – Module Loading and Execution – Packages – Python Standard Libraries.

SUGGESTED ACTIVITIES:

- Implementing Python program by importing Time module, Math package etc.
- Creation of any package (student's choice) and importing into the application.

SUGGESTED EVALUATION METHODS:

- Tutorials on the above activities.

UNIT V FILE HANDLING AND EXCEPTION HANDLING 7

Introduction to Files – File Path – Opening and Closing Files – Reading and Writing Files – File Position – Exception: Errors and Exceptions, Exception Handling, Multiple Exceptions.

SUGGESTED ACTIVITIES:

- Developing modules using Python to handle files and apply various operations on files.
- Usage of exceptions, multiple except blocks - for applications that use delimiters like age, range of numerals etc.
- Implementing Python program to open a non-existent file using exceptions.

SUGGESTED EVALUATION METHODS:

- Tutorials on the above activities.
- Case Studies.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Develop algorithmic solutions to simple computational problems.
CO2: Develop and execute simple Python programs.
CO3: Write simple Python programs for solving problems.
CO4: Decompose a Python program into functions.
CO5: Represent compound data using Python lists, tuples, dictionaries etc.
CO6: Read and write data from/to files in Python programs.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓									✓
CO2	✓		✓		✓							✓
CO3	✓	✓	✓									✓
CO4	✓	✓	✓	✓	✓							✓
CO5	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

TEXT BOOKS:

1. Reema Thareja, “Python Programming: Using Problem Solving Approach”, Oxford University Press, 2017.
2. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, Second Edition, Shroff/O‘Reilly Publishers, 2016. (http://greenteapress.com/wp/thinkpython/).

REFERENCES:

1. Guido van Rossum, Fred L. Drake Jr., “An Introduction to Python – Revised and Updated for Python 3.2”, Network Theory Ltd., 2011.
2. John V Guttag, “Introduction to Computation and Programming Using Python”, Revised and Expanded Edition, MIT Press , 2013
3. Charles Dierbach, “Introduction to Computer Science using Python”, Wiley India Edition, 2016.
4. Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd., 2015.
5. Kenneth A. Lambert, “Fundamentals of Python: First Programs”, Cengage Learning, 2012.

EE5251 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING L T P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the basic concepts of electric circuits, magnetic circuits and wiring.
- To understand the operation of AC and DC machines.
- To understand the working principle of electronic devices and circuits.

UNIT I BASIC CIRCUITS AND DOMESTIC WIRING 9

Electrical circuit elements (R, L and C)-Dependent and independent sources – Ohm’s Law-Kirchhoff’s laws - mesh current and node voltage methods (Analysis with only independent source) - Phasors – RMS-Average values-sinusoidal steady state response of simple RLC circuits. Types of wiring- Domestic wiring - Specification of Wires-Earthing-Methods-Protective devices.

UNIT II THREE PHASE CIRCUITS AND MAGNETIC CIRCUITS 9

Three phase supply – Star connection – Delta connection –Balanced and Unbalanced Loads- Power in three-phase systems – Comparison of star and delta connections – Advantages-Magnetic circuits-Definitions-MMF, Flux, Reluctance, Magnetic field intensity, Flux density, Fringing, self and mutual inductances-simple problems.

UNIT III ELECTRICAL MACHINES 9

Working principle of DC generator, motor-EMF and Torque equation-Types –Shunt, Series and Compound-Applications. Working principle of transformer-EMF equation-Operating principles of three phase and single phase induction motor-Applications. Working principles of alternator-EMF equation-Operating principles of Synchronous motor, stepper motor-Applications.

UNIT IV BASICS OF ELECTRONICS 9

Intrinsic semiconductors, Extrinsic semiconductors – P-type and N-type, P-N junction, VI Characteristics of PN junction diode, Zener effect, Zener diode, Zener diode Characteristics-Rectifier circuits-Wave shaping.

UNIT V CURRENT CONTROLLED AND VOLTAGE CONTROLLED DEVICES 9

Working principle and characteristics - BJT, SCR, JFET, MOSFET.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1 To be able to understand the concepts related with electrical circuits and wiring.
CO2 To be able to study the different three phase connections and the concepts of magnetic circuits.
CO3 Capable of understanding the operating principle of AC and DC machines.
CO4 To be able to understand the working principle of electronic devices such as diode and zener diode.
CO 5 To be able to understand the characteristics and working of current controlled and voltage controlled devices.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							
CO2	✓	✓	✓	✓	✓						✓	
CO3	✓	✓	✓	✓	✓						✓	✓
CO4	✓	✓	✓	✓	✓						✓	✓
CO5	✓		✓	✓	✓						✓	✓

TEXT BOOKS:

1. Kothari DP and I.J Nagrath, “Basic Electrical and Electronics Engineering”, McGraw Hill Education, 2014
2. Del Toro, “Electrical Engineering Fundamentals”, Second edition, Pearson Education, New Delhi,1989.
3. John Bird, “Electrical Circuit theory and technology”, Routledge; 5th edition, 2013

REFERENCES:

1. Thomas L. Floyd, ‘Electronic Devices’, 10th Edition, Pearson Education, 2018.
2. Albert Malvino, David Bates, ‘Electronic Principles, McGraw Hill Education; 7th edition, 2017
3. Kothari DP and I.J Nagrath, “Basic Electrical Engineering”, McGraw Hill, 2010.
4. Muhammad H.Rashid, “Spice for Circuits and electronics”, 4th ed., Cengage India,2019.

GE5152 ENGINEERING MECHANICS L T P C
3 1 0 4

COURSE OBJECTIVES:

The main learning objective of this course is to prepare the students for:

1. Applying the various methods to determine the resultant forces and its equilibrium acting on a particle in 2D and 3D.
2. Applying the concept of reaction forces (non-concurrent coplanar and noncoplanar forces) and moment of various support systems with rigid bodies in 2D and 3D in equilibrium. Reducing the force, moment, and couple to an equivalent force - couple system acting on rigid bodies in 2D and 3D.
3. Applying the concepts of locating centroids/center of gravity of various sections / volumes and to find out area moments of inertia for the sections and mass moment of inertia of solids.
4. Applying the concepts of frictional forces at the contact surfaces of various engineering systems.
5. Applying the various methods of evaluating kinetic and kinematic parameters of the rigid bodies subjected to concurrent coplanar forces.

UNIT I STATICS OF PARTICLES (9+3)

Fundamental Concepts and Principles, Systems of Units, Method of Problem Solutions, Statics of Particles -Forces in a Plane, Resultant of Forces, Resolution of a Force into Components, Rectangular Components of a Force, Unit Vectors. Equilibrium of a Particle- Newton's First Law of Motion, Space and Free-Body Diagrams, Forces in Space, Equilibrium of a Particle in Space.

UNITII EQUILIBRIUM OF RIGID BODIES (9+3)

Principle of Transmissibility, Equivalent Forces, Vector Product of Two Vectors, Moment of a Force about a Point, Varignon's Theorem, Rectangular Components of the Moment of a Force, Scalar Product of Two Vectors, Mixed Triple Product of Three Vectors, Moment of a Force about an Axis, Couple - Moment of a Couple, Equivalent Couples, Addition of Couples, Resolution of a Given Force into a Force -Couple system, Further Reduction of a System of Forces, Equilibrium in Two and Three Dimensions - Reactions at Supports and Connections.

UNITIII DISTRIBUTED FORCES (9+3)

Centroids of lines and areas – symmetrical and unsymmetrical shapes, Determination of Centroids by Integration , Theorems of Pappus-Guldinus, Distributed Loads on Beams, Centre of Gravity of a Three-Dimensional Body, Centroid of a Volume, Composite Bodies , Determination of Centroids of Volumes by Integration.

Moments of Inertia of Areas and Mass - Determination of the Moment of Inertia of an Area by Integration , Polar Moment of Inertia , Radius of Gyration of an Area , Parallel-Axis Theorem , Moments of Inertia of Composite Areas, Moments of Inertia of a Mass - Moments of Inertia of Thin Plates, Determination of the Moment of Inertia of a Three-Dimensional Body by Integration

UNIT IV FRICTION (9+3)

The Laws of Dry Friction. Coefficients of Friction, Angles of Friction, Wedges, Wheel Friction. Rolling Resistance, Ladder friction.

UNITV DYNAMICS OF PARTICLES (9+3)

Kinematics - Rectilinear Motion and Curvilinear Motion of Particles. Kinetics- Newton's Second Law of Motion -Equations of Motions, Dynamic Equilibrium, Energy and Momentum Methods - Work of a Force , Kinetic Energy of a Particle, Principle of Work and Energy, Principle of Impulse and Momentum, Impact, Method of Virtual Work - Work of a Force, Potential Energy, Potential Energy and Equilibrium.

TOTAL (L: 45 + T: 15)=60 PERIODS

COURSE OUTCOMES:

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

1. Apply the various methods to determine the resultant forces and its equilibrium acting on a particle in 2D and 3D.

2. Apply the concept of reaction forces (non-concurrent coplanar and noncoplanar forces) and moment of various support systems with rigid bodies in 2D and 3D in equilibrium. Reducing the force, moment, and couple to an equivalent force - couple system acting on rigid bodies in 2D and 3D.
3. Apply the concepts of locating centroids / center of gravity of various sections / volumes and to find out area moments of inertia for the sections and mass moment of inertia of solids.
4. Apply the concepts of frictional forces at the contact surfaces of various engineering systems.
5. Apply the various methods of evaluating kinetic and kinematic parameters of the rigid bodies subjected to concurrent coplanar forces.

TEXT BOOKS:

1. Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, SanjeevSanghi, Vector Mechanics for Engineers: Statics and Dynamics, McGraw Higher Education., 11thEdition, 2017.
2. Vela Murali, "Engineering Mechanics-Statics and Dynamics", Oxford University Press, 2018.

REFERENCES:

1. Boresi P and Schmidt J, Engineering Mechanics: Statics and Dynamics, 1/e, Cengage learning, 2008.
2. Hibbeller, R.C., Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics, 13th edition, Prentice Hall, 2013.
3. Irving H. Shames, Krishna Mohana Rao G, Engineering Mechanics – Statics and Dynamics, 4thEdition, Pearson Education Asia Pvt. Ltd., 2005.
4. Meriam J L and Kraige L G, Engineering Mechanics: Statics and Engineering Mechanics: Dynamics, 7th edition, Wiley student edition, 2013.
5. Timoshenko S, Young D H, Rao J V and Sukumar Pati, Engineering Mechanics, 5thEdition, McGraw Hill Higher Education, 2013.

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	0.9	0.6	0.6	0.3								0.6	0.9	0.3	0.3
2	0.9	0.6	0.6	0.3								0.6	0.9	0.3	0.3
3	0.9	0.6	0.9	0.3								0.6	0.9	0.3	0.6
4	0.9	0.6	0.9	0.3								0.6	0.9	0.3	0.6
5	0.9	0.6	0.9	0.3								0.6	0.9	0.3	0.6

CY5201 CHEMISTRY FOR PRINTING TECHNOLOGY L T P C
3 0 0 3

COURSE OBJECTIVES:

- To introduce the basic concepts of surface chemistry and corrosion.
- To impart knowledge on the properties of lubricants and understand the mechanism of adhesive action.
- To familiarize the preparation and properties of various commercial polymers and composite materials.
- To facilitate the understanding of alloys and its properties and application of physical metallurgy.
- To inculcate understanding of principle, instrumentation and data analysis of instrumental methods of analysis.

UNIT I SURFACE CHEMISTRY AND CORROSION 9

Adsorption-Types of adsorption-adsorption of gases on solids- adsorption from solutions-Types of isotherms–Frendlich adsorption isotherm, Langmuir adsorption isotherm- colloids-types-multimolecular, macromolecular, and associated colloids-preparation, purification and characteristics of colloidal solutions-coagulation of sols-origin of charge on colloids-stability of colloids- protective colloids-emulsions-gels and micelles-Corrosion-types, corrosion control; paints-constituents and their functions- mechanism of drying of an oil paint.

UNIT II LUBRICANTS AND ADHESIVES 9

Lubricants and lubrication- functions-classification with examples-properties (viscosity index, flash and fire point, oiliness, carbon residue, aniline point, cloud and pour point)-greases (calcium based, sodium based, lithium based only)-solid lubricants-graphite and molybdenum sulphide. Adhesives-adhesive action-development of adhesive strength-physical and chemical factors influencing adhesive action-bonding process of adhesives-phenol formaldehyde resins, polyurethane, epoxy resins and urea formaldehyde.

UNIT III POLYMERS, COMPOSITES AND FOAMS 9

Polymers-classification; commodity-polyethylene, polypropylene, polyvinyl chloride, polystyrene; polyamide, polyethylene terephthalate, polycarbonate, acrylonitrile-butadiene-styrene, specialtypolyether ether ketone, polyethersulfone, polyphenylene oxide- preparation, properties, uses.Foams-polystyrene, polyurethane, polyolefins-characterization, development, processing,applications. Composites-Introduction-definition-constitution-classification-applications of composite materials-fiber reinforced composites-properties of reinforced composites.

UNIT IV ALLOYS AND PHYSICAL METALLURGY 9

Alloys: Introduction-definition-properties of alloys-significance of alloying, functions and effect of alloying elements-ferrous alloys-heat treatment of steel- Nonferrous alloys: importance-brass, bronze, aluminum alloys, solders, nickel alloys. Physical metallurgy- powder metallurgy- preparation of metal powders (mechanical pulverization, atomatization, chemical reduction, electrolytic process and decomposition)-mixed and blending, compacting – sintering– uses- advantages and limitations of powder metallurgy.

UNIT V INSTRUMENTAL METHODS AND ANALYSIS 9

Principle-instrumentation-block diagram-data analysis and applications of: X-Ray diffraction analysis, Microscopic analyses: Scanning Electron Microscopy, Tunneling Electron Microscopy. Thermal methods: Thermo-gravimetric analysis, Differential thermal analysis. Chromatography-column chromatography, TLC.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

- To identify and apply basic concepts of surface chemistry in the preparation of colloids, gels and micelles and apply in printing technology methods and applications to futuristic material fabrication needs.
- To recognize and apply basic knowledge on lubricants and their application in printing press and adhesives for packaging technology.
- To recognize and apply basic knowledge on different types of polymeric and composite materials, their manufacturing and applications to innovative high performance material needs.
- To identify and recognize the usage of alloys and powder metallurgy in the field of printing technology.
- To demonstrate the knowledge of various instrumental methods of analysis in characterisation of materials.

TEXT BOOKS:

1. Jain P.C. and Monica Jain, Engineering Chemistry, DhanpatRai Publishing Company (P) Ltd., New Delhi, 2014.
2. Dara. S. S., A Textbook of Engineering Chemistry, S. Chand & Company Ltd., New Delhi, 2010.
3. P. Kannan, A. Ravikrishnan., “Engineering Chemistry” Srikrishna Hitech Publishing Company. 2014.

REFERENCES :

1. Kenneth G. Budinski, Michael K. Budinski., Eastern Economy Edition. Ninth Edition, 2010.
2. Gauri Shankar Misra., Introductory polymer chemistry. New Age International, 2010.
3. B. Sivasankar., “Instrumental Methods of Analysis”, Oxford University Press, 2012.

GE5161 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY L T P C
0 0 4 2

COURSE OBJECTIVES:

- To understand the problem solving approaches.
- To learn the basic programming constructs in Python.
- To articulate where computing strategies support in providing Python-based solutions to real world problems.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python.

EXPERIMENTS:

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same.
2. Python programming using simple statements and expressions.
3. Scientific problems using Conditionals and Iterative loops.
4. Implementing real-time/technical applications using Lists, Tuples.
5. Implementing real-time/technical applications using Sets, Dictionaries.
6. Implementing programs using Functions.
7. Implementing programs using Strings.
8. Implementing programs using written modules and Python Standard Libraries.
9. Implementing real-time/technical applications using File handling.
10. Implementing real-time/technical applications using Exception handling.
11. Exploring Pygame tool.
12. Developing a game activity using Pygame like bouncing ball, car race etc.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1: Develop algorithmic solutions to simple computational problems
CO2: Develop and execute simple Python programs.
CO3: Structure simple Python programs for solving problems.
CO4: Decompose a Python program into functions.
CO5: Represent compound data using Python data structures.
CO6: Apply Python features in developing software applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓									✓
CO2	✓		✓		✓							✓
CO3	✓	✓	✓									✓
CO4	✓	✓	✓	✓	✓							✓
CO5	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

EE5261 ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY

L	T	P	C
0	0	4	2

COURSE OBJECTIVES

1. To impart hands on experience in verification of circuit laws and measurement of circuit parameters
2. To train the students in performing various tests on electrical motors.
3. It also gives practical exposure to the usage of CRO, power sources & function generators

LIST OF EXPERIMENTS

1. Verification of Kirchhoff's Law.
2. Steady state response of AC and DC circuits (Mesh, Node Analysis)
3. Frequency response of RLC circuits.
4. Measurement power in three phase circuits by two-watt meter method.
5. Regulation of single phase transformer.
6. Performance characteristics of DC shunt generator.
7. Performance characteristics of single phase induction motor.
8. Characteristics of PN diode and Zener diode
9. Characteristics of Zener diode
10. Half wave and full wave Rectifiers
11. Application of Zener diode as shunt regulator.
12. Characteristics of BJT and JFET

TOTAL: 60 PERIODS

COURSE OUTCOMES:

1. To become familiar with the basic circuit components and know how to connect them to make a real electrical circuit;
2. Ability to perform speed characteristic of different electrical machines
3. Ability to use logic gates and Flip flops

MA5355 TRANSFORM TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS

L	T	P	C
4	0	0	4

OBJECTIVES:

- To introduce the effective mathematical tools for the solutions of partial differential equations that model physical processes;
- To introduce Fourier series analysis which is central to many applications in engineering :
- To develop the analytic solutions for partial differential equations used in engineering by Fourier series;
- To acquaint the student with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic;
- To develop Z- transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 12

Formation – Solutions of first order equations – Standard types and Equations reducible to standard types – Lagrange's Linear equation – Solution of linear equations of higher order with constant coefficients – Linear non-homogeneous partial differential equations.

UNIT II FOURIER SERIES 12

Dirichlet's conditions – General Fourier series – Odd and even functions – Half-range Sine and cosine series – Complex form of Fourier series – Parseval's identity – Harmonic Analysis.

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATION 12

Classification of partial differential equations- Method of separation of variables – Solutions of one dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions in cartesian coordinates.

UNIT IV FOURIER TRANSFORM 12

Fourier integral theorem – Fourier transform pair - Sine and cosine transforms – Properties – Transform of elementary functions – Convolution theorem – Parseval's identity.

UNIT V Z – TRANSFORM AND DIFFERENCE EQUATIONS 12

Z-transform – Elementary properties – Inverse Z-transform – Convolution theorem – Initial and final value theorems – Formation of difference equation – Solution of difference equation using Z - transform.

TOTAL : 60 PERIODS

COURSE OUTCOMES :

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

- Solve partial differential equations which arise in application problems.
- Analyze the functions as an infinite series involving sine and cosine functions.
- Obtain the solutions of the partial differential equations using Fourier series.
- Obtain Fourier transforms for the functions which are needed for solving application problems.
- Manipulate discrete data sequences using Z transform techniques.

TEXT BOOKS:

1. Erwin kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 10th Edition, New Delhi, 2015.
2. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, 44th Edition, New Delhi, 2017.

REFERENCES:

1. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), 7th Edition, New Delhi, 2009.
2. Glyn James, "Advanced Modern Engineering Mathematics", Pearson Education, 4th Edition, New Delhi, 2011.
3. Peter V.O'Neil, "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, 7th Edition, New Delhi, 2012.
4. Ramana, B.V. "Higher Engineering Mathematics", Tata McGraw Hill, 11th Reprint, New Delhi, 2010.

ML5352 MECHANICS OF MATERIALS L T P C

3 0 0 3

COURSE OBJECTIVES:

The main learning objective of this course is to prepare students for:

1. Applying the principle concepts behind stress, strain and deformation of solids for various engineering applications.
2. Analyzing the transverse loading on beams and stresses in beam for various engineering applications.
3. Analyzing the torsion principles on shafts and springs for various engineering applications.
4. Analyzing the deflection of beams for various engineering applications.
5. Analyzing the thin and thick shells and principal stresses in beam for various engineering applications

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS 9

Rigid bodies and deformable solids – Tension, Compression and Shear Stresses – Deformation of simple and compound bars – Thermal stresses – Elastic constants – Volumertric strains

UNIT II TRANSVERSE LOADING ON BEAMS AND STRESSES IN BEAM 9

Beams – types transverse loading on beams – Shear force and bending moment in beams – Cantilevers – Simply supported beams and over – hanging beams. Theory of simple bending – Bending stress distribution – Flitched beams – Shear stress distribution.

UNIT III TORSION 9

Torsion formulation stresses and deformation in circular and hollows shafts – Stepped shafts – Deflection in shafts fixed at the both ends – Stresses in helical springs – Deflection of helical springs, carriage springs.

UNIT IV DEFLECTION OF BEAMS 9

Double Integration method – Macaulay's method – Area moment Theorems for computation of slopes and deflections in beams - Conjugate beam and strain energy – Maxwell's reciprocal theorems.

UNIT V THICK & THIN SHELLS & PRINCIPAL STRESSES 9

Stresses in thin cylindrical shell due to internal pressure, circumferential and longitudinal stresses and deformation in thin cylinders – spherical shells subjected to internal pressure – Deformation in spherical shells – Lame's theory – Application of theories of failure – Stresses on inclined planes – principal stresses and principal planes – Mohr's circle of stress.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

1. Apply the principle concepts behind stress, strain and deformation of solids for various engineering applications.
2. Analyze the transverse loading on beams and stresses in beam for various engineering applications.
3. Analyze the torsion principles on shafts and springs for various engineering applications.
4. Analyze the deflection of beams for various engineering applications.
5. Analyze the thin and thick shells and principal stresses in beam for various engineering applications.

TEXT BOOKS:

1. Bansal, R.K., Strength of Materials, Laxmi Publications (P) Ltd., 2007
2. Jindal U.C., Strength of Materials, Asian Books Pvt. Ltd., New Delhi, 2007

REFERENCES:

1. Egor. P.Popov " Engineering Mechanics of Solids" Prentice Hall of India, New Delhi, 2001
2. Ferdinand P. Beer, Russell Johnson, J.r. and John J. Dewole Mechanics of Materials, Tata McGraw Hill publishing 'co. Ltd., New Delhi.
3. Hibbeler, R.C., Mechanics of Materials, Pearson Education, Low Price Edition, 2007.
4. Subramanian R., Strength of Materials, oxford University Press, Oxford Higher Education Series, 2007.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C01	0.9	0.9	0.9										0.9	0.6	
C02	0.9	0.9	0.9										0.9	0.6	
C03	0.9	0.9	0.9										0.9	0.6	
CO4	0.9	0.9	0.9										0.9	0.6	
CO5	0.9	0.9	0.9										0.9	0.6	

PT5301 FUNDAMENTALS OF PRINTING AND PACKAGING TECHNOLOGY L T P C
3 0 0 3

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.

UNIT I EVOLUTION OF PRINTING AND PACKAGING TECHNOLOGY 9

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.

UNIT II PRINCIPLES OF DESIGN 9

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.

UNIT III INTRODUCTION TO PRINTING PROCESSES 9

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.

UNIT IV FUNDAMENTALS OF PACKAGING 9

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

UNIT V PRODUCTION PLANNING AND MANAGEMENT 9

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.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

1. Explain the history and evolution of Printing and Packaging technology
2. Create layouts and designs for various printing and packaging products.
3. Identify the key characteristics of each printing process.
4. Comprehend the basics of packaging technology.
5. 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.

REFERENCES:

1. Aaris Sherin, Irina Lee, Poppy Evans, The Graphic Design Reference & Specification Book, Rockport Publishers, 2013
2. Pamela Mortimer, Document Design Primer, GATF, 2003
3. Poppy Evans and Mark A.Thomas, Exploring the Elements of Design, Delmar Publishers, 2004
4. Robin McAllister, Design for Production, Delmar Publishers, 1997
5. T. M. Adams, D.D. Faux and L. T. Ricber, Printing Technology, Delmar Publications Inc., 1996

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√										
CO2	√	√	√		√							
CO3	√	√	√	√								
CO4	√	√		√								√
CO5	√	√	√		√				√		√	√

PT5302 PRE-PRESS AND IMAGING TECHNOLOGY L T P C
3 0 0 3

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.

UNIT I TEXT 9

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.

UNIT II GRAPHICS AND IMAGE 9

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.

UNIT III DIGITAL PREPRESS WORKFLOW 9

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;

UNIT IV SCREENING 9

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.

UNIT V OUTPUT DEVICES 9

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.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Apply typographic principles in graphic design and solve problems in font handling.
2. Summarize the working principle of image acquisition devices and factors affecting image quality
3. Create imposition schemes and determine the job sequence, software and hardware requirements in prepress workflow
4. Explain the need for halftoning, compare the digital halftoning and screening technologies and choose appropriate settings in RIP.
5. 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.

REFERENCES:

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.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√		√							
CO2	√	√										
CO3	√	√	√									
CO4	√	√		√								
CO5	√	√	√		√							√

PT5311 **DIGITAL PREPRESS LABORATORY I** **L T P C**
0 0 4 2

OBJECTIVES:

- To familiarize the tools and features of pagination and vector graphics design software.
- To learn formatting of text and concepts in bookwork.
- To understand the concept and application of layers in graphic design.

Creative Thinking

1. Thumbnails and Rough Sketch
2. Create artwork and design for print products

Pagination Software

1. Familiarization of software tool and basic typographic parameters
2. Create single and multiple columns
3. Tab setting and table edit
4. Create page by integrating text, graphics and images.
5. Create bookwork using advanced features.

Graphic Design Software

1. Introduction to vector graphic software features and tools
2. Creation of shapes & objects using drawing tools
3. Logo creation using object transformation tools
4. Graphic design for printed products

TOTAL: 60 PERIODS

OUTCOMES:

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

1. Reproduce page designs by applying typographic principles.
2. Create bookwork using master page and style sheets.
3. Replicate the given graphic design.
4. Create graphic design for various applications.
5. Prepare the artwork to suit production requirements.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√			√				√	√		
CO2	√	√	√		√				√	√		
CO3	√				√				√	√		
CO4	√		√		√				√	√		
CO5	√	√	√	√	√				√	√		√

ML5312 MATERIALS TESTING LABORATORY

L	T	P	C
0	0	4	2

COURSE OBJECTIVES:

1. To make the student familiarize with various mechanical testing.
2. To offer hands-on training in the evaluation of mechanical properties and the standards.
3. To know the importance of testing standards.
4. To demonstrate the importance of stress-strain curves and resistance to indentation in materials selection.
5. To expose the different methods of evaluating the soundness of weldment.

LIST OF EXPERIMENTS

1. To perform tensile test and draw stress-strain plot, determination of yield/proof stress, Ultimate tensile strength, breaking stress and % elongation.
2. Comparison of the stress-strain curves of aluminium alloys, steels, polymers and composites.
3. To perform hardness test and determine hardness value using Rockwell Hardness/ Brinnel Tester.
4. To determine hardness distribution using Micro vicker's hardness.
5. Determination of hardness by LEEB's Hardness tester.
6. Determination of fracture toughness by charpy impact test.
7. To perform compression test and compare the compressive behaviour of steels/ aluminium alloys.
8. To perform the torsion test.
9. To perform Longitudinal and transverse welds test.
10. To perform guide and root bend tests in welded specimen.
11. To perform Scratch hardness tests are to determine the hardness of a material to scratches and abrasion in Mohrs scale.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

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

1. Select a suitable mechanical test method to evaluate the properties of material.
2. Identify appropriate test method while performing failure analysis.
3. Use the stress-strain plot in materials selection.
4. Evaluate the soundness of the weldments.
5. Discriminate hardness and hardenability.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	0.9											0.3			
CO2	0.9			0.6								0.3			
CO3	0.9	0.3		0.6											
CO4	0.6	0.3		0.9								0.6			
CO5	0.3	0.6			0.9										

PT5401 COLOUR REPRODUCTION L T P C

3 0 0 3

OBJECTIVES:

- To learn the fundamental concepts of colour science, colour perception & measurement.
- To understand the principle of colour separation and colour reproduction in printing.
- To appreciate the impact of material variables on colour reproduction.
- To gain knowledge on systems approach to colour reproduction.
- To familiarize about proofing and colour control techniques.

UNITI COLOUR SCIENCE & MEASUREMENT 9

Light, colour, Light sources, Sample, Colour vision theories, Colour Perception, Colour appearance models, Colour attributes, Colourant-illuminant interaction, CIE Colour System – Standard observer, Colour matching experiment, Tristimulus values, Chromaticity diagram; Visual colour order systems, Nearly uniform colour spaces, Colour mixing systems, Colour difference equations, Colour measurement - Spectrophotometer, Colourimeter; ISO standards - Colour Viewing and Measurement.

UNIT II PRINCIPLES OF COLOUR REPRODUCTION 9

Additive theory - Display systems; Subtractive theory - Photographic systems, Printing systems; Colour halftoning; Colour originals - Types, Problems, Reproduction objectives, evaluation; Image acquisition - Image capture distortions, Image processing distortions; Colour Separation, Black generation - Skeletal black, UCR, GCR; High fidelity colour.

UNIT III SUBSTRATE AND INK 9

Substrates - Optical properties, Surface properties; Ink - Pigment colour, Transparency, Opacity, Masstone, Undertone, Colour gamut, Tinctorial strength, Gloss, Colour fastness, Fluorescence, Metallic appearance; Colour matching of inks - Classification of colourants, Spectral match, Metameric match, Kubelka Munk Theory, Colour mixing laws, Visual based colour matching, Instrumental based colour matching.

UNIT IV PRINTING SYSTEM ANALYSIS AND ADJUSTMENTS 9

Colour printing - Ink film thickness, Dot gain, Colour sequence, Ink trapping, Registration; Process

capability - Colour gamut, Additivity failure, Proportionality failure, image resolution; Process characterization, Colour reproduction strategies - Tone reproduction, Colour balance, Component approach, Integrative approach, fine tuning, related considerations; Colour Management Systems.

UNIT V PROOFING AND COLOUR CONTROL 9

Colour proofing– Purpose, Classification, Proofing considerations, Matching proofs and press sheets, ISO standards; Colour evaluation - colour bars, gray balance patches; Inline colour measurement devices - Principle, Components; Colour exchange format (CxF/X), ISO standards, Emerging trends - Spot colour characterization.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Represent colour using different colour models and calculate colour difference
2. Explain the principle of colour reproduction, evaluate colour originals and choose appropriate reproduction objective.
3. Infer the influence of substrate and ink properties on colour reproduction.
4. Implement suitable method to control colour in press.
5. Analyze the quality of colour proofs and printed sheets.

TEXT BOOKS:

1. Abhay Sharma, “Understanding Colour Management”,Thomson Delmar, 2004
2. Gary Field, “Colour and its Reproduction”, 3rd edition, GATF Press, 2004

REFERENCES:

1. BernsRS, “Billmeyer & Saltzman‘s Principle of Colour Technology”,3rd Edition, Wiley, 2000
2. John A.C. Yule, “Principles of colour reproduction applied to photomechanical reproduction, Colour photography and ink, paper and other related industries”, John Wiley & Sons, U.K., 2001
3. Phil Green, “Understanding Digital Colour”, 2nd edition, GATF Press, 1999.
4. R. W. G. Hunt, “The Reproduction of Colour”, 6th Edition, Wiley, 2004.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√		√	√							
CO2	√	√		√								
CO3	√	√	√	√								
CO4	√	√		√								
CO5	√	√	√	√	√							√

PT5402 FLEXOGRAPHY AND CONVERTING PROCESS L T P C
3 0 0 3

OBJECTIVES:

- To learn the basic principles of flexographic printing and designing for flexo
- To understand the various plate preparation methods
- To learn the mounting and proofing methods
- To comprehend the parts of flexo press and its operation.
- To obtain knowledge on flexographic quality control principles

UNIT I INTRODUCTION 9

Flexography – Basic principle, advantages, limitations, applications; Designing for flexo - Type, Tint, Vignette, Reverse, Registration tolerances, Barcode design; Template/Dieline preparation; Pre-flighting; Proofing; Design considerations, Screening Technologies for flexo; Environment and safety aspects; Ink, substrates.

UNIT II IMAGE CARRIER PREPARATION 9

Construction, Characteristics, Preparation - Moulded rubber plates, Sheet photopolymer plates, Liquid photopolymer plates; Direct Imaged Plates - Image Masking Technologies, Equipments; Plate considerations – plate handling, storage, wrap distortion, Ink and solvent compatibility, quality.

UNIT III PLATE MOUNTING AND PRESS CONFIGURATION 9

Plate mounting procedures - Optical, Pin Register, Microdot, Video, Sleeve; Mounting tapes - types, properties, selection; Improving press performance through mounting; Proofing procedure. Press types – stack, CI, inline, narrow web, wide web, corrugated post print; Variations of press – coating, lamination, corrugated post printing; extruders, online digital printing; Printing station – fountain rollers, anilox rollers, doctor blades, plate cylinders, impression rollers;

UNIT IV WEB HANDLING AND CONVERTING 9

Web Handling - Infeed, Outfeed, web guiding, pneumatic shafts and chucks; Web treatment and processing - Film treating, Dryers, Cooling rollers, static electricity, substrate cleaning, varnishing; Web inspection systems, Press Mechanics; Drives- Gear, Servo; Pressroom Practices ; inline converting operations- coating, embossing, die cutting, slitting, perforating, bag making, filling, folding, pasting;

UNIT V QUALITY CONTROL 9

Plate Standardization, ISO 12647-6, Flexo QC targets, Flexographic Print Evaluation, Job specific print variables, Automatic viscosity controls; Colour Matching, Press Optimization, Fingerprinting, Troubleshooting, Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. State the factors influencing design for flexography.
2. Design and optimize the plate preparation process
3. Explain the steps in the image carrier preparation and mounting
4. Discuss about the working of flexographic press and its control.
5. Implement quality control in flexographic printing workflow

TEXT BOOKS:

1. Flexography : Principles & Practices, 6th Edition, Foundation of Flexographic Technical Association, 2014.
2. FIRST: Flexographic Image Reproduction Specifications &Tolerances 5.0, 5th Edition, Foundation of Flexographic Technical Association, 2014.

REFERENCES:

1. Anthony White, High Quality Flexography, Pira reviews of Printing, Pira International,1999.
2. Frederick R.Boyle, The Flexo Environment, Foundation of Flexographic Technical Association, 2002.
3. Helmut Kipphan, Handbook of Print Media, Springer-Verlag, 2001

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√			√						
CO2	√	√	√									
CO3	√	√	√		√							

CO4	√	√	√		√							
CO5	√	√	√		√		√				√	

ME5752 **MECHATRONICS** **L T P C**
3 0 0 3

COURSE OBJECTIVES: The main learning objective of this course is to prepare the students for:

1. Selecting sensors to develop mechatronics systems.
2. Explaining the architecture and timing diagram of microprocessor, and also interpret and develop programs.
3. Designing appropriate interfacing circuits to connect I/O devices with microprocessor.
4. Applying PLC as a controller in mechatronics system.
5. Designing and develop the apt mechatronics system for an application.

UNIT I INTRODUCTION AND SENSORS 9

Introduction to Mechatronics – Systems – Need for Mechatronics – Emerging areas of Mechatronics – Classification of Mechatronics. Sensors and Transducers: Static and Dynamic Characteristics of Sensor, Potentiometers – LVDT – Capacitance Sensors – Strain Gauges – Eddy Current Sensor – Hall Effect Sensor –Temperature Sensors – Light Sensors.

UNIT II 8085 MICROPROCESSOR 9

Introduction – Pin Configuration - Architecture of 8085 – Addressing Modes – Instruction set, Timing diagram of 8085.

UNIT III PROGRAMMABLE PERIPHERAL INTERFACE 9

Introduction – Architecture of 8255, Keyboard Interfacing, LED display – Interfacing, ADC and DAC Interface, Temperature Control – Stepper Motor Control – Traffic Control Interface.

UNIT IV PROGRAMMABLE LOGIC CONTROLLER 9

Introduction – Architecture – Input / Output Processing – Programming with Timers, Counters and Internal relays – Data Handling – Selection of PLC.

UNIT V ACTUATORS AND MECHATRONICS SYSTEM DESIGN 9

Types of Stepper and Servo motors – Construction – Working Principle – Characteristics, Stages of Mechatronics Design Process – Comparison of Traditional and Mechatronics Design Concepts with Examples – Case studies of Mechatronics Systems – Pick and Place Robot – Engine Management system – Automatic Car Park Barrier.

TOTAL = 45 PERIODS

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

1. Select sensors to develop mechatronics systems.
2. Explain the architecture and timing diagram of microprocessor, and also interpret and develop programs.
3. Design appropriate interfacing circuits to connect I/O devices with microprocessor.
4. Apply PLC as a controller in mechatronics system.
5. Design and develop the apt mechatronics system for an application.

TEXT BOOKS:

1. Bolton W., “Mechatronics”, Pearson Education, 6th Edition, 2015.
2. Ramesh S Gaonkar, “Microprocessor Architecture, Programming, and Applications with the 8085”, Penram International Publishing Private Limited, 6th Edition, 2013.

REFERENCES:

1. Bradley D.A., Dawson D., Buru N.C. and Loader A.J., “Mechatronics”, Chapman and Hall, 1993.

2. Davis G.Alciatore and Michael B.Histand, “Introduction to Mechatronics and Measurement systems”, McGraw Hill Education, 2011.
3. Devadas Shetty and Richard A. Kolk, “Mechatronics Systems Design”, Cengage Learning, 2010.
4. NitaigourPremchandMahalik, “Mechatronics Principles, Concepts and Applications”, McGraw Hill Education, 2015.
5. Smaili.A and Mrad.F, “Mechatronics Integrated Technologies for Intelligent Machines”, Oxford University Press, 2007.

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	0.9	0.6											0.9		
2	0.9				0.9								0.9		
3	0.9		0.9										0.9		
4	0.9	0.6			0.9									0.9	
5	0.9								0.9						0.9

PT5403 PAPER AND BOARD TECHNOLOGY L T P C
3 0 0 3

OBJECTIVES:

- To study the fibrous and non fibrous processing
- To understand about paper manufacturing processes
- To learn the properties of paper and paper board and testing methods
- To be familiar with paper related problems in printing.
- To impart the knowledge about coating and coating techniques

UNIT I RAW MATERIALS & PROCESSING 9

Introduction to raw materials and processing, Sources, Kinds of cellulose fibres, De-barking, Pulping – Mechanical, Thermo-mechanical and Chemical processes –Bleaching techniques – Stock preparation – Beating & refining – Fillers, Sizing, Dyeing, bleaching –Non-fibrous additives, consistency and other raw materials.

UNIT II MANUFACTURING 9

Paper making machines, Head boxes and inlets, sheet formation, wet pressing and drying – mechanisms of drying, wires, felts, automation; Calendaring – types, winding process, Defects arising during the winding process, Board manufacturing – cylinder machines.

UNIT III COATING & CLASSIFICATION 9

Paper and board coating – Pigments, binders, additives. Coating – weightage, types/Techniques and metallization; Main classes of paper and board; paper and board sizes; paper requirements for different printing processes; paper handling, De-Inking-methods, recycling, paper properties, end-use; Environmental aspects and certification.

UNIT IV PROPERTIES 9

Structural – Formation, 2-sidedness, grain direction; Physical – GSM, caliper, bulk, porosity, smoothness, dimensional stability, curl, moisture content and relative humidity, Cobb tester, Optical - Gloss, brightness, Whiteness, colour, opacity; Chemical – pH, ash content, Taint and odor neutrality; Mechanical – Tensile, burst, tear, internal bonding, fold endurance, stiffness, pick resistance, absorbency, surface structure, surface smoothness and surface strength.

UNIT V PAPERAND PAPERBOARDRELATEDPROBLEMS INPRINTING 9

Fluff, hickies, picking, piling, slurring and doubling, curl, chalking, set-off, mottle, poor ink drying, show through, strike through mis-register, static electricity, blistering, and web break.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Summarize the various sources for paper and board manufacturing process
2. Appraise the various Properties and testing of papers and paper board
3. Follow the standards used for testing of paper and board
4. Rectify the paper related problems in printing and packaging
5. Recognize the need, importance of corrugated box in printing and packaging applications.

TEXTBOOKS:

1. Lawrence H.Wilson, What the printer should know about paper, GATF Press, Third Edition, 2000.
2. Lothar Gottsching & Heikki Pakarinen, Papermaking Science andTechnology,Book7, Fapet Publishing, 2000

REFERENCES:

1. Bob Thompson, Printing Materials Science and Technology, PiraInternational Publications 2nd edition,2004.
2. Charles Finley,PrintingPaperandInk,DelmarPublisher,1997.
3. Christopher J. Biermann, Handbook of Pulping and Papermaking,1996.
4. Herbert Holik, Handbook of Paper and Board,Wiley–VCH,2006.
5. John Christopher Roberts, Paper Chemistry, Springer, 1996

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√			√				√	√
CO2	√	√	√									
CO3	√	√	√									
CO4	√	√	√									
CO5	√	√	√	√	√							√

PT5404 OFFSET PRINTING TECHNOLOGY L T P C
3 0 0 3

OBJECTIVES:

- To study the principles of offset printing plates
- To acquire knowledge on sheet feeding and control
- To familiarize various cylinder configurations
- To understand the mechanisms of sheetfed offset printing machines
- To impart knowledge about materials and inline operations

UNIT I PRINCIPLES OF OFFSET PRINTING, PLATE CHEMISTRY & PROCESSING 9

Principles of lithography, wetting of a solid surface by a liquid before and after surface treatment. Base materials & properties – Aluminium, Stainless steel, Copper, Chromium, Nickel, Poly masters and paper masters; Graining – types; Contact angle and wettability; Anodisation – Process; Plate chemistry – Conventional plates, Photopolymer compounds, Digital Imaging Plates-Thermal sensitive, Silver halide, Silver hybrid plates; Plate exposing unit; Light source – Types– advantages,

disadvantages, Plates for digital imaging-, sensitivity, chemistry, mechanism of image formation and processing. Processless plates. Desensitizing process, gum, developing inks, lacquers and asphaltum, Quality Control Aids.

UNIT II SHEET FEEDING AND CONTROL 9

Fundamental elements of offset printing machine. Sheet feeding requirements. Types of feeders, sheet controls, drives, suction head mechanism, double sheet and no sheet detectors, side lays and front lays. Non-stop feeders. Sheet insertion and transfer systems, working principle, relative merits.

UNIT III PRINTING UNIT CONFIGURATION 9

Various types of configurations, cylinder design, requirements, plate and blanket clamping mechanisms. Gears, drives. Pressure setting, packing, print length variation, equal diameter, true rolling principles. Grippers, settings. Sheet transfer in multi colour presses, reversal systems for perfecting. Requirements of sheet delivery, quick delivery mechanisms. Anti set-off spray devices. Feeders, delivery and other system requirements for metal printing machines, Computerized offset machineries, Offset machine manufacturers - Major brands, Machine Formats, Technical comparison;

UNIT IV PRINTING BLANKETS, ROLLERS AND FOUNTAIN SOLUTION 9

Blanket types, requirements, manufacture, performance attributes. Rollers, types, properties, behavior. Emulsification of ink and fountain solution, fluid behavior in a nip. Basic inking and dampening system configuration. UV coaters and dryers; Fountain solution requirements, composition, re-circulation system and dosing units, Ink/water balance.

UNIT V PRINTING AND INLINE OPERATIONS 9

Make-ready operations, multi colour printing, automatic plate fixing, computer controls in printing, automatic blanket washing devices, roller washing solutions. Sheet coating systems, configuration spot coating and varnishing, numbering. Types of Dryers. Print problem identification and quality control strips, Test charts, ISO 12647-2. Emerging Trends - Automation, Print industry 4.0, Hybrid presses;

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Describe the principle of offset printing process and image carriers
2. Explain the sheet feeding mechanism
3. Infer the design principle of sheetfed offset machines
4. Identify factors influencing print quality
5. Demonstrate the sequence of press operating procedures and solve print problems

TEXT BOOKS:

1. Helmutt Kipphan, Handbook of Print Media, Springer, Heidelberg, 2001
2. Lloyd P. Dejidas, Thomas M. Destree, Sheetfed Offset Press Operating, GATF, 2005.

REFERENCES:

1. A.S.Porter, A Manual of Lithographic Press Operation, Lithographic Training Services, 1977
2. John MacPhee, Fundamentals of Lithographic Printing: Vol.I - Mechanics of Printing, GATF, 1998.
3. Thomas M. Destree, The PIA/GATF Guide to Troubleshooting for the Sheetfed Offset Press, GATF, 2005
4. W.R.Durrant. R.E. Witeworth and C.W.Meacock, Machine Printing, Focal Press, London, 1973

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√			√					
CO2	√	√	√		√							

CO3	√	√	√		√		√					
CO4	√	√		√		√	√	√				
CO5	√					√	√			√	√	√

PT5411 **PRINTING MACHINE LABORATORY** **L T P C**
0 0 4 2

OBJECTIVES:

- To understand the controls, settings and mechanisms of printing machines.
- To have hands on training in Semiautomatic and Automatic printing machine.
- To implement standard operating procedure for printing machines.

EXERCISES:

1. Study of controls, operations and specifications of printing machines.
2. Feeder setting and Plate fixing
3. Single colour printing in semi automatic offset machine.
4. Study of various mechanisms and settings.
5. Comparative study on different offset printing machines.
6. Single colour printing in automatic printing machine.
7. Roller and Cylinder pressure setting.
8. Study the effect of packing on print length.
9. Process colour printing in offset machine.
10. Densitometric measurements.

TOTAL: 60 PERIODS

OUTCOMES:

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

1. Summarize the standard operating procedure.
2. Operate a s heetfed offset press
3. Identify process control parameters
4. Standardize the machine and evaluate print quality
5. Demonstrate the practical knowledge and skills

CO-PO Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	√		√		√				√		√	
CO2	√	√		√								√
CO3	√	√	√	√						√		
CO4	√			√		√					√	
CO5	√	√	√	√			√			√	√	

PT5412 **DIGITAL PREPRESS LABORATORY II** **L T P C**
0 0 4 2

OBJECTIVES:

- To familiarize with the tools and features of image editing and colour correction software
- To learn about digital imposition and preparation of offset plates incorporating quality control aids.

EXERCISES:

Image Editing and Colour Correction Software

1. Introduction to Raster Graphics Software Features and tools
2. Creative image design
3. File formats & Sampling
4. Tonal adjustment, Histogram analysis and equalization
5. Image editing using masking and special effects

Digital prepress workflow

1. Output file preparation - File Packages, Exporting file in various PDF Versions PDF – Preparation, normalization
2. PDF – preflighting , Analyzing files for print production
3. Creating a digital imposition – Book Work, Multiple-Ups
4. Obtaining RIP output – Proofing, Plate
5. Exposure optimization and standardization
6. Preparing offset plates with quality aids

TOTAL : 30 PERIODS

OUTCOMES:

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

1. Design computer graphic image for print.
2. Perform image editing and create print ready file format
3. Generate PDF print ready files
4. Perform automatic workflow of jobs in prepress (Design and plan)
5. Understand the variables in plate making and standardize plate preparation

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√		√		√				√		√	
CO2	√	√			√						√	
CO3	√	√	√		√					√		
CO4	√		√		√				√		√	√
CO5	√	√	√	√					√			

GE5451 TOTAL QUALITY MANAGEMENT L T P C
3 0 0 3

COURSE OBJECTIVES:

- Teach the need for quality, its evolution, basic concepts, contribution of quality gurus, TQM framework, Barriers and Benefits of TQM.
- Explain the TQM Principles for application.
- Define the basics of Six Sigma and apply Traditional tools, New tools, Benchmarking and FMEA.
- Describe Taguchi's Quality Loss Function, Performance Measures and apply Techniques like QFD, TPM, COQ and BPR.
- Illustrate and apply QMS and EMS in any organization.

UNIT I INTRODUCTION 9

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of product and service quality –Definition of TQM-- Basic concepts of TQM –-Gurus of TQM (Brief introduction) -- TQM Framework- Barriers to TQM –Benefits of TQM.

UNIT II TQM PRINCIPLES 9

Leadership - Deming Philosophy, Quality Council, Quality statements and Strategic planning- Customer Satisfaction –Customer Perception of Quality, Feedback, Customer complaints, Service Quality, Kano Model and Customer retention – Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition & Reward and Performance Appraisal--Continuous process improvement –Juran Trilogy, PDSA cycle, 5S and Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating and Relationship development.

UNIT III TQM TOOLS & TECHNIQUES I 9

The seven traditional tools of quality - New management tools - Six-sigma Process Capability- Bench marking - Reasons to benchmark, Benchmarking process, What to Bench Mark, Understanding Current Performance, Planning, Studying Others, Learning from the data, Using the findings, Pitfalls and Criticisms of Benchmarking - FMEA - Intent , Documentation, Stages: Design FMEA and Process FMEA.

UNIT IV TQM TOOLS & TECHNIQUES II 9

Quality circles – Quality Function Deployment (QFD) - Taguchi quality loss function – TPM – Concepts, improvement needs – Performance measures- Cost of Quality - BPR.

UNIT V QUALITY MANAGEMENT SYSTEM 9

Introduction-Benefits of ISO Registration-ISO 9000 Series of Standards-Sector-Specific Standards - AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements-Implementation-Documentation-Internal Audits-Registration-ENVIRONMENTAL MANAGEMENT SYSTEM: Introduction—ISO 14000 Series Standards—Concepts of ISO 14001—Requirements of ISO 14001-Benefits of EMS.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1: Ability to apply TQM concepts in a selected enterprise.
CO2: Ability to apply TQM principles in a selected enterprise.
CO3: Ability to understand Six Sigma and apply Traditional tools, New tools, Benchmarking and FMEA.
CO4: Ability to understand Taguchi's Quality Loss Function, Performance Measures and apply QFD, TPM, COQ and BPR.
CO5: Ability to apply QMS and EMS in any organization.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		✓										✓
CO2						✓						✓
CO3					✓				✓			
CO4		✓			✓	✓	✓	✓				✓
CO5			✓			✓	✓	✓				

TEXT BOOK:

1. Dale H.Besterfiled, Carol B.Michna,Glen H. Bester field,MaryB.Sacre,HemantUrdhwareshe and RashmiUrdhwareshe, “Total Quality Management”, Pearson Education Asia, Revised Third Edition, Indian Reprint, Sixth Impression,2013.

REFERENCES:

1. Joel.E. Ross, “Total Quality Management – Text and Cases”,Routledge.,2017.
2. Kiran.D.R, “Total Quality Management: Key concepts and case studies, Butterworth – Heinemann Ltd, 2016.

3. Oakland, J.S. “TQM – Text with Cases”, Butterworth – Heinemann Ltd., Oxford, Third Edition, 2003.
4. Suganthi,L and Anand Samuel, “Total Quality Management”, Prentice Hall (India) Pvt. Ltd., 2006 .

PT5501 COSTING AND ESTIMATING FOR PRINTING AND PACKAGING L T P C
3 0 0 3

OBJECTIVES:

- To impart the knowledge basic concepts of costing and pricing
- To study the pricing, estimating and computer estimating process
- To understand the Cost estimating, Price estimating for various print jobs
- To analyze the cost and price for print finishing operations
- To familiarize the concepts on investment analysis

UNIT I COSTING AND PRICING 9

Costing systems - cost; profit; price; functions of costing; costing models; types of costing – marginal costing, job costing, budgeting costing; types of budgets; budgetary control; sales forecasts and budgets for printing and allied industries; relationship between cost control and budgetary control.

UNIT II ESTIMATING 9

Cost estimating, price estimating, estimator needs; procedure for selling, estimating, pricing and quoting for printing; estimating methods; production planning; computerized estimating.

UNIT III ESTIMATING MATERIALS FOR PROCESSES 9

Printing cost – Paper, sheet and web; ink; toners; pre-press; machine printing–sheet-fed offset, web offset, flexography, gravure, screen printing, digital printing; post press; e-publishing. Packaging cost – material cost, process cost and profit.

UNIT IV COST ANALYSIS 9

Classification of cost; elements of cost; costing of direct materials; costing of manual operations; costing of machine operations; costing – type setting, scanning, plate-making, printing, binding and finishing operations.

UNIT V INVESTMENTANALYSIS 9

Time value of money, compound value, present value, annuities, payback method, average rate of return and internal rate of return method; Depreciation, Return on Investment, Return On Capital Expenditure; Break even analysis-Calculation of breakeven point, margin of safety, sensitivity analysis and profit graphs, Basics of Credit Management–AR, AP.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Estimate the cost of different materials used in printing
2. Identify the pricing, costing and budget system for printing
3. Apply the concepts of costing technique in Press, prepress and post press
4. Calculate the composite machine hour rate(CMHR)and budgeted hour rate(BHR) for the machines used in printing
5. Do Investment analysis and breakeven analysis

TEXTBOOKS:

1. Hugh Speirs, Print Estimator's Handbook, 2nd edition, PiraInternational Ltd., 2004
2. Prasanna Chandra, Financial Management, Theory and Practice, TataMcGrawHill, NewDelhi,6thEd., 2004.

REFERENCES:

1. Cost Accounting for Printers, Part I and Part II, British Printing Industries Federation, 1982
2. Dipl.-Ing.B.D.Mendiratta,Printer'sCostingandEstimating,PrintingIndiaPublications Pvt. Ltd., 1999.
3. Hugh M.Speirs, Print Estimators–The Handbook, BPIF, 1996.
4. K.S. Venkataraman and K.S. Balaraman, Estimating Methods and Cost Analysis for Printers, Ramya Features and Publications,1987

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√								√	√
CO2	√	√	√	√							√	
CO3	√	√	√	√							√	
CO4	√	√	√	√							√	
CO5	√	√	√	√	√							√

PT5502 PACKAGING MATERIALS L T P C

3 0 0 3

OBJECTIVES

- To introduce the fundamental knowledge in the different types of packaging materials
- To impart knowledge in the selection of suitable material for various packaging applications.
- To identify the suitable packaging material for various applications.
- To give the knowledge on ancillary materials.
- To describe the various characterization and testing methods.

UNIT I PLASTICS 9

Polymers, Plastics in packaging – types, advantages; Flexible and Rigid packaging – Properties, applications; Thermoplastic Materials, Thermoset Materials, Food grade plastics – properties, processing methods, applications; Recycling; Biodegradable and Eco friendly packaging - Advantages and disadvantages.

UNIT II WOOD, PAPER AND TEXTILE 9

Wood – Types, Materials, characteristic properties, application, Nature of wood, properties, wood treatment; Textile – Types of cloth, properties, application; Paper and Board – Types, Properties, Specialty papers for Packaging, Corrugated Boards – Types, Applications, Specifications.

UNIT III GLASS AND METALS 9

Glass – Types, Properties, use, Chemistry, coatings, defects and application areas; Metals – Tin, Steel, Aluminium – Cans, drums, lacquers, sheet – Materials, properties, treatment, coatings, recycling process; Foil – Materials, characteristics, decoration, lamination and metallization methods.

UNIT IV ANCILLARY MATERIALS 9

Closures and sealing – materials and properties. Cushioning Materials – properties and areas of application. Lacquers – properties, uses; Special additives for food grade films; Nano materials, Reinforcement – materials and properties.

UNIT V MATERIAL TESTING 9

Mechanical – Tensile, Tear, Burst, Impact; Barrier properties - WVTR , OTR , Adhesion test, Optical – Gloss, haze and clarity; Chemical Resistance test – solvents and chemicals, Migration test, Plastic material identification test, solvent retention; Hardness and corrosion test for metals; Clarity and brittleness test for glass, Standards – ISO, ASTM, TAPPI, BIS.

TOTAL: 45 PERIODS

OUTCOMES

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

1. Analyze the suitable plastic packaging material for various applications.
2. Determine the appropriate paper and board for packaging applications
3. Categorize the suitable coating methods for packaging material.
4. Assess the correct ancillary materials for different applications.
5. Identify the quality control standards used for testing of packaging materials

TEXT BOOKS

1. S. Natarajan. M. Govindarajan, and B. Kumar Fundamental of Packaging Technology PHI, New Delhi, 2014
2. Walter Soroka, Fundamentals of Packaging Technology, Institute of packaging Professionals, Fourth Edition, 2010.

REFERENCES:

1. Bettine Boltres, “When Glass Meets Pharma: Insights about Glass as Primary Packaging Material”, Editio Cantor, 2015.
2. Gordon L. Robertson, “Food Packaging: Principles and Practice”, Third edition, CRC Press, 2016.
3. Mark J.Kirwan, “Handbook of Paper and Paperboard Packaging Technology”, Wiley – Blackwell, 2012.
4. Selke, Susan EM, and John D. Culter. Plastics packaging: properties, processing, applications, and regulations. Carl Hanser Verlag GmbH Co KG, 2016.
5. Shah, V. (2007). Handbook of plastics testing and failure analysis (Vol. 21). John Wiley & Sons.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√	√		√	√				
CO2	√	√	√	√	√	√	√					
CO3	√	√	√	√	√		√	√				
CO4	√	√	√	√	√	√	√	√		√		
CO5	√	√	√	√	√	√						√

PT5503 INKS AND COATINGS L T P C
3 0 0 3

OBJECTIVES:

- To study the raw materials for the preparation of printing inks
- To provide the knowledge on ink formulation and manufacturing methods
- To discuss the different specilaity inks and drying mechanism.
- To give the importance and types of various surface treatment methods and coatings.
- To analyse the ink related problems and testing methods.

UNIT I RAW MATERIALS 9

Colourants – Classification, preparation and properties; Inorganic – white and coloured, carbon black, metallic, ultramarine and fluorescent; organic - Diarylide yellow, Hansa yellow, Rhodamine, Lithol, Rubine; Dyestuffs and oils - Types, Preparation, Properties and uses; Varnishes-types, applications; Solvents - General properties; Solvents like Hydrocarbon, alcohols, glycols, ketones, esters and their properties; Resins – Natural Rosin and its derivatives and Gumarabic; Synthetic – Rosin modified fumaric, maleic and phenolic, alkyds, hydro carbons, polyamides, Polyvinyl, Epoxy resins, Acrylic resins, Ethyl Cellulose and Nitrocellulose; Additives–Properties and applications Driers, Waxes, Antioxidants, plasticizers, wetting agents, defoaming agents and Antiskinning agents.

UNIT II INK FORMULATION AND MANUFACTURING 9

Offset Inks – Pigments, Resins, Vehicles, Plasticizers, Additives, Ink dispersion, Ink rheology and variables; Inks for sheet and web – Book printing, package printing, publication printing; Flexography Inks – colourants, pigments and dyes, selection criteria, Ink vehicle and its properties, resin types and selection criteria, Additives, Ink rheology, Inks for paper, plastics and foil; Gravure Inks – colourants, Vehicles, solvents, Ink additives, Publication gravure inks, Packaging and product inks, rheology; Screen inks - Constituents, Properties, Inks for paperboard, plastic containers, textile inks, impervious substrates and metallic substrates; Manufacturing methods – Paste inks, Liquid inks, premixing, Flowchart - Ball mill, Bead mill and Triple roll mill.

UNIT III SPECIALITY INKS AND INK DRYING MECHANISMS 9

Metallic Inks, Fluorescent Inks, Fugitive, Penetrating, Magic Inks, Invisible Inks, Polybond Inks, Mellow Inks, Carbonising Inks, Radiation curable inks-IR, UV & EB–Raw materials, equipment used for drying; Security inks– Thermochromic and Photochromic; Nanoinks; Ink drying mechanisms.

UNIT IV COATINGS AND SURFACE MODIFICATION 9

Importance and Scope of surface modification, Surface Energy, Role of surface roughness, Methods – Chemical, Corona Treatment, Plasma Treatment, Laser assisted modification, Coating types - Oil based, water based, UV and EB coatings and nano emulsions, Roller coatings and Hybrid coatings - constituents, properties.

UNIT V TEST AND MEASUREMENTS 9

Viscosity, Tack, Colour, Gloss, Rub resistance, Length, Drying Characteristic, and Fineness of grind gauge, light fastness, Effect of temperature and humidity; Standards on environmental concerns, end use applications, Ink problems related to printing processes – Trouble shooting.

TOTAL: 45 PERIODS

OUTCOMES

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

1. Select suitable raw material for ink preparation.
2. Comprehend the manufacturing process of Inks.
3. Recognize the suitable ink drying mechanism
4. Select the coating and surface modification methods.
5. Follow the standards and rectify the problems used for testing of printing Inks.

TEXT BOOKS

1. Steven Abbott, Nigel Holmes, “Nanocoatings: Principles and Practice: From Research to Production”, DesTECH Publications, 2013.

REFERENCES

1. Hans-Joachim Streitberger, Artur Goldschmidt, “Basics of Coating Technology”, European Coatings Library, 2018.
2. Joanna Izdebska, Sabu Thomas, “Printing on Polymers”, Elsevier, 2016.
3. Robert Leach, “The Printing Ink manual”, Springer, 2012.
4. Sam Zhang, “Thin Films and Coatings”, CRC Press, 2016
5. Steven Abbott, Nigel Holmes, “Nanocoatings: Principles and Practice: From Research to Production”, DesTECH Publications, 2013.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√			√	√	√				
CO2	√	√				√	√	√	√			√
CO3	√	√		√	√	√	√		√			√
CO4	√	√	√	√	√	√	√	√	√	√		√
CO5	√	√	√	√	√	√	√	√	√	√		√

PT5511 **PACKAGE DESIGN LABORATORY** **L T P C**
0 0 4 2

OBJECTIVES:

- To describe the role of graphic design in packaging
- To illustrate the design of labels for folding cartons
- To outline the utility of package structural designing software
- To illustrate the integration of graphic design in 3D structural design
- To illustrate the use of 3D modeling software to create simple packaging components

EXERCISES:

1. Graphic design for packaging applications
2. Designing Graphics for flexible pouches and metal cans
3. Designing for labels and folding cartons
4. Structural design for packaging applications
    a. Parallel Tuck-in Carton layout preparation
    b. Reverse Tuck-in carton layout preparation
    c. Auto-lock bottom carton layout preparation
5. Integration and visualization of structural and graphic designs
6. Designing for multiple-ups using Package Designing software
7. Introduction to CAD/3D modeling software
8. Designing of simple packaging component in 3D
9. 3D designing of bottle

TOTAL: 60 PERIODS

OUTCOMES:

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

1. Create graphic design for packages
2. Design considering the structural aspects of packages
3. Optimise material usage in package design
4. Prepare multiple-ups suitable for real time production
5. Create simple 3D models of packaging components

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		✓			✓	✓				✓		
CO2			✓		✓	✓	✓					
CO3		✓			✓	✓	✓					
CO4	✓	✓	✓		✓	✓						
CO5			✓		✓	✓						

PT5512 PRINTING AND PACKAGING QUALITY CONTROL LABORATORY L T P C
0 0 4 2

OBJECTIVES:

- To understand the testing and quality control of printing and packaging materials.
- To have hands on training in Instrumentation handling and testing
- To learn about performance properties of package materials

EXERCISES:

1. Determination of GSM for various substrates.
2. Determination of viscosity for Ink.
3. Determination of stiffness for paper and board
4. Determination of burst strength for paper and board
5. Determination of rub resistance for paper and board
6. Determination of COBB value for paper and board
7. Determination of tensile and compression strength
8. Determination of smoothness and porosity
9. Determination of WVTR for paper board and plastic film.
10. Determination of OTR for paper board and plastic film.

TOTAL:60 PERIODS

OUTCOMES:

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

1. Operate the quality control and testing equipment's
2. Standardize the quality and performance of printing and packaging materials.
3. Create the standard working procedure for testing of packaging materials.
4. Implement various standards like ISO, TAPPI, ASTM and IS in testing.
5. Identify samples and sampling method for package testing.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓							✓	
CO2	✓	✓	✓	✓							✓	
CO3	✓	✓	✓	✓							✓	
CO4	✓	✓	✓	✓							✓	
CO5	✓	✓	✓	✓							✓	

PT5513 **INDUSTRIAL TRAINING /INTERNSHIP** **L T P C**
0 0 0 2

OBJECTIVES:

- To experience and understand real life situations in industrial organizations and their related environments
- To accelerate the learning process of how student's knowledge could be used in a realistic way.

*The students have to undergo practical industrial training for four weeks (in second and third year holidays) in industrial establishments.

I. At the end of the training they have to submit a report with following information:

1. Profile of the Industry
2. Product range
3. Organization structure
4. Plant layout
5. Processes/Machines/Equipment/devices
6. Workflow & standard operating procedure
7. Safety measures
8. Projects undertaken during the training, if any
9. Learning points.

OUTCOMES:

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

1. Identify various new technologies and process involved in printing and packaging industries
2. Solve printing and packaging problems.
3. Prepare technical report

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

GE5251 ENVIRONMENTAL SCIENCES L T P C
3 0 0 3

OBJECTIVES:

- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
- To facilitate the understanding of global and Indian scenario of renewable and non-renewable resources, causes of their degradation and measures to preserve them.
- To familiarize the influence of societal use of resources on the environment and introduce the legal provisions, National and International laws and conventions for environmental protection.
- To inculcate the effect of population dynamics on human and environmental health and inform about human right, value education and role of technology in monitoring human and environmental issues.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – bio geographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land 47 degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment protection act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

- To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.
- To identify the causes, effects and environmental pollution and natural disasters and contribute to the preventive measures in the immediate society.
- To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.
- To recognize different forms of energy and apply them for suitable applications in for technological advancement and societal development.
- To demonstrate the knowledge of societal activity on the long and short term environmental issues and abide by the legal provisions, National and International laws and conventions in professional and personal activities and to identify and analyse effect of population dynamics on human value education, consumerism and role of technology in environmental issues.

TEXT BOOKS:

1. Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers (2018).
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, (2016).
3. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education (2004).

REFERENCE BOOKS:

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.
2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT. LTD, New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press (2005).
5. Erach Bharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. (2013).

PT5601 PACKAGING TECHNIQUES AND PROCESSES L T P C
3 0 0 3

OBJECTIVES:

- To understand the purpose of packaging design
- To study the different types of packaging process
- To understand the packaging testing methods
- To learn about package manufacturing process
- To implement procedure for quality control package testing

UNIT I INTRODUCTION 9

Need for packaging, functions of packaging and types of package, packaging hazards, interaction of package and contents, shelf life, Packaging materials selection criteria, Materials and machine interface, lifecycle assessment.

UNIT II PACKAGE DESIGN 9

Package design, Package specification Types of design, structural, graphics, Factors influencing design, fundamentals of graphic layout design, Package colour - Selection criteria - Applications, Types of load, unit load safe stacking load, elements and principles of design, Structural design – cans, bottles, folding cartons, corrugated boxes, CAD applications

UNIT III PACKAGING TYPES 9

Food, Pharmaceutical, FMCG, Industrial and Specialty packaging: Aerosol packaging, blister packaging, Anti-static packaging, Aseptic packaging, Child resistant packages -closures, Modified Atmospheric Packaging(MAP),Vacuum Packaging, Retort packaging, Eco-friendly packaging, Export packaging, Labels, Closures and Cushioning in packaging.

UNIT IV MANUFACTURING PROCESSES 9

Folding carton manufacturing cutting; creasing; die making, punching, Cartoning Machineries types, flexible pouches forming machines, corrugated box manufacturing process, Rigid boxes manufacturing process, Drums-types, applications; Molded pulp containers; Three piece and two piece can; seam treatment types, Collapsible tubes, Flexible pouches forming machines; Metal foil packaging; bag making machinery-types; packaging line automation.

UNIT V PACKAGE TESTING 9

Package Performance testing-test standards; drop test, inclined impact, horizontal impact, vibration testing, stacking and compression test, rolling test, climatic test, rain test and corrugated board testing.

TOTAL:45 PERIODS

OUTCOMES:

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

1. Articulate the types of packages and manufacturing processes.
2. Comprehend the importance of package design for various applications
3. Analyze various test methods for package suitability
4. Summarize the concepts of food, Pharma and FMCG packaging
5. To create the design of primary, secondary and tertiary packaging

TEXT BOOKS:

1. Bill Stewart, Packaging Design Strategies, PiraInternational Ltd, 2nd Edition 2004
2. Walter Soroka, Fundamentals of Packaging Technology, Institute of packaging professionals, Fifth Edition,2014.

REFERENCES:

1. Arthur Hirsch, Flexible Food Packaging, Van Nostor and Reinhold, New York, 1991.
2. Aaron L. Brody & Kenneth S. Marsh, Encyclopedia of Packaging Technology, John Wiley Inter science Publication, II Edition,1997.
3. Paine, Packaging Development, PIRA International,1990.
4. Walter Stern, Hand book of Package Design Research, Wiley Interscience,1981.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√				√				√	√
CO2	√	√	√								√	
CO3	√	√	√	√			√				√	
CO4	√	√	√	√			√				√	
CO5	√	√	√								√	√

PT5602 **PRINT FINISHING** **L T P C**
3 0 0 3

OBJECTIVES:

- To explain the print finishing workflow
- To illustrate the use of automatic and semi-automatic guillotine machine
- To illustrate the process involved in various securing operations,
- To illustrate the case making process for hard bound books
- To illustrate the controls, operations and Mechanisms of various print finishing equipments.

UNIT I BINDING MATERIALS 9

Overview of binding and finishing; Print finishing – classification; materials; JDF and MIS in book binding and print finishing, trends and developments in finishing operations; adhesives – types, manufacturing, theory of adhesion; prevention of deterioration; Production control, Network analysis and Quality control.

UNIT II GUILLOTINES 9

Joggers; cutting – overview, work preparation; cutting machine – parts, types of motion; Principles of single knife guillotines, semi-automatic and automatic programming systems, three knife trimmers; operation, mechanism and maintenance of guillotines; various adjustments; operational procedure of sensors and hydraulic systems; problems and remedies during cutting.

UNIT III FOLDING 9

Principles of folding, types of folding for sheet and web, methods of feeding and delivery; folding production line, folding terminology, folding diagram, folding scheme; problems involving folding; mechanism, operation and adjustment of folding machines; additional features – fold gluing, perforators, creasers and slitters.

UNIT IV GATHERING AND SECURING OPERATION 9

Principles of gathering, types of machines, feeders, delivery, inline production; Securing – types, characterization; stitching – wire and thread; adhesive binding; sewing – types, feeders and delivery; mechanical and loose leaf binding; materials, styles, purpose of each method.

UNIT V MISCELLANEOUS FINISHING OPERATION AND AUTOMATION IN BINDING 9

Edge treatment – characterization, edge staining, bookmark, rounding, backing, headband, edge treatment operation in production lines; case making – characterization, producing book covers, case making, casing in, inserting jackets; principles and operation of embossing, foil stamping – hot and cold, die-cutting, coating, indexing, round cornering, poly-bagging, preventing transit marking; lamination – types; In-Line Gluing Equipment, Off-Line Scoring, Shrink Wrapping, Automated OffLine Kit Fulfillment, Integrated Off-Line Card and Label, Hybrid finishing formats and equipments, materials handling and mailing.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Outline and discuss the print finishing workflow
2. Examine and operate automatic and semi-automatic guillotine machines
3. Plan the sequences suitable for various types of securing operations
4. Design and construct hard case for book binding
5. Examine and operate various print finishing machineries

TEXT BOOKS:

1. A. G. Martin, Finishing Process in Printing, Focal press Ltd., Britain, 1980.
2. T. J. Tedesco, Binding, Finishing and Mailing: The Final World, GATF press, Pittsburgh, 2005.

REFERENCES:

1. Arthur W. Johnson, The practical guide to Craft Book Binding, Thames and Hudson, 1985
2. Arthur W. Johnson, Book Binding, Thames and Hudson, 1984
3. Helmutt Kipphan, Handbook of Print Media, Springer, Heidelberg, 2001
4. Ralph Lyman, Binding and finishing, GATF, 1993
5. T. M. Adams, D.D. Faux and L. T. Ricber, Printing Technology, Delmar Publications Inc., 1996

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓				✓	✓			✓	✓		
CO2	✓	✓	✓		✓	✓			✓			
CO3	✓	✓	✓		✓	✓		✓	✓		✓	
CO4	✓	✓	✓		✓	✓		✓	✓			
CO5	✓	✓	✓		✓	✓			✓			

PT5603 GRAVURE AND SCREEN PRINTING L T P C
3 0 0 3

OBJECTIVES:

- 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.

UNIT I GRAVURE PROCESS AND IMAGE CARRIER PREPARATION 9

Process characteristics, cylinder construction – design, balancing; electro plating and polishing - copper, chrome; reuse of cylinder; cylinder layout; chemical etching - masking, etching bath, spray etching; electromechanical - cell configuration, cell volume, stylus angle, line screen, moire, engraving time, electromechanical engraver; laser engraving - cylinder materials, laser sources, direct process, indirect process, cell structure, laser engraver; electron beam engraving; Wrap around plates; Quality Control for cylinders, Cylinder inspection systems,

UNIT II GRAVURE PRINTING MACHINE 9

Doctor blade assembly – conventional, reverse angle, holder, loading, doctor and back-up blades; oscillation, positioning; impression rollers – types, loading, deflection; electrostatic assist impression system; inking system – types; dryer – types; Press design – types; in feed and out feed coating; lamination, inline solventless lamination; inline converting operations; power transmission system.

UNIT III SCREEN PRINTING COMPONENTS 9

Process characteristics; essential components; Screen fabrics – types, fabric terminology, fabric selection; frames – types; fabric tension characteristics; tension measurement; squeegees – types, techniques, selection, maintenance and blade sharpening; substrates and inks; screen printed products.

UNIT IV STENCIL PREPARATION AND PRESSES 9

Stencil types – Direct stencil, indirect stencil, capillary film – stencil exposure, stencil preparation; stencil selection; presses – graphic presses, textile presses, and container printing; dryers – types.

UNIT V PRINT PROBLEMS AND QUALITY CONTROL 9

Print problems and remedies; quality control aids; maintenance; health and safety issues; waste disposal and environmental safeguards. Machine manufacturers - Major brands, Machine Formats, Technical comparison; ISO - 12647- 5;

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Summarize the characteristics of gravure printing process and discuss about the methods of cylinder engraving.
2. Explain the components and operation of the different types of gravure presses
3. Analyze the process characteristics of screen printing technology and relate print quality with the selection of printing components.
4. Compare the stencil preparation techniques and select the type of screen printing press based on the application requirements.
5. Apply quality control concepts and solve print problems in gravure and screen printing processes

TEXT BOOKS:

1. Gravure: Process and Technology, Gravure Education Foundation, 2003
2. Kaj Johansson, Peter Lundberg, Robert Ruberg, A Guide to Graphic Print Production, Wiley, 2002

REFERENCES:

1. Harry B. Smith, Modern Gravure Technology, Pira reviews of Printing, Pira International,1994
2. Ingram, Samuel, Screen Printing Primer, GATF press, 2nd Edition, 1999.
3. NIIR Board, Screen Printing Technology Handbook, Asia Pacific Business Press Inc., 2004
4. Samuel B. Hoff, Screen Printing – A Contemporary Approach, Delmar Publishers,1997.
5. William Appleton, Screen Printing, PIRA International, 1994.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓		✓					✓
CO2	✓	✓	✓									
CO3	✓	✓	✓	✓			✓					
CO4	✓	✓	✓	✓								
CO5	✓	✓	✓	✓		✓	✓			✓	✓	✓

PT5611 COLOUR REPRODUCTION AND MANAGEMENT LABORATORY L T P C
0 0 4 2

OBJECTIVES:

- To understand the influence of device settings in image acquisition and learn the tonal and colour adjustments
- To understand colour management options in various stages of prepress workflow

EXERCISES:

1. Monitor profiling and colour management settings
2. Image acquisition and analysis
3. Colour correction
4. Creating output profiles
5. Generation of soft proof and digital proof
6. Colour measurement and evaluation
7. RGB and CMYK workflow
8. Colour separation with different black generation settings
9. Colour reproduction comparison using various substrates
10. Colour reproduction evaluation - ISO standards
11. Introduction to numerical computing software for image editing.

TOTAL: 60 PERIODS

OUTCOMES:

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

1. Perform image acquisition, colour correction and image analysis.
2. Create profiles for various devices.
3. Evaluate quality of proof and print for given quality standards.
4. Perform colour conversion for different colour reproduction objectives.
5. Customize software and RIP settings for given press parameters.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√	√				√	√		
CO2	√	√		√					√	√		
CO3	√	√		√					√	√		√
CO4	√	√	√	√					√	√		√
CO5	√	√	√	√	√				√	√		

PT5612 **PRINT FINISHING LABORATORY** **L T P C**
0 0 4 2

OBJECTIVES:

- To explain the print finishing workflow
- To illustrate the use of automatic and semi-automatic guillotine machine
- To illustrate the process involved in various securing operations,
- To illustrate the case making process for hard bound books
- To illustrate the controls, operations and Mechanisms of various print finishing equipments.

I STUDY OF VARIOUS CONTROLS, OPERATION AND MECHANISMS OF

1. Programmable Cutting Machine
2. Folding Machine
3. Perfect Binding Machine
4. Wire Stitching Machine
5. Lamination Machine (Wet and Dry types)

II MECHANICAL AND LOOSE LEAF BINDING

1. Comb binding
2. Spiral binding
3. Wire-o-binding

III PREPARATION OF

1. End Papers
2. Case Bound
3. Perfect Bound
4. Saddle and Side stitch Binding

TOTAL: 60 PERIODS

OUTCOMES:

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

1. Outline and discuss the print finishing workflow
2. Examine and operate automatic and semi-automatic guillotine machines
3. Plan the sequences suitable for various types of securing operations
4. Design and construct hard case for book binding
5. Examine and operate various print finishing machineries

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓				✓	✓			✓	✓		
CO2	✓	✓	✓		✓	✓			✓			
CO3	✓	✓	✓		✓	✓		✓	✓		✓	
CO4	✓	✓	✓		✓	✓		✓	✓			
CO5	✓	✓	✓		✓	✓			✓			

PT5701 **ELECTRONIC PUBLISHING** **L T P C**
3 0 0 3

OBJECTIVES:

1. To understand the basics of Online Publishing concepts and avenues.
2. To learn the importance of layout and design in areas of publishing
3. To familiarize electronic publishing models and workflow software.
4. To comprehend various software tools in designing e-publishing
5. To design and launch website for online publishing

UNIT I INTRODUCTION **9**

Internet, WWW, Web2.0, Broadband, Print On-demand, e-Book, e-Journals, e-Newspaper, internet advertising, Digital libraries, e-Readers – e-Ink, e-paper, Electronic Publishing- Advantages, Issues.

UNIT II TYPE OF PUBLISHING **9**

Areas of publishing – Legal, STM, Book Publishing – Manuscript, Anatomy of a book, Layout & Design, Journal Publishing – Layout & Design, Web Publishing – Layout & Design, Accessibility, usability, standards, Publishing on Handheld devices – Layout & Design , - Reference database – PUBMED, Index – author, volume, keyword.

UNIT III WORKFLOW **9**

Authors, Publishers, e Publishing Companies; Workflow – Receiving Jobs (FTP), Pre-editing, Copy editing, Proof reading, Graphics, Pagination, Quality Control, Output – Print, Proof, Web, Handheld devices(file formats) ; Workflow softwares, Publishing Management System: Publication representation; Publication environments; Publication node structure; Version management; Content objects & processing objects; Publication naming; Information sharing Hypertext and its principle.

UNIT IV SOFTWARES & TOOLS **9**

Conventional workflow, XML workflow, STM Typesetting softwares, Pagination softwares, Image manipulation softwares, Markup languages – fundamentals, Presentation technologies (HTML, CSS, WML, XSL/XSL-FO), Representation technologies (XML, DTD, W3C XML Schema,) Transformation technologies (SAX, DOM, XSLT), Scripting languages (ASP, JS, Perl), Unicodes for non-English characters.

UNIT V PRODUCTION AND MAINTENANCE OF WEBSITE 9

Digital Business models in Internet, Marketing, Future publishing Models, Recent trends in e-publiing; Design and Construction – Testing, Launch and Handover – Maintenance – Review and Evaluation and Scripts, Develop Portfolios in the Form of Web Pages which have to be uploaded in Free Public Domains.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Summarize the avenues of electronic publishing
2. Develop and design layouts for various digital gadgets.
3. Distinguish the functions of various modules of a workflow software
4. Choose proper software for web presentation and transformation language.
5. Construct and launch a website for publishing.

TEXT BOOKS:

1. Peter K. Ryan, Careers in Electronic Publishing, The Rosen Publishing Group, 2013
2. Robert Campbell, Ed Pentz,, Ian Borthwick, Academic and Professional Publishing, Elsevier, 2012

REFERENCES:

1. Eric Ladd, Jim O' Donnel, Using HTML 4, XML and Java, Prentice Hall of India – QUE, 1999
2. Harold Henke, Electronic Books and e-Publishing: A Practical Guide for Authors, Springer Science & Business Media,2001
3. Rae A. Earnshaw, Huw Jones, John A. Vince, Digital Media and Electronic Publishing, Academic Press, 2007.
4. Richard Guthrie, Publishing: Principles and Practice, SAGE, 2011
5. Thomas A. Powell, ―The Complete Reference–Web Design‖, Tata McGraw Hill, Third Edition, 2003.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√							√	
CO2	√		√						√	√		
CO3	√		√		√				√	√		
CO4	√	√	√		√				√			√
CO5	√	√	√	√						√	√	

PT5702 PRINT OPERATIONS MANAGEMENT L T P C

3 0 0 3

OBJECTIVES:

- To understand the concepts of scheduling and its importance in the printing Industry.
- To acquire knowledge about the various applications of inventory and project management with respect to the printing Industry.
- To sequence printing jobs in a printing organization
- To extrapolate networking to planning jobs in a printing and packaging company
- To design the day to day management plan for the functioning of a printing and packaging organization

UNIT I INTRODUCTION 9

Organization Structure – Sole Proprietor, Partnership, Limited Company, Administrative office routine, Forms used, Processing orders; Facility location decision making – Economic analysis – Qualitative factor Analysis – Layout of the factory – Analysis & selection; Human Factors - Consideration of man & machine, job design; Ergonomics – Working environment, Worker safety.

UNIT II SEQUENCING 9

Gantt chart, Algorithms for solving sequencing problems – Processing of N jobs through 2 machines, n jobs through 3 machines, n jobs on K machines, Assignments and transportation algorithms, Production Line Balancing

UNIT III INVENTORY MANAGEMENT 9

Definition & purpose, Inventory classification, EOQ, Materials handling & Warehousing.

UNIT IV MATERIALS & CAPACITY REQUIREMENT PLANNING 9

MRP, CRP–Concepts & applications, Aggregate planning & Master Scheduling, ERP–Concepts and systems.

UNIT V NETWORK MODELS 9

Introduction, PERT & CPM models, Network construction, Problems, Resource analysis & allocation, Replacement analysis, Application & case studies.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Discuss the working of printing organization
2. Calculate ideal sequencing time using various algorithms and models
3. Solve inventory management problems
4. Discuss materials and capacity requirement planning
5. Plan Network models for printing and packaging industries

TEXT BOOKS:

1. Joseph G.Monks, “Operations Management – Theory and Problems”, Mc Graw Hill International Ltd., 2003.
2. N.D.Vohra, “Quantitative techniques in management”, Tata McGraw Hill Publishing Co.Ltd., 2003.

REFERENCE BOOK:

1. U.K.Srivastava, G.V.Shenory & S.C.Sharma, “Quantitative techniques for Managerial decisions”, New Age international (P) Ltd., Publishers – Formerly Wiley Eastern Ltd., 2001.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓				✓					✓	✓
CO2	✓	✓	✓	✓	✓						✓	✓
CO3	✓	✓	✓	✓	✓						✓	✓
CO4	✓	✓	✓	✓	✓						✓	✓
CO5	✓	✓	✓	✓	✓						✓	✓

PT5703 **DIGITAL PRINTING** **L T P C**
3 0 0 3

OBJECTIVES:

- To discuss on the components of digital workflow
- To discuss about electrophotography, ionography and magnetography
- To discuss about ink jet and nanographic printing
- To discuss about thermography and electrography
- To discuss about applications of digital printing techniques

UNIT I PRINCIPLES AND BASIC COMPONENTS 9

Variable Data Printing; Print on Demand; Evolution – Computer to Press, Computer to Print;, Non-Impact Printing Technologies - Overview, Process characteristics, economics, job suitability; Computer to Print systems – Ddigital Front Engine, Components, Architecture, Inline Print Finishing; ISO Standards

UNIT II ELECTROPHOTOGRAPHY, IONOGRAPHY & MAGNETOGRAPHY 9

Principle of Electrophotography, Imaging Systems, Inking Unit (Developing Unit) and Toner Fixing and Cleaning, Conception of the Printing Unit, Ionography, Printing Unit, Imaging System and the Principle of Ionography, Printing Unit Concepts and Printing Systems based on Ionography; Principle of Magnetography, Imaging System for Magnetography, Examples of Applications/Printing Systems

UNIT III INK JET & NANOGRAPHIC PRINTING 9

Overview of Ink Jet Technologies and Processes, Continuous Ink Jet, Drop on Demand Ink Jet Technologies, Structure of Ink Jet Arrays, Printing Systems based on Ink Jet Technology for Multicolour Printing (Selection); Nanographic printing – Principle, Inks, Press configuration;

UNIT IV THERMOGRAPHY AND ELECTROGRAPHY 9

Overview of Thermography, Technologies, Thermal Transfer Printing Systems, Thermal Sublimation Printing Systems, Electrography, Photography, “X”-Graphy, TonerJet Printing Technology, Elcography, Direct Imaging Printing Technology, Assessment of New Types of NIP Technologies.

UNIT V APPLICATIONS 9

Hybrid Printing Systems – Configuration, Integration, Applications; Printed Electronics, Photography, Coding, Display and Signages, Textiles, Security Printing – Inks, Substrates, Digital Press configurations, Major manufacturers;

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Explain and illustrate the workflow for digital printing techniques
2. Explain the working principles of electrophotography, ionography and magnetography
3. Explain the working principles of ink jet and nanographic printing
4. Explain the working principles of thermography and electrography
5. Compare and contrast the applications of digital printing technologies

TEXT BOOKS:

1. Harald Johnson, Mastering Digital Printing, Cengage Learning PTR; 2 edition, 2004
2. Mitchell Rosen, Noboru Ohta, Colour Desktop Printer Technology, CRC Press, 2006

REFERENCE:

1. Helmut Kipphan, Handbook of Print Media, Springer Verlag, 2001

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓					✓	✓				✓	
CO2	✓	✓				✓	✓				✓	
CO3	✓	✓				✓	✓				✓	
CO4	✓	✓				✓	✓				✓	
CO5	✓	✓				✓	✓				✓	

PT5711 CROSSMEDIA PUBLISHING LABORATORY L T P C
0 0 4 2

OBJECTIVES:

- To understand various technologies in creating a website
- Explore various style sheets to adapt for various gadgets
- Learn to include different media in websites.

EXERCISES:

1. Creating 2D animation and 3D animation
2. Audio & Video editing
3. Creating simple presentations
4. Introduction to html
5. Creating static web page
6. Creating tables and forms
7. Web page design with style sheet
8. Web page design with column design style sheet
9. Introduction to XML
10. Cross Media layout designing XSLT
11. Online publishing forum/ blog
12. Cross Media publishing

TOTAL: 60 PERIODS

OUTCOMES:

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

1. Create 2D and 3D animation by incorporating all media
2. Design simple and dynamic web pages.
3. Build and embed a web page for dynamic data handling.
4. Apply XML concept in e-publishing
5. Construct a style sheet for different gadgets.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√		√		√				√	√	√	
CO2	√		√		√				√	√	√	
CO3	√	√	√		√				√	√		
CO4	√		√						√		√	√
CO5	√	√	√		√				√			√

PT5712 **PROJECT I** **L T P C**
0 0 6 3

OBJECTIVES:

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same.
- To train the students in preparing project reports and to face reviews and viva voce examination.

A Project topic must be selected by the students in consultation with their guides. The aim of the project work is to deepen comprehension of principles by applying them to a new problem which may be the design and fabrication of a device for a specific application, a research project with a focus on an application needed by the industry/society, a computer project, a management project or a design project. A project report is required at the end of the semester.

OUTCOMES:

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

1. Define the problem and state the objectives.
2. Identify ways to solve the problem.
3. Implement the solution and analyze its effectiveness.
4. Prepare a technical report.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√	√	√	√	√	√	√	√	√
CO2	√	√	√	√	√	√	√	√	√	√	√	√
CO3	√	√	√	√	√	√	√	√	√	√	√	√
CO4	√	√	√	√	√	√	√	√	√	√	√	√

PT5811 **PROJECT II** **L T P C**
0 0 16 8

OBJECTIVES:

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same.
- To train the students in preparing project reports and to face reviews and viva voce examination.

A Project topic must be selected by the students in consultation with their guides. The aim of the project work is to deepen comprehension of principles by applying them to a new problem which may be the design and fabrication of a device for a specific application, a research project with a focus on an application needed by the industry/society, a computer project, a management project or a design project. A project report is required at the end of the semester.

OUTCOMES:

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

1. Define the problem and state the objectives.
2. Identify ways to solve the problem.
3. Implement the solution and analyze its effectiveness.
4. Prepare a technical report.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√	√	√	√	√	√	√	√	√
CO2	√	√	√	√	√	√	√	√	√	√	√	√
CO3	√	√	√	√	√	√	√	√	√	√	√	√
CO4	√	√	√	√	√	√	√	√	√	√	√	√

PT5001 COLOUR MANAGEMENT SYSTEM L T P C
3 0 0 3

OBJECTIVES:

- To learn the fundamentals of colour management system.
- To understand the device variables and procedure for device characterization.
- To comprehend issues in colour conversion.
- To familiarize about press standardization.
- To gain knowledge about colour management workflows

UNIT I COLOUR MANAGEMENT BASICS 9

Need for colour management, Device characteristics, Closed and Open loop colour control, International colour consortium – standards, profiles, profile types; Colour Management - Components, steps, workflow; Colour tolerances – dE, dE00, dE CMC, weighting factors; Colour measurement devices - types, calibration, accuracy, sampling size, sample type (textile/metallics/pearlescent/translucent), measurement condition; Standards – ISO, ASTM, DIN.

UNIT II DEVICE CHARACTERIZATION 9

Profile structure, Lookup table construction, Profile Connection Space, Test targets, Profiling software; Device characterization methods-Numerical, LUT; Calibration and characterization of display, scanner, digital camera, cellphone/tablets, press and proofer; Profile quality evaluation; Profile editing.

UNIT III CONVERSION 9

CMM - functions, static, dynamic; Gamut boundaries, Gamut mapping – influencing factors, algorithms, Rendering Intent, ICC limitations - Effect of optical brighteners, Black point compensation, Black channel preservation, Optimization of colour transforms; Device link profiles, Colour servers, Colour Appearance Models; ICCMax – spectral transform, BRDF, calculator transform; Brand/Spot colour matching – gamut limitations, substrate considerations

UNIT IV PRESS STANDARDISATION 9

Variables in printing process, Test forms, Press standardization, Optimization - Gravure, Flexography, Offset, Screen, Digital; ISO standards; Press Certifications – G7, PSO, Japan Colour, FOGRA; Colour conformance software

UNIT V COLOUR WORKFLOW 9

Colour features and Settings – Operating system, Prepress software, Press (RIP), Print driver; Colour profiles – Input, Output, Simulation; Standard colour spaces – AdobeRGB, USSWOP, GRACoL, Fogra; Embedded profiles; Grayscale profile; Soft Proofing, Digital proofing, Spot colour workflow and colour matching; Colour Vision tests; Production workflows - Data format, Configurations, Colour conversions; Internet workflow, Colour Science in other fields (textile, food, astronomy, medical, cosmetics), Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Infer the steps in implementing colour management system and choose suitable device configuration for colour measurement following quality standards.
2. Create profiles for display, input and output devices.
3. Explain the gamut mapping concepts by applying boundary constraints
4. Design methodology to standardize the various printing processes as per ISO standards
5. Reproduce and match colour across various devices and software applications

TEXT BOOKS:

1. Abhay Sharma, Understanding Colour Management, Thomson Delmar, 2004.
2. Phil Green, Michael Kriss,Colour Management: Understanding and Using ICC profiles, The Wiley-IS&T Series in Imaging Science and Technology, 2010

REFERENCES:

1. Adams R.M. & Weisberg J.B., GATF Practical Guide to Colour Management, 2nd. Ed., GATF Press, 2000
2. Bruce Fraser, Chris Murphy, & Fred Bunting, Real World Colour Management, 2nd Edition, Peachpit Press
3. Mark D.Fairchild, Colour Appearance Models, Second Edition, John Wiley & Sons Ltd., 2005
4. Phil Green, Lindsay MacDonald, Colour Engineering, John Wiley & Sons Ltd., 2002

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√									
CO2	√	√	√		√							
CO3	√	√	√	√								
CO4	√	√	√	√	√							√
CO5	√	√	√		√							√

PT5002 DISPLAY AND SIGNAGE PRINTING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the features of sign and display industry.
- To acquire knowledge about various materials used in displays.
- To learn about the printing techniques used in display and signage industry.
- To understand the different types of converting operations.
- To study about the types of print products for display and signage industry.

UNIT I INTRODUCTION 9

Sign and Display Industry Overview; Visual Branding; Marketing Campaigns; Seasonal promotions and one-off events; File formats - DWG, DXF; Plotting; Resolution, Sign Creation Software - Features.

UNIT II MATERIALS 9

Product Requirements - Durability, Light Fastness, Weather Resistance, Fire Resistance and Retardancy; Types, Properties and applications of signage and display materials - Paper, Paperboard, Corrugated boards, Sublimation transfer papers, Textile, vinyl, polyester, nylon, satin, Metallized Films, Glass, Ceramics; Inks - Aqueous, solvent, UV, Latex; Ink, Substrate – Compatibility.

UNIT III PRINTING TECHNIQUES 9

Machine configurations, features - Wide format Inkjet Printing, Thermography, Screen Printing; Selection of printing process - Media Handling, Size, Resolution, Speed, Colours; Printing Problems - Cockling, Banding, Media Distortion;

UNIT IV CONVERTING 9

Banner - Pole Pockets, Wind Pockets, Grommets, Taping, Seaming, Welding; Coating; Lamination - Thermal, Pressure Sensitive; Digital Finishing - Knife Cutters, Routers, Creasers, Laser engravers, Heat Sealers; Cut-to-Print Systems;

UNIT V APPLICATIONS 9

Outdoor Graphics - Building coverings and wraps, Flexface billboards, Backlit signage: day and night, Banners, Fleet graphics, Vehicle wraps, Transit and informational signage; Point-of-Purchase (POP) Displays - Rigid POP displays, 3D POP displays, Open-box packages and displays, In-store promotions; Indoor Graphics - Branding Promotion, Popup displays, Posters, Backlit signage: day and night, Exhibition and event graphics, Floor and window graphics, Backdrops, Electro Luminance Printing.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Identify the requirements of printed products for signage industry.
2. Select suitable material based on the requirement.
3. Comprehend the various printing technologies used in display and signage industry.
4. Appraise different types of converting operations in display and signage production.
5. Analyze the various applications of display and signage in day-to-day use.

TEXT BOOKS:

1. Elizabeth Allen, Sophie Trianta phillidou Dara, The Manual of Photography and Digital Imaging, Tenth edition, Focal Press, 2009
2. Helmut Kipphan, Handbook of Print Media, GATF, 2001

REFERENCES:

1. Ian M. Hutchings, Graham D. Martin, Inkjet Technology for Digital Fabrication, John Wiley & Sons, 2013.
2. Vincent Blyden, Graphic Communication Materials and Processes, BookSurge Publishing, 2008

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√		√							
CO2	√	√	√				√					
CO3	√	√	√	√								
CO4	√	√	√									
CO5	√	√	√				√				√	√

PT5003 NEWSPAPER AND PERIODICAL PUBLISHING L T P C
3 0 0 3

OBJECTIVES:

- To provide detailed knowledge on the operations of newspaper and magazine companies.
- To provide exposure to the basic concepts of news and editing.
- To impart knowledge on the workflow of digital prepress and periodical digital output.
- To understand the different workflow of prepress, press and post press.
- To impart knowledge on editorial process, production workflows and legal issues

UNIT I NEWSPAPER ORGANISATION & MANAGEMENT 9

Organizational structure & functions - Owner, editorial organization, management, Incoming materials, financial aspects, Production, advertising, distribution and promotion. Role of copy editors, city editors, news editors, editorial cartoonist, artists, Sunday editor, sports editor, business editor, journalist & reports; editorial responsibilities.

UNIT II NEWS AND EDITING 9

Basic determinants of News; Impact, unusual and prominent; Additional determinants of news; Conflict, proximity, timeliness, currency, gathering the news, sources of news; Beat system, interviewing, wire services, syndicate, news writing, copy preparation, features & reviews, editorial and opinion column, sports, photo production; Editing - manuscript editing, creative and substantive editing, technical editing.

UNIT III PERIODICAL PUBLISHING 9

Types of magazines, Difference between writing for a magazine & newspaper, structure of a magazine's editorial department & roles, Designing a layout for magazine, story design, page design, web design; Redesigning.

UNIT IV PRODUCTION & WORKFLOW 9

Manuscript from editorial organization: Layout & design, composition; Advertisements, Digital Newsroom, Archival of news; Press & web publishing workflows, RSS, Distributed production workflow; Press, Paper, Finishing; Off-prints and re-prints.

UNIT V LEGAL ASPECTS **9**

The press and the law liabilities, defense against libel, mitigation & damages, Digital Rights Management, Watermarking, Readership strategies & trends, Distribution model for newspapers & magazines, Future developments.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Comprehend the operations of newspaper and magazine companies and their organizational structure
2. Analyze the concepts on news and editing
3. Assess the production and workflow of newspaper and magazine organizations

TEXT BOOKS:

1. Carter Nancy M. ,The Computerization of Newspaper Organizations, University Press of America , 2002
2. Daryl R. Moen, Newspaper Layout & Design: A Team Approach ,Iowa State Press, 2000

REFERENCES:

1. Helmut Kiphhan, Handbook of Print Media, Springer Verlag, 2001
2. James E. Pollard, Principles Of Newspaper Management, Mcgraw-Hill Book Company, Inc, 1937
3. Melvin Mencher, Basic News Writing, Wm.C.Brown Company Publishers, Dubuque, Iowa, 1983.
4. Robert H.Bohle, From News to Newsprint, Prentice Hall Inc., 1992
5. William L.Rivers, Magazine Editing in the 80's, Wadsworth Publishing Company,Belmont, California, 1983.
6. William L.Rivers, News Editing in the 80's, Wadsworth Publishing Company, Belmont, California, 1983.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√		√					√			
CO2	√		√			√			√			
CO3	√	√		√								
CO4	√	√		√								
CO5	√				√			√			√	

MF5071 PROCESSING OF PLASTICS **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To introduce types of plastics and properties
- To equip the students with the knowledge of processes utilized in developing materials or making components using plastics
- To introduce joining and machining of plastics
- To impart knowledge in preparation of polymer composites.
- To develop the competence in major industrially practiced plastic processing techniques with sustainability.

UNIT I INTRODUCTION TO PLASTICS 9

Introduction to polymers and plastics-Plastics- -Glass thermal properties-Mechanical Properties –Rheological properties- Additives, colourants and fillers- Classification -—Thermoplastics: Acrylic, ABS. Nylon, PLA, Polycarbonate, Polyethylene, Polypropylene, Polystyrene, Polyvinyl chloride, Teflon-Thermosets: Polyester, Polyurethanes, Bakelite, Duroplast, Urea-formaldehyde foam, Epoxy ,Polyimides, Furan resins ,Silicone- Properties and applications.

UNIT II PROCESSING OF THERMOPLASTICS AND THERMOSETS 9

Principle, advantages, disadvantages and applications- Processing of thermoplastics : Extrusion, Injection Molding, Blow moulding, Rotational Molding, Calendaring, Film Blowing Thermoforming, Foaming- -Processing of thermosets: Compression Molding, Transfer Molding, Injection Molding, Jet Moulding, Liquid Resin Molding, Resin Transfer Molding(RTM), Reaction Injection Molding (RIM). Rotational Molding (Rotomolding), Laminated plastics-Casting-Powder coating processes.

UNIT III JOINING AND MACHINING OF PLASTICS 9

Mechanical fastening- Press Fit-snap fit - Adhesive bonding : Theories of Adhesion- Thermal welding : Direct thermal welding processes: Heated tool welding, Hot gas welding- Indirect Thermal welding processes: Friction or spin welding, Induction welding, Ultrasonic and vibration welding, Dielectric welding- Solvent cementing-Machining of plastics.

UNIT IV REINFORCED PLASTICS 9

Reinforced plastics (Composites) - Hand layup – Sprayup- Vaccum and Pressure bag moulding- Matched die molding. -Continuous laminating - Pultrusion - Injection molding-Filament winding - Prepregs -Sheet molding compound -Bulk molding compound- - principle, advantages, disadvantages and applications.

UNIT V SUSTAINABLE PLASTICS 9

Polymer Products: case Studies-Sustainability: Overview-Survey of polymer waste disposal methods- Recycling: Identical products, Low demand products-Recycling and reclamation equipments-Depolymerisation-Incineration-Biodegradability-Source Reduction.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

The students shall be able to

- CO1: Identify various processing methods used for different types of plastics and their useful properties in daily life.
- CO2: Select suitable process for application requirements.
- CO3: Select various machining variables used for joining and machining plastic components.
- CO4: Select suitable process for polymer matrix composites.
- CO5: Be concerned with sustainable practice and its requirement

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	0.6												0.9	0.6	0.6
2	0.6												0.9	0.6	0.9
3	0.6												0.9	0.6	0.9
4	0.6	0.6	0.6	0.6	0.6		0.6						0.9	0.6	0.9
5	0.6	0.6	0.6	0.6	0.6		0.9						0.9	0.9	0.9

TEXT BOOKS:

1. Belofsky K., Plastics: “Product Design and Process Engineering” Hanser Gardner Publications., United States, 1995, ISBN: 9781569901427,1-56990-142-2,1-56990-179-1,3-446-17417-6,3-446-18155-5.
2. Charles A. Harper , “Handbook of Plastics Technologies: The Complete Guide to Properties and Performance”, 2nd Edition, McGraw-Hill Education., United States, 2006.ISBN: 0071460683, 978-0071460682.

REFERENCES:

1. David H. Morton-Jones and John W. Ellis, “Polymer Products Design, Materials and Processing”,1st Edition, Chapman and Hall., United Kingdom, 1986, ISBN-13: 978-94-010-8320-1e-ISBN-13: 978-94-009-4101-4.
2. Joseph P. Greene, “Sustainable Plastics: Environmental Assessments of Biobased, Biodegradable, and Recycled Plastics”,1st Edition, John Wiley & Sons Ltd, United States, 2014,ISBN: 978-1-118-10481-1.
3. Kobyashi A., “Machining of Plastics”,1st edition, Mc-Graw Hill. United States 1981,ISBN 0070352666 , 9780070352667.
4. Muccio E.A., “Plastics processing technology” ,1st edition, ASM International., United States 1994. ISBN: 0871704943, 978-0871704948.
5. NIIR Board, “Polymers and Plastics Technology Handbook” ,1st edition, Asia Pacific Business Press Inc., India ,2004, ISBN 8178330768, 9788178330761.

PT5004 WEB OFFSET PRINTING TECHNOLOGY L T P C
3 0 0 3

OBJECTIVE:

- To study the principles of web feeding and controls
- To understand the web offset machine configuration
- To learn about dampening & inking systems
- To acquire knowledge on drying and chilling systems
- To familiarize on mailroom operations

UNIT I PRESS CLASSIFICATION AND INFEED UNITS 9

Development, Classification – blanket-to-blanket, in-line, common impression; Job suitability and factors to be considered for selection, presses – Full size, narrow web presses and continuous stationery; Roll stands; Automatic pasters – Zero speed and Flying pasters; Web pre-conditioners, infeed units, dancing roller types, design, tension control systems. Reel handling and storage; Requirements of paper-roll and web.

UNIT II PRINTING UNIT 9

Printing Unit – plate cylinder, blanket cylinder, lock-up mechanisms, cylinder pressure and timing, unit configuration, webbing up options; Automatic webbing up device, control of fan out using buzzle wheels and air guns; web aligner concepts; Web break detectors &Severers; Cylinder drives; Circumferential and lateral movement of plate cylinder; Automatic register control system, concepts and design; Shaft less drives, automation in closed loop controls.

UNIT III INKING & DAMPENING SYSTEMS 9

Inking system: requirements, design concepts, types of ink metering, roller train design, form rollers, heat generation, ghosting. Ink agitators, automatic ink pumping systems. Roller setting. Dampening system: requirements, types, metering methods, column control. Keyless inking, Alcohol damping, spray, brush dampeners. Test forms. Print quality, measurement and control systems, ISO 12647-3. Web offset printing problems, solutions and paper waste control.

UNIT IV DRYING, CHILLING, FOLDING AND SHEETING UNITS 9

Dryers: need, types, construction and working. Silicone coating, Chilling units, construction. Operational care and maintenance. Folders, types and delivery, Settings & Adjustments; Former and its adjustment, Balloon formers and insertions R.T.F., nip rollers, turner bars, bay windows, side and cut off margin controls. Inline finishing-gluers, paster wheels, pattern gluers, segmented gluers, envelope pattern gluers, backbone gluers. Kickers, markers, perforators, slitters, operation and maintenance. Sheeting device and mechanism, inline stitchers, Semi commercial – concepts, problems, challenges

UNIT V MAIL ROOM OPERATION 9

Products, sizes, formats, sections, Pagination, single/double/quadruple production, speed, time schedules, conveyor system, counter stackers, wrapping requirements, strapping requirements. Bundle addressing, system and control, online trimmers, copy counting mechanisms, Programming and Telescopic conveyor for truck loading, copy storage system, Inserting, Diverters & Kickers Web Offset machine manufacturers - Major brands, Machine Formats, Technical comparison; Emerging Trends - Lean Production, VDP & Inkjet Integration, Value addition.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Analyze different configurations, components and mechanisms of a web offset machine
2. Identify and solve problems related to runnability and printability of substrates
3. Summarize the design concepts of inking and dampening system and devise methods to ensure conformance to quality standards.
4. Explain the construction of drying, chilling and folding units
5. Describe the components of mailroom system

TEXT BOOKS:

1. Daniel G. Wilson and GATF Staff, Web Offset Press Operating, Fifth edition, GATF Press, USA, 2003
2. W.R. Durrant, Web Control: A Handbook for the Web Printer, 1997

REFERENCES:

1. David B. Crouse, Web Offset Press Troubles, GATF Press, 1984
2. Helmutt Kipphan, Handbook of Print Media, Springer, Heidelberg, 2001
3. John MacPhee, Fundamentals of Lithographic Printing Vol.I Mechanics of Printing, GATF Press, 1998

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√		√							√
CO2	√	√	√	√								
CO3	√	√	√	√								√
CO4	√	√		√	√	√						
CO5	√		√		√		√			√	√	√

PT5005 **DIGITAL MEDIA MANAGEMENT** **L T P C**
3 0 0 3

OBJECTIVES:

- To outline and discuss digital media contents
- To discuss the basic concepts of managing digital content.
- To list and explain various content protection techniques of digital media.
- To explain the digital rights management methods
- To outline and discuss current issues and developments

UNIT I DIGITAL MEDIA 9

Overview of multimedia contents, Content acquisition & development, Product development & design- Designing Publications, Designing content Components, Digital Media Storage, Marketing (Circulation management, Single copy sales), Pricing, Distribution – crossmedia, file download security and sharing.

UNIT II DIGITAL ASSET MANAGEMENT 9

DAM Components, Functions, Relationships with other systems, including ERP, DCM, ECM, DMM, WCM, CMS, CRM and DRM, Metadata, cataloguing, indexing and retrieval- standards for production and content description, Accounting for Authors, Accounting for Acquisition sources.

UNIT III CONTENT PROTECTION TECHNIQUES 9

Encryption, stegnography, watermarking, robustness and implementation, considerations, examples of media protection schemes, CCS, CGMS, HDCP, Type of contents, copyrights, patents, trade marks, trade secrets, licensing agreements, web posting policies, copyright and patent laws, fair uses, privacy regulations, piracy, DMCA, ISP obligations and liabilities,

UNIT IV DIGITAL RIGHTS MANAGEMENT 9

Digital right models, transactions, types of rights and licenses, DRM system architecture, content server, license server, secure platform. Digital Millennium Copyright Act

UNIT V CURRENT ISSUES AND DEVELOPMENT 9

Copyright laws, balance between rights enforcement and fair uses, changing landscape in content distributions, recent enforcement cases. Security Applications-OS, Network , Web page, Online transactions.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Explain the contents and principles of digital media dissemination and distribution process.
2. Apply the concepts of Content Management System.
3. Describe the intricacies in digital content protection techniques
4. Restate the concepts of intellectual property rights for digital content.
5. Analyze current issues and development aspects of digital media management

TEXT BOOKS :

1. Curtis Poole, Janette Bradley, Reference Developer's Digital Media Reference: New Tools, New Methods, Taylor & Francis, 2013
2. Dr Andreas Mauthe, Dr Peter Thomas, Professional Content Management Systems: Handling Digital Media Assets, John Wiley & Sons, 2005.

REFERENCES:

1.John Rice and Brian Mckerman (Editors), Peter Bergman, Creating Digital Content, McGraw- Hill, USA, 2010

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓					✓	✓				✓	
CO2	✓	✓			✓			✓		✓	✓	
CO3	✓	✓			✓			✓		✓		
CO4					✓					✓	✓	
CO5								✓	✓	✓		✓

PT5006 **3D PRINTING** **L T P C**
3 0 0 3

OBJECTIVES:

- To discuss on basics of 3D printing
- To explain the principles of 3D printing technique
- To explain and illustrate inkjet technology
- To explain and illustrate laser technology
- To discuss the applications of 3D printing

UNIT I INTRODUCTION **9**

Introduction; Design considerations – Material, Size, Resolution, Process; Modelling and viewing - 3D; Scanning; Model preparation – Digital; Slicing; Software; File formats

UNIT II PRINCIPLE **9**

Processes – Extrusion, Wire, Granular, Lamination, Photopolymerisation; Materials - Paper, Plastics, Metals, Ceramics, Glass, Wood, Fiber, Sand, Biological Tissues, Hydrogels, Graphene; Material Selection - Processes, applications, limitations;

UNIT III INKJET TECHNOLOGY **9**

Printer - Working Principle, Positioning System, Print head, Print bed, Frames, Motion control; Print head Considerations – Continuous Inkjet, Thermal Inkjet, Piezoelectric Drop-On-Demand; Material Formulation for jetting; Liquid based fabrication – Continous jet, Mulitjet; Powder based fabrication – Colourjet.

UNIT IV LASER TECHNOLOGY **9**

Light Sources – Types, Characteristics; Optics – Deflection, Modulation; Material feeding and flow – Liquid, powder; Printing machines – Types, Working Principle, Build Platform, Print bed Movement, Support structures;

UNIT V INDUSTRIAL APPLICATIONS **9**

Product Models, manufacturing – Printed electronics, Biopolymers, Packaging, Healthcare, Food, Medical, Biotechnology, Displays; Future trends;

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Outline and examine the basic concepts of 3D printing technology
2. Outline 3D printing workflow`
3. Explain and categorise the concepts and working principles of 3D printing using inkjet technique
4. Explain and categorise the working principles of 3D printing using laser technique
5. Explain various method for designing and modeling for industrial applications

TEXT BOOKS:

1. Christopher Barnatt, 3D Printing: The Next Industrial Revolution, CreateSpace Independent Publishing Platform, 2013.
2. Ian M. Hutchings, Graham D. Martin, Inkjet Technology for Digital Fabrication, John Wiley & Sons, 2013.

REFERENCES:

1. Chua, C.K., Leong K.F. and Lim C.S., Rapid prototyping: Principles and applications, second edition, World Scientific Publishers, 2010
2. Ibrahim Zeid, Mastering CAD CAM Tata McGraw-Hill Publishing Co., 2007
3. Joan Horvath, Mastering 3D Printing, APress, 2014

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓					✓		✓				
CO2	✓					✓	✓				✓	
CO3	✓					✓	✓				✓	
CO4	✓					✓	✓				✓	
CO5	✓					✓	✓				✓	

IE5076 SAFETY ENGINEERING AND MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

- Identify unsafe conditions and recognize unsafe alerts.
- Interpret the rules and regulations for safety operations.
- Capable of solving problem of accidents.
- Capable of solving the present for criticizing the present for improved safety.
- Collaborate and modify processes / procedures for safety.

UNIT I INTRODUCTION 9

Evolution of modern safety concepts – Fire prevention – Mechanical hazards – Boilers, Pressure vessels, Electrical Exposure.

UNIT II CHEMICAL HAZARDS 9

Chemical exposure – Toxic materials – Radiation Ionizing and Non-ionizing Radiation - Industrial Hygiene – Industrial Toxicology.

UNIT III ENVIRONMENTAL CONTROL 9

Industrial Health Hazards – Environmental Control – Industrial Noise - Noise measuring instruments, Control of Noise, Vibration, - Personal Protection.

UNIT IV HAZARD ANALYSIS 9

System Safety Analysis –Techniques – Fault Tree Analysis (FTA), Failure Modes and Effects Analysis (FMEA), HAZOP analysis and Risk Assessment.

UNIT V SAFETY REGULATIONS 9

Explosions – Disaster management – catastrophe control, hazard control, Factories Act, Safety regulations Product safety – case studies.

TOTAL: 45 PERIODS

OUTCOMES:

Students will be able to

CO1 : Identify and prevent chemical, environmental mechanical, fire hazard .
CO2 : Collect, analyze and interpret the accidents data based on various safety techniques.
CO3 : Apply proper safety techniques on safety engineering and management .
CO4 : Able to perform hazard analysis.
CO5 : Aid to design the system with environmental consciousness by implementing safety regulation.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓		✓						
CO2	✓	✓		✓	✓							
CO3	✓	✓	✓		✓		✓	✓		✓		
CO4	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
CO5		✓	✓			✓		✓	✓	✓	✓	✓

TEXT BOOK:

1. John V.Grimaldi, “Safety Management”, AITB S Publishers, 2003.

REFERENCES:

1. David L.Goetsch, “Occupational Safety and Health for Technologists”, Engineers and Managers, Pearson Education Ltd. 5th Edition, 2005.
2. Deshmukh L M, “Industrial Safety Management”, Tata McGraw-Hill Publishing Company Ltd.,2005
3. Safety Manual, “EDEL Engineering Consultancy”, 2000.

GE5076 PROFESSIONAL ETHICS IN ENGINEERING L T P C
3 0 0 3

OBJECTIVES

- Identify the core values that shape the ethical behavior of an engineer.
- Utilize opportunities to explore one’s own values in ethical issues.
- Become aware of ethical concerns and conflicts.
- Enhance familiarity with codes of conduct.
- Increase the ability to recognize and resolve ethical dilemmas.

UNIT I ENGINEERING ETHICS 9

Senses of ‘Engineering Ethics’ – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg’s theory – Gilligan’s theory – Consensus and Controversy – Professions and Professionalism - Professional Ideals and Virtues – Uses of Ethical Theories.

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics - Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study

UNIT III ENGINEER'S RESPONSIBILITY FOR SAFETY 9

Safety and Risk – Assessment of Safety and Risk – Risk Analysis – Reducing Risk – The Government Regulator's Approach to Risk - l Case Studies Chernoby and Bhopal

UNIT IV RESPONSIBILITIES AND RIGHTS 9

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) - Discrimination

UNIT V GLOBAL ISSUES 9

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers –Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct

TOTAL: 45 PERIODS

OUTCOMES:

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

CO1: Use ethical theories in the professional life
CO2: Do social experimentation with engineering approaches
CO3: Follow safety norms in the engineering practices
CO4: Confidence in their approaches and claim their rights
CO5: Take moral leadership with the knowledge in global practices

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								✓		✓		✓
CO2						✓		✓				✓
CO3								✓				✓
CO4								✓				
CO5								✓	✓			✓

TEXT BOOKS

1. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics Concepts and Cases", Cengage Learning., Belmont, 2009, ISBN-13: 978-0-495-50279-1 ISBN-10: 0-495-50279-0.
2. Mike Martin and Roland Schinzinger, "Introduction To Engineering Ethics", 2nd Edition McGraw Hill., New York, 2010, ISBN 978-0-07-248311-6—ISBN 0-07-248311-3.

REFERENCES

1. Charles D Fleddermann, “Engineering Ethics”, 4th edition, Prentice Hall., New Mexico, Newjersey, 1999, ISBN-13: 978-0-13-214521-3 , ISBN-10: 0-13-214521-9
2. David Ermann and Michele S Shauf, “Computers, Ethics and Society”, Oxford University Press,United Kingdom , 2002, ISBN: 9780195143027.
3. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, 1st edition, Oxford University Press, United Kingdom, 2000, ISBN-13: 978-0195134889, ISBN-10: 0195134885
4. John R Boatright, “Ethics and the Conduct of Business”, 8th edition Pearson Education, Boston, 2017,ISBN-10:9789352862306, ISBN-13:978-9352862306
5. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, “Business Ethics – An Indian Perspective”, Wiley, 2004, ISBN-10: 8177221671 ISBN -13: 9788177221671.

PT5007	DIGITAL DATA HANDLING	L	T	P	C
		3	0	0	3

OBJECTIVES

- To gain knowledge on the workflow of digital prepress production
- To get exposure to the basic concepts of networking
- To infer the different types of file formats and their compression techniques
- To understand the database management system
- To learn about security issues in computing.

UNITI DIGITAL PRE PRESS 9

Software used – Processing, Normalization, Page layout preparation, Preflighting-Parameters and their importance; Imposition – schemes, software and Workflows, Optimization, RIP- Structure and Functions, OPI, Trapping, Postscript, PDF- Versions, Structure; CIP4 – JDF, JMF.

UNIT II NETWORKING 9

Data transmission fundamentals, Communication media; LAN, WAN, MAN; Network topologies; Network Standards: OSI Model; Network protocols – TCP/IP and UDP; Network node components – Hubs, Bridges, Routers, Gateways, Switches; Fundamental concepts of IoT, Artificial Intelligence and Deep learning.

UNIT III FILE FORMATS &COMPRESSION TECHNIQUES 9

File format – EPS, DCS, JPEG, GIF, TIFF, PNG, PDF, Comparison of file formats; Overview of compression techniques - Lossy & Lossless compression, RLE, Huffman compression, LZW, DCT.

UNITIV DATABASE MANAGEMENT 9

Database - system structure architecture, Database languages, Query processing, Data storage, Backup & Recovery, Distributed databases, Cloud databases, Data warehousing, Data mining; Digital Asset Management. Introduction to Bigdata and Data Analytics.

UNITV SECURITY IN COMPUTING 9

Principles of network security, Digital watermarking, Data encryption standard, Digital signature, Fire walls, Intrusion Detection Systems, Secure e-mail, Digital Rights Management; Information security in India.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Identify individual steps involved in digital prepress production workflow
2. Understand Networking concepts and applications
3. Choose suitable file format for images based on publishing mode
4. Apply knowledge of database management in digital data handling
5. Understand various security features in computing and Digital rights management practices.

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, Database System Concepts, Sixth Edition, Tata Mcgraw Hill, 2013
2. Helmut Kipphan, Handbook of Print Media, Springer Verlag, 2001

REFERENCES:

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, Security in Computing, Fourth Edition, Pearson Hall, 2006
2. Douglas E. Comer, Computer Networks and Internets, 2nd Edition, Pearson Education
3. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2011
4. Mani Subramanian, Network Management: Principles & Practice, Pearson Education India, 2010
5. SanjivPurba, Handbook of Data Management, Viva Books Private Ltd., 1999

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√										
CO2	√	√	√									
CO3	√	√		√	√							
CO4	√	√		√	√						√	
CO5	√	√	√		√	√					√	√

PT5008 **PRINTING MACHINE DESIGN** **L T P C**

3 0 0 3

OBJECTIVES:

- To explain the principles and procedure for machine design
- To explain about shafts, couplings and cylinders
- To explain and discuss about gears
- To explain and discuss about gear boxes
- To discuss and explain about cams, clutches and brakes

UNIT I INTRODUCTION **9**

Introduction to the design process - factors influencing machine design, selection of materials based on mechanical properties Direct, Bending and torsional stress equations calculation of principle stresses Electric motor classification, Motor selection: Speed-Torque curves, Speed control of electrical motors, Design of Flat belts and pulleys - Selection of V belts and pulleys – Design of Transmission chains and Sprockets. Selection of pulleys and sprockets for the above transmission systems.

UNIT II SHAFTS, COUPLINGS AND CYLINDERS 9

Design of solid and hollow shafts based on strength, rigidity and critical speed – Keys, key ways and splines – crankshafts - Rigid and flexible couplings. Static and Dynamic balancing- Rotating and Reciprocating masses, Balancing machine; Cylinders–Thin and thick cylinders.

UNIT III GEARS 9

Law of Gearing, Tooth Profile, Speed ratios and number of teeth-Force analysis -Tooth stresses - Dynamic effects – Fatigue strength - Factor of safety - Gear materials – Design of straight tooth spur & helical gears – Pressure angle in the normal and transverseplane- Equivalent number of teeth-forces for helical gears.

UNIT IV GEAR BOXES 9

Straight bevel gear, Worm Gear: Merits and demerits- terminology, materials-forces and stresses, efficiency. Geometric progression - Standard step ratio - Ray diagram, kinematics layout -Design of sliding mesh gear box -Constant mesh gear box. – Design of multi speed gear box.

UNIT V CAMS CLUTCHES AND BRAKES 9

Cam Design: Types, Timing Diagram-Follower types-pressure angle and under cutting base circle determination-forces and surface stresses. Design of plate clutches –axial clutches-cone clutches-internal expanding rim clutches-shoe and band brakes - external shoe brakes – Internal expanding shoe brake -Electromagnetic clutches.

TOTAL : 45 PERIODS

Note: (Use of P S G Design Data Book is permitted in the University examination)

OUTCOMES:

Upon completion of this course the student will be able to :-

1. Compare and discuss the basic concepts of machine element design
2. Predict and complete the design of machine elements like shafts, couplings and cylinders
3. Examine and complete the design various types of gears
4. Examine and complete the design of gear boxes
5. Examine and complete the design of cams, clutches and brakes

TEXT BOOKS:

1. Bhandari V, Design of Machine Elements, 3rd Edition, Tata McGraw-Hill Book Co, 2010.
2. Joseph Shigley, Charles Mischke, Richard Budynas and Keith Nisbett, Mechanical Engineering Design, 8th Edition, Tata McGraw-Hill, 2008.

REFERENCES:

1. Bernard Hamrock, Steven Schmid,Bo Jacobson, Fundamentals of Machine Elements, 2nd Edition, Tata McGraw-Hill Book Co., 2006.
2. C.S.Sharma, Kamlesh Purohit, Design of Machine Elements, Prentice Hall of India, Pvt. Ltd., 2003.
3. Gitin Maitra,L. Prasad Hand book of Mechanical Design, 2nd Edition, Tata McGraw-Hill,2001.
4. Prabhu. T.J., Design of Transmission Elements, Mani Offset, Chennai, 2000.
5. Sundararajamoorthy T. V, Shanmugam .N, Machine Design, Anuradha Publications, Chennai, 2003.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓		✓		✓	✓			
CO2	✓	✓	✓	✓		✓			✓		✓	
CO3	✓	✓	✓	✓		✓			✓		✓	
CO4	✓	✓	✓	✓		✓			✓		✓	
CO5	✓	✓	✓	✓		✓			✓		✓	

PT5009 BOOK PUBLISHING L T P C
3 0 0 3

OBJECTIVES:

- To impart knowledge on areas of publishing, editorial process, production management, distribution methods and legal aspects involved in book publishing.
- To understand the components of digital workflow
- To carryout the production and cost estimation for book production.
- To promote the basic understanding of sales techniques, promotion channels and distribution.
- To impart knowledge on legal aspects of book publishing.al issues.

UNIT I PUBLISHING ORGANISATION 9

Areas of publishing – General publishing, Educational publishing, Professional publishing, Reference publishing, Publishing text books for children, Publishing house role – Commissioning editor, Desk editor, Designer, Production manager, Sales/Marketing manager, Publishing manager

UNIT II EDITORIAL PROCESS AND DEVELOPMENT 9

Copy editing , Page makeup, Proofs; Book editor – Multipurpose functions; Discussion with author; Editing educational material, Decision making role; Editorial technique – Style sheet. Reference aids; Author and his manuscript – Unsolicited manuscripts; Author – Publisher relationship, Professional guides and Societies, Literary agency.

UNIT III PRODUCTION & ESTIMATING IN BOOK PUBLISHING 9

Pre-production planning, manuscript, layout & design, imposition, composition, anatomy of books; Printing techniques; Production process; Technical aspects of production; Quality control – proofing stage; Finishing operations; Financial aspects; First copy cost, manufacturing cost, overheads; Economics of publishing – net book, non-net book, variation in price, published price of the book.

UNIT IV PROMOTION CHANNELS, DISTRIBUTION OUTLETS AND SALES TECHNIQUES 9

Direct promotion techniques, mail order advertising, subscription books, direct mail promotion, library purchases, export and import of books, publishers and booksellers catalogues, publicity campaign, paperback distribution, the central book clearing house, economics of distribution, the role of booksellers, book marketing council, book development council.

UNIT V DIGITAL PUBLISHING AND LEGAL ASPECTS OF BOOK PUBLISHING 9

Software needs, manuscript formats and file management, editing tools, web design and publishing; copy right, types of agreement between author and publishers, agreement of sale of translation rights, illustration and artwork agreement, the outright sale of the copyright, profit sharing agreement, the royalty system, commission agreement.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Identify the responsibilities and functions of publishing house.
2. Analyze the author publisher relationship and editor's functions.
3. Analyze book distribution and copyright agreements.

TEXT BOOKS:

1. D Richard Guthrie, Publishing Principle and Practice, Fifth Edition, 2011
2. Pete Masterson, Book Design and Production, Aeonix Publishing, Second Edition, 2007

REFERENCES:

1. Adrain Bullock, Book Production, Routledge, First Edition, 2012
2. Frania Hall, The business of Digital Publishing, Routledge, Fifth Edition, 2013
3. G.S.Jolly, Book Publishing Management, Har-Anand Publication, First Edition, 2009.
4. Lynette Owen, Clark's Publishing Agreements: A Book of Precedents, Bloombury Publications, Ninth Edition, 2013
5. Giles Clark and Angus Phillips, Inside Book Publishing, Routledge, Fifth Edition, 2014

WEB RESOURCES:

1. www.esl-lab.com

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√		√	√	√	√					√	
CO2	√				√					√		
CO3	√	√	√								√	√
CO4	√	√		√		√					√	√
CO5	√	√			√							√

ME5076 MARKETING MANAGEMENT L T P C

3 0 0 3

COURSE OBJECTIVES:

The main learning objective of this course is to prepare the students for:

1. Explaining the basic concepts in marketing.
2. Explaining the various buying behaviour methods.
3. Analyzing the various product pricing concepts.
4. Analyzing the various marketing planning principles and its strategies.
5. Describing the trends of advertising, sales promotion methods..

UNIT I CONCEPTS IN MARKETING 9

Definition, Marketing Process, Dynamics, Needs, Wants and Demands, Marketing Concepts, Environment, Mix, Types, Philosophies, Selling vs Marketing, Consumer Goods, Industrial Goods.

UNIT II BUYING BEHAVIOUR AND MARKET SEGMENTATION 9

Cultural, Demographic factors, Motives, Types, Buying Decisions, Segmentation factors, Demographic, Psycho graphic and Geographic Segmentation, Process, Patterns. Services marketing and Industrial marketing.

UNIT III PRODUCT, PRICE AND MARKETING RESEARCH 9

Product, Classifications of product, Product Hierarchy, Product Life Cycle, New product development, Branding. Price: Objectives, Pricing Decisions and Pricing Methods, Pricing Management, Introduction, Uses, Process of Marketing Research.

UNIT IV MARKETING PLANNING AND STRATEGY FORMULATION 9

Components of a Marketing Plan, Strategy Formulation and the Marketing Process, Implementation, Portfolio Analysis, BCG, GEC, DPM, Ansoff Grids.

UNIT V ADVERTISING, SALES PROMOTION AND DISTRIBUTION 9

Advertising-Characteristics, Impact, Goals, Types, Sales Promotion – Point of purchase, Unique Selling Propositions, Characteristics, Wholesaling, Retailing, Channel Design, Logistics, Modern Trends in Retailing, Modern Trends, e-Marketing.

Total (L: 45) = 45 Periods

COURSE OUTCOMES:

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

1. Explain the basic concepts in marketing.
2. Explain the various buying behaviour methods.
3. Analyze the various product pricing concepts.
4. Analyze the various marketing planning principles and its strategies.
5. Describe the trends of advertising, sales promotion methods.

TEXT BOOKS:

1. Govindarajan. M, “Marketing management – concepts, cases, challenges and trends”, Prentice hall of India, second edition, 2007.
2. Philip Kolter& Keller, “Marketing Management”, Prentice Hall of India, XII edition, 2006

REFERENCES:

1. Adrain palmer, “Introduction to marketing theory and practice”, Oxford university press IE 2004.
2. Czinkota&Kotabe, “Marketing management”, Thomson learning, Indian edition 2007.
3. Donald S. Tull and Hawkins, “Marketing Research”, Prentice Hall of Inida-1997.
4. Philip Kotler and Gary Armstrong “Principles of Marketing” Prentice Hall of India, XII Edn, 2000.
5. Ramasamy and Namakumari, “Marketing Management: Planning, Implementation and Control, Macmillan and Company”, 2002.

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	0.3			0.6		0.6			0.3	0.6		0.3	0.6	0.3	0.6
2	0.3			0.6		0.6			0.3	0.6		0.3	0.6	0.3	0.6
3	0.3			0.6		0.6			0.3	0.6		0.3	0.6	0.3	0.6
4	0.3			0.6		0.6			0.3	0.6		0.3	0.6	0.3	0.6
5	0.3			0.6		0.6			0.3	0.6		0.3	0.6	0.3	0.6

PT5010 ADVERTISING TECHNIQUES L T P C
3 0 0 3

OBJECTIVES:

- To understand the concepts of Advertising and the role of the media
- To discuss about advertising production and business in detail
- To discuss advertising planning in detail
- To give examples of advertising production
- To explain the functioning of advertising agencies

UNIT I INTRODUCTION 9

Advertising concept, development and scope of advertising, economic and Social roles of advertising, legal aspects of advertising, major institutions Involved in advertising. Meaning of consumer behavior. How marketing firms use consumer behavior, characteristics of advertising communications, achieving desired responses, stimulating attention and facilitating retention, human needs as a basis for appeals. Role of printing presses in advertising.

UNIT II ADVERTISING PLANNING 9

Factors involved in advertising planning decision making, basis for advertising Objectives, Methods of Measuring Advertising Effectiveness.

UNIT III ADVERTISING MEDIA AND MEDIA PLANNING 9

Media concept, structure of media, media characteristics, publication media, TV and Ratio, direct mail and POP, out of home advertising. Media planning concept, media decision tools, media plan, media plan strategy, media buying and scheduling. Internet and Mobile Phone Advertising.

UNIT IV ADVERTISING PRODUCTION 9

Copy concept, copy structure, essentials of a copy, creative approaches and styles, copy testing criteria, types of copy testing, validity and reliability of copy test. Advertising design, layout, visualization, principles of advertising design, contribution of visual elements, what to picture, how to choose colour, test of a good layout, production of print advertising, production of TV/Radio commercials.

UNIT V ADVERTISING BUSINESS AND COORDINATION 9

Historical development, advertising agencies, special service groups. Coordination with personal selling and distribution channels, cooperative advertising and public relation, advertising and product management. Advertising campaign concept, planning and execution of campaign, evaluation of the campaign.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. State the concepts and the importance of advertising.
2. Analyze the planning aspects of advertising
3. Explain the functioning of advertising in the various media
4. Discuss various advertising production methods
5. Develop advertising campaigns.

TEXT BOOKS:

1. David A.Aaker, Rajeev Batra, John G.Myers, “Advertising Management”, Prentice Hall Inc., 1999.
2. Maurice I.Mandell, “Advertising”, Prentice Hall Inc., 1999

REFERENCES:

1. Leon G.Schiffman and Leslie Lajar Konar, “Consumer Behaviour”, Prentice Hall Inc., 1996.
2. Loudon, Della Bitta, “Consumer Behaviour concepts and Application”, McGraw Hill, 1996.
3. Wells, Burnett and Moriarty, “Advertising; Principles & Practice”, Prentice Hall Inc., 2002.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓									
CO2	✓	✓	✓	✓							✓	
CO3	✓	✓	✓	✓							✓	
CO4	✓	✓	✓	✓							✓	
CO5	✓	✓	✓								✓	

PT5011 QUALITY CONTROL IN PRINTING AND PACKAGING L T P C
3 0 0 3

OBJECTIVES:

- To impart knowledge about principles of quality
- To learn the basic process control tools and sampling
- To implement quality control procedure for press incoming materials
- To design test chart and learn control procedures in various stages of printing
- To develop quality monitoring checklist for print standards

UNIT I FUNDAMENTALS OF QUALITY 9

Fundamental concepts of Quality, Quality Cost, Specification of Quality, Quality inspection, Quality Challenges in printing; Records - types, maintenance; Pre press quality control; Quality of originals, Input Resolution, File-formats, Linearization, Calibration and Profile creation, Image editing, anti aliasing, trapping, image mixing, Pre-flight Check, Proofing, RIP, Simulation of Proof to-Press, Output/Imaging.

UNIT II STATISTICAL PROCESS CONTROL 9

Introduction to Statistical Process Control, Statistical Quality Control tools; Types of Variation, Control charts for Variable and attribute data, Acceptance sampling for attributes, Acceptance sampling for variables, Operation Characteristics curve, Selection and collection of data, Interpretation of data and statistical inference, Data analysis using statistical software like Minitab, SPSS, SAS.

UNIT III PACKAGING MATERIAL'S QUALITY CONTROL 9

Quality control procedure and practices used in receiving inventory inventory management - Paper and board, Glass, Metals, Plastic and wood, Testing of printability - surface properties, optical properties, ink characteristics, press performance and post print performance testing, Aspects of suitability of packaging material for various packaging applications - performance testing - Physical, chemical and biological characteristics

UNIT IV PACKAGE PRINTING QUALITY CONTROL 9

Process variability and measures of variability, Process inspection and control procedures for every production department, waste and spoilage reduction, Press Characterization (finger printing) and standardization, Various test forms used for standardization; Quality control in conversion process.

UNIT V STANDARDS 9

Principles of print standards, Types of Standards such as ISO/PSO, TAPPI, CGATS, CIE, ICC, Media Standard, DIN, ASTM, ANSI developing of quality monitoring checklists for all processes, checklists of definable and measurable attributes of products

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Implement ISO standards in prepress
2. Apply statistical process control tools and quality standards
3. Evaluate quality of incoming materials and outgoing products
4. Identify instruments required for implementing quality
5. Analyze the Print standards and establish process control checklist

TEXT BOOKS:

1. Joseph M. Juran, Joseph A. De Feo, Juran's Quality Handbook, Tata McGraw Hill Publication, 6th edition, 2010.
2. Miles Southworth & Donna Southworth, Quality and Productivity in the Graphic Arts, Graphic Arts Publishing Company, 1990

REFERENCES:

1. Apfelberg, H.L., Apfelberg, M.J., Implementing Quality Management in Graphic A
2. Brian Rothery, ISO 9000, Productivity & Quality, Publishing Private Ltd., 1992
3. Douglas C. Montgomery, Introduction to Statistical Quality Control, John Wiley, 1985
4. Kelvin Tritton, Colour Control for Lithography, PIRA International, 1992
5. Ken Holmes, Implementing ISO 9000, 2nd edition, PIRA International, 1995
6. Mortimer, A., Colour Reproduction in Printing Industry, PIRA International, 1991. 103
7. Phil Green, (1992), Quality Control for Print Buyers, Blue Print.
8. Ronald E. Todd, Printing Inks – Formulation Principles, Manufacture and Quality Control Testing Procedures, PIRA International,1994

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√		√		√				√		√	
CO2	√	√		√								√
CO3	√	√	√	√						√		
CO4	√			√		√					√	
CO5	√	√	√	√			√			√	√	

PT5012 VISUAL COMMUNICATION L T P C

3 0 0 3

OBJECTIVES:

- To understand the Importance of Visual Communication
- To infer the basic concepts in creating visual images
- To analyze the various vehicles of Visual communication
- To be aware of fundamentals in film making process
- To learn about various applications in different media

UNIT I INTRODUCTION 9

Visual arts history from cave drawings to video painting, identifying and analyzing hidden languages in various media and cultures, Need and importance of Communication, Communication theories and models.

UNIT II PRINCIPLES OF VISUAL COMMUNICATION 9

Psychology of human vision, How the eye and brain process image, Visual grammar, Colour form, Depth and movement, Visual theories, Perception, Semiotics, Visual story creation; Principles of Design – The applications of design principles in creating visual images.

UNIT III VISUAL ANALYSIS 9

Visual persuasion and propaganda, Understanding an image - Analysis Models, Visual image analysis – Perspectives, stereotypes and the media, Ethics of visual story telling; Standard Observer.

UNIT IV BASICS OF FILMMAKING 9

Planning, pre-production- Concept / Story development, Scripting / Screen play writing, Budgeting, Casting, Locations, Financing. Production-Shooting, Direction & Cinematography. Post production- Editing, Sound recording, Dubbing, Special effects, Graphics & Final mixing. Distribution & Exhibition.

UNIT V APPLICATION OF VISUAL COMMUNICATION 9

Overview of print, Photography, Video and audio media, Study of techniques and methods of applying visual communication in newspapers, magazines, video, internet, advertising and public relations .Analysis of a visual event–film, TV, photo exhibit, advertisements, Case studies, Standard observer.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Apply the principles of visual communication to various media.
2. Design using the various visual communication theories.
3. Analyze images and visual arts effectively
4. Understand various processes involved in film making
5. Develop Visual Communications in day to day usage.

TEXT BOOKS:

1. Bo Bergström, Essentials of Visual Communication, Laurence King Publishing, 2012
2. Rick Williams, Julianne Newton, Visual Communication: Integrating Media, Art, and Science, Routledge, 2014

REFERENCES:

1. Gregg Beryman, Notes on Graphic Design & Visual Communication, Crisp Publications, 1990.
2. Gunther R.Krers, Theo Van Ceeuwen, Routledge, Gunther R.Grers, Reading Images – The Grammar of Visual Design, Routledge Publishers, 1995.
3. Horn, Robert, Visual Language, Macro UV Publishers, 1999.
4. Kosternics, Charles and David Roberts, Designing Visual Language,2ndEdition, Allyn & Bacon, 1999
5. Lucienne Roberts, Jonathan Baldwin, Visual Communication: From Theory to Practice, AVA Publishing, 2012
6. Paul Martin Lester, Visual Communication; Images with Messages, 3rd Edition, Thomson/Wadsworth, Belmont, California, 2003.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						√		√		√		
CO2		√	√		√					√		
CO3		√	√	√	√	√				√		
CO4				√		√		√		√	√	√
CO5			√		√	√				√		√

PT5013 HEALTHCARE PACKAGING L T P C
3 0 0 3

OBJECTIVES:

- To provide an understanding of regulatory expectations and standards for design control of pharmaceutical/medical device package manufacturing, distribution and various strategies for validation
- To explain about special requirements of pharmaceutical and medical products
- To provide knowledge about licensing and legislative requirements
- To describe about the various types of packaging for pharmaceutical and medical products
- To understand the usage of various packaging materials in healthcare sectors

UNIT I BASICS OF PHARMACEUTICAL PACKAGING AND PROCESS 9

Types of Pharmaceutical products, Physical forms, Levels of Packaging, approved materials, Packaging Materials for tablets, capsules, syrups, ointments, Dry powders sprays, I.V. fluids, pre-fillable inhalers, pre-fillable syringes, Parental vials, ampoules, product spoilage mechanisms. Pharmaceutical good manufacture requirements, Pharmaceutical machinery-filling and sealing machines for injection, infusion and screw neck bottles, ampoules, prefilled syringes and cartridges**,** parental stoppers, flip-top closures, unit dose packaging, bulk package, universal product code, global trade number, package inserts, smart labels

UNIT II BASICS OF MEDICAL DEVICE PACKAGING AND MATERIALS 9

Overview of Medical Devices, Medical Device Class, Medical Device Packaging and Packaging Requirements, compliant related to packaging; **Package Materials-**Types of Packaging, Levels of Packaging, Packaging Materials, Paper & Speciality Papers, Glass, Metals, Composites, Regenerated Cellulose Films; **Design Control-**, Why Design Control is required?, Design Control Elements, **Package Specifications-** Packaging Material Specification for different Materials, Package Material Characteristics, Advantages and Limitations, Package Construction, Package Sealing, Qualification Considerations, Process Control & Capability, and Package Integrity Testing. **Functions of Healthcare Packages**; Protection, Identification, Process ability, Package Integrity, Packaging requirements for reusable medical devices in healthcare

UNIT III PACKAGE STERILIZATION METHODS 9

Terminologies & Definitions, Types of Sterilization, Sterilizing Methods/ Agent, Variables that affect sterilization , Pros & Cons of each method with respect to the packaging, MSI / PSI / SAL, Heat Sterilization & Suitable Package Material, Dry, Wet (Steam), Gaseous Sterilization & Suitable Package Material, Ionizing Radiation Sterilization & Suitable Package Material, Gas Plasma Sterilization & Suitable Package Material, Liquid Sterilization & Suitable Package Material, Shelf Life stability study –ASTM F 1980, Aseptic Presentation, Storage Autoclave Case System & Instrument Cassette Designs.

UNIT IV PACKAGE VALIDATION: PACKAGE FUNCTIONAL TESTING 9

Packaging System, Protective Package, Sterile Barrier System (SBS), COBB, Grammage, types of seals, seal/closure evaluation, Physical Testing for sterile package integrity, Tensile strength test, Tear strength test, Impact strength test, Puncture resistance test, Air permanency test, Microbial barrier test, Basis weight, Oxygen Transmissibility rate, Flexural Durability, Static Electricity Thickness & density. **Distribution Testing Standards-**Distribution- Definition, Hazards, ISO requirement; D4169 – 14-Terminology, Distribution cycles, Distribution Standards; Distribution Tests-Box compression strength, ECT, RCT, inclined impact test, Drop and vibration Test, Stack strength analysis, Transit pack leak study, Box stability Test and theoretical estimation of top load, Pallet Assembly and configuration (Optimization), Ancillary material requirements for pallet forming and its importance

UNIT V INTERNATIONAL STANDARDS & COMPLIANCE 9

Overview of medical device Quality System - ISO 13485, US FDA- 21 CFR 820 and EU MDR-745/2017. Healthcare **Packaging** international standards / ISO 11607 Part 1,2 & EN 868-1, Transport Simulation tests per ASTM D 4169, ASTM D4332. Healthcare Packaging Labeling and **Barcode Labelling -**21 CFR 801 – Labeling, 21 CFR 830- Unique Device Identifier(UDI) & Packaging Symbols Used in Labeling – ISO 15223

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Introduces the Quality System Regulations, offers extensive syllabus on international standards requirements on pharmaceutical and medical devices packaging and how these regulations can improve the safety and efficacy of medical products
2. Understand legislative and statutory requirements for medical package
3. Select appropriate packaging material and package design for various pharmaceutical products
4. Acquire knowledge on selecting suitable dispensing techniques for health care products
5. Summarize the packaging technology and security features in pharmaceutical packaging

REFERENCES:

1. Medical Device Packaging Handbook, 2nd edition Revised and Expanded; Max Sherman
2. Pharmaceutical Packaging Handbook, Edward Bauer
3. ISO 13485- Medical Device – Quality Management Systems Requirements for regulatory purposes
4. US FDA 21 CFR 820: Medical Devices – Quality system regulations
5. ISO 11607- 1 & 2: Packaging for Terminally sterilized Medical Devices
6. ISO 15223: Medical Devices – Symbols to be used medical devices labels, Labeling and information to be supplied
7. US FDA 21 CFR 801: Healthcare Labeling
8. 21 CFR 830: Unique Device Identified
9. ASTM D 4169: Standard Practice for Performance Testing of Shipping Containers and Systems
10. ASTM F 1980: Standard Guide for Accelerated Aging of Sterile Barrier Systems for Medical Devices

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√	√							√
CO2	√	√	√									
CO3	√	√	√									
CO4	√	√	√									
CO5	√	√	√	√	√							√

IE5653 RELIABILITY ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

- Describe reliability concepts.
- Teach the students in filling the life data into theoretical distribution.
- Teach the students in reliability evaluation of various configuration.
- Describe knowledge in reliability monitoring methods.
- Appraise effectively various techniques to improve reliability of the system.

UNIT I RELIABILITY CONCEPT 9

Reliability definition –Reliability parameters- f(t), F(t) and R(t) functions- Measures of central tendency – Bath tub curve – A priori and posteriori probabilities of failure – Component mortality - Useful life.

UNIT II LIFE DATA ANALYSIS 9

Data classification – Non parametric methods: Ungrouped, Grouped, Complete, Censored data – Time to failure distributions - Survival graphs – Probability plotting: Exponential, Weibull - Goodness of fit tests – -Bartlett's test, KS test, chi-square test.

UNIT III RELIABILITY ESTIMATION 9

Series parallel configurations – Parallel redundancy – m/n system – Complex systems: RBD approach – Baye's method – Minimal path and cut sets - Fault Tree analysis – Standby system.

UNIT IV RELIABILITY MANAGEMENT 9

Reliability testing: Failure terminated test – Time terminated test – Upper and lower MTBFs – Sequential Testing – Reliability growth monitoring – Reliability allocation.

UNIT V RELIABILITY IMPROVEMENT 9

Analysis of downtime – Repair time distribution – Maintainability prediction – Measures of maintainability – Availability definitions – System Availability – Replacement decisions – Economic life.

TOTAL: 45 PERIODS

OUTCOMES:

CO1: Students will be able to conduct failure data analysis.
CO2: Students will be able to estimate reliability of standard systems as well as complex systems.
CO3: Students will be able to explore reliability management tools and techniques.
CO4: Students will be able to contribute in maintainability and availability demonstration programs.
CO5: Students will be able to take decisions on inspection and replacement.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓	✓							
CO2	✓	✓	✓	✓	✓				✓			
CO3	✓	✓	✓	✓	✓				✓		✓	✓
CO4	✓	✓	✓	✓	✓						✓	✓
CO5	✓	✓	✓									

TEXT BOOK:

1. Charles E.Ebeling, "An Introduction to Reliability and Maintainability Engineering", TMH, 2007

REFERENCE:

1. Roy Billington and Ronald N. Allan, “Reliability Evaluation of Engineering Systems”, Springer, 2007.

PT5014 PRINTED ELECTRONICS L T P C
3 0 0 3

OBJECTIVES:

- To explain the basics of printed electronics and its applications
- To list and outline the printing techniques used in electronic products manufacturing
- To list and outline the materials used for printed electronics
- To describe and discuss the basics of semiconductors and substrates
- To list and discuss the standard interconnection methods

UNIT I INTRODUCTION 9

Printing Technology in Electronics Manufacturing, PE Technology and Its Benefits, PE Products and Trends, Lighting, Organic/Inorganic Photovoltaics, Displays, Integrated Smart Systems, RFID, Other Electronics and Components

UNIT II PRINTING TECHNOLOGY 9

Printing Parameters, Screen Printing, Inkjet Printing, Fast Printing: Flexo Printing and Offset-Gravure Printing, Fine Pattern Printing: Nanoimprint, μCP, and Electrostatic Inkjet, Laser-Induced Forward Transfer, Post-treatment Process

UNIT III MATERIALS FOR PRINTED ELECTRONICS 9

Varieties of Conducting Materials, Metallic Nanoparticles, Metal-Organic Decomposition Ink, Nanowires; Applications to Transparent Conductive Films, Low Temperature Fabrication of Metal Nanowire TCF

UNIT IV SEMICONDUCTORS AND SUBSTRATES 9

Semiconductor Category and History, Organic Semiconductors, Oxide Semiconductors, Other Semiconductors; Substrate-Polymeric film, glass, paper; Barrier Film Technology

UNIT V INTERCONNECTION AND STANDARDS 9

Choice of Interconnection Methods- Soldering, Adhesives; Conductive Adhesives- Isotropic Conductive Adhesives- Anisotropic Conductive Adhesives- Interconnection Reliability; Standards-ISO, IEC, IEE, IPC.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Explain and restate the basics of printed electronics
2. Compare and contrast the suitability of printing processes for various electronic products
3. Compare and discuss about the materials and the techniques involved in printed electronics
4. List and discuss the basics of semiconductors and substrates
5. Outline and restate various standards in printed electronics

TEXT BOOKS:

1. Katsuaki Suganuma 'Introduction to Printed Electronics', Springer, 2014

REFERENCES:

1. John Birkenshaw 'Printed Electronics' Pira International, 2004
2. Jutta E. M Rasp 'Flexible and Printed Electronics Explained: Technology and Commercial Applications', John Wiley & Sons, Limited, 2015.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓					✓				✓		
CO2	✓	✓			✓	✓			✓			
CO3	✓	✓			✓	✓			✓			
CO4	✓					✓	✓					
CO5	✓	✓				✓						

PT5015 **SECURITY PRINTING** **L T P C**
3 0 0 3

OBJECTIVES:

- To discuss the need for security printing.
- To list and explain the types of security inks
- To list and explain the types of security substrates
- To identify and explain the security printing techniques
- To explain various security printing applications

UNIT I INTRODUCTION 9

Need for Security printing – special issues, counterfeiting -Creation & Graphics, Making of a bank note, Circulation & Bank maintenance- RBI specifications- General security aspects of currencies- Importance of Academic and industrial security- types of products – Suitable Printing techniques for various applications

UNIT II SECURITY INKS 9

Types of security printing inks-Invisible ink, thermochromic ink, solvent sensitive ink, optically variable ink, magnetic ink, biometric ink, fugitive ink, secondary fluorescing ink, indelible inks, Invisible Phosphorescent inks, Water Resistant Inks.

UNIT III SECURITY SUBSTRATES 9

Security Fibres, , Fluorescent Hilites, Iridescent coating, Security threads, Holographic foil, Colour centered paper, Chemical reactive, chemically void, toner fused paper, visible security fibers, invisible fluorescent fibers and other security papers.

UNIT IV SECURITY PRINTING TECHNOLOGIES 9

Water marking – Digital Watermark -Holograms, rainbow printing, micro lines, Micro-dot, guilloches, numbering, Line-printing, stamp embossing, hot-foil-embossing, embossing / punching, customer - designed hologram, Principles of Bar coding, Types of Coding EAN 13 Code, Code 39 ACA.

UNIT V APPLICATIONS 9

Security design and processes for various print products: Bar-codes, Holograms, cheque printing- MICR cheques and Reserve Bank of India (RBI) specifications, finishing, paper specifications- Manufacturing process of – Bank Notes – Business forms – Certificates- Passports – Packaging - Card printing. Security Labels- substrates, content; Label authentication and protection- Logo, Adhesive types- low residue, high residue, self voiding, secutiy cuts, security threads, Types of marking-on-asset marking, online authentication and item level traceablity.

OUTCOMES:

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

1. Explain the basic concepts of security printing.
2. Illustrate and classify the security inks
3. Identify and utilize the advantages of security inks and substrates
4. Develop security techniques as per the requirement
5. Categorise and recommend suitable security printing technique for appropriate applications

TEXT BOOKS:

1. Richard D. Warner, Richard M. Adams, “Introduction to Security Printing”, PIA/GATF Press, 2005

REFERENCES:

1. A.S. Bhaskar Raj, Barcode Technology and Implementation, McGraw Hill, 2007.
2. Developments in Security Labels and Tags, Rudie Lion, Pria International Ltd.
3. Martin Monestics, The Art of Paper Currency, Quarlet Books Ltd.,1983.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓							✓				
CO2	✓	✓	✓			✓	✓	✓				
CO3	✓	✓	✓			✓	✓	✓				
CO4	✓	✓	✓	✓		✓		✓				
CO5	✓	✓	✓			✓	✓	✓				

PT5016 MASS COMMUNICATION L T P C

3 0 0 3

OBJECTIVES:

- To understand the concepts of verbal and non-verbal communication
- To learn and practice news reporting and editing
- To gain knowledge about the process of writing articles
- To understand the concepts of broadcast journalism
- To appraise the applications of Audio and video communication

UNIT I INTRODUCTION 9

Communication and its types, History and evolution of communication, Communication theories, Verbal and non-verbal communication, formal and informal communication, Role of mass media in society. Current trends in communication

UNIT II NEWS REPORTING AND EDITING 9

Fundamentals of reporting, news gathering, evaluation, news writing & newsroom procedures, Depth reporting, Trend reporting, Investigative reporting, Economic and Science reporting, Preparation of news copy for publication, Copy reading, Rewriting, Proof reading, Page making, Typography, Picture editing.

UNIT III WRITING 9

Newspaper feature and magazine, non-fiction writing, writing editorials, analytical articles, reviews, columns, commentaries & analysis.

UNIT IV BROADCAST JOURNALISM 9

Gathering & reporting news for radio & television. The structure, functions and administration of a news and public affairs department in a broadcast station. Radio/TV station management.

UNIT V AUDIO-VISUAL COMMUNICATION 9

Audio-visual aids & techniques, use of non-projected and projected aids as black boards, Charts, Graphs, Film appreciation, principles and techniques of various types of communication research.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Understand and Apply communication theories in Mass Media
2. Gather news and convert it into a news report for publishing
3. Develop content for different media
4. Analyze the functionary of Radio and Television Media
5. Use the various tools and techniques for audio visual communication

TEXT BOOKS

1. Keval J. Kumar, Mass Communication in India, Jaico Publishing, 2014
2. Nick Couldry, Media, Society, World: Social Theory and Digital Media Practice, Wadsworth Publishing, 2015.

REFERENCES:

1. Arthur Asa Berger, Essentials of Mass Communications Theory, SAGE Publications, 1995.
2. Denis McQualil, Mass Communication Theory; An Introduction to Theories of Mass Communication, 5th Edition, Melvin L.DeFluer, Sandra Bale-Rokeach, Sage Publications, 1999.
3. Jennings Bryant, Dolfzillmann, Media Effects; Advances in Theory and search, 2nd Edition, Lea Publishers, 2002.
4. Melvin L. Deflear, Sandra Bale-Rokeach, Theories of Mass Communication, 5th Edition, Allyn and Bacon Publishers, 1999.
5. Stanley J.Baran, Dennis K.Davis, Mass Communication Theory Foundations, Ferment and Future, 3rd Edition, Wadsworth Publishing, 2002.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						√		√		√		
CO2		√	√		√					√		
CO3		√	√	√	√	√				√		
CO4				√		√		√		√	√	√
CO5			√		√	√				√		√

PT5017 **PACKAGING APPLICATIONS** **L T P C**
3 0 0 3

OBJECTIVES

- To introduce the fundamental knowledge in the different package applications.
- To provide an overall knowledge about the various packaging technologies
- To explain about the food packaging materials and technologies
- To describe about the various technologies used in packaging beverages
- To discuss the challenges in electronics packaging.

UNIT I INTRODUCTION 9

Introduction to Packaging, Definitions, Functions, Package Environments, Environment Grid and Innovation, Demands and challenges, Packaging sustainability, Environmental Issues, Packaging waste management, Life cycle assessment, Social and legislative considerations.

UNIT II FOOD PACKAGING 9

Introduction, Factors affecting product quality and shelf life, Migration from packaging to foods, Shelf life determination and testing, Mass transfer, Permeation – Importance, Effect of Time, Temperature, Moisture, Gases, Permeation mechanism, Fick's law, Knudsen diffusion, Hydrodynamic flow of gases, Antimicrobial packaging, Product fragrance and packaging material interactions.

UNIT III BEVERAGE PACKAGING 9

Introduction, Water – Indices of failure, Packaging, Carbonated soft drinks – Glass, Metal, Plastics, Coffee – Roasted Whole beans, Roasted and ground coffee, Instant Coffee, Tea – Black and Green Tea, Juices – Beer – Wine.

UNIT IV PHARMACEUTICAL PACKAGING 9

Introduction, Function, Regulatory aspects, spoilage mechanisms, Drugs, Generic Medicines, Pharmaceutical product types, Material Types - Package requirements, Packaging design making process, Packaging structure, Unit dose packaging, sterile product packaging, Packages for semi solid and liquid, Primary and secondary packaging types.

UNIT V ELECTRONICS PACKAGING 9

Overview, Challenges, Materials, Properties – Mechanical, Electrical, Thermal, Physical, Manufacturability properties, Composite electronic packaging, Conducting polymer composites, Packaging Level – First, Second, Third.

TOTAL: 45 PERIODS

OUTCOMES

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

1. Explain the fundamental knowledge in the different package applications.
2. Classify the various packaging methods in food packaging applications.
3. Discuss the various materials used for beverage packaging
4. Discover the suitable packaging type.
5. Detect and overcome the challenges in Electronics packaging.

REFERENCES:

1. Edward Bauer, "Pharmaceutical Packaging Handbook", CRC Press, 2016
2. Gordon L. Robertson, "Food Packaging: Principles and Practice", Third edition, CRC Press, 2016.
3. Michael Pecht, Rakish Agarwal, F. Patrick, "Electronic Packaging – Material and their Properties", CRC Press, 2017
4. Selke, Susan EM, and John D. Culter. Plastics packaging: properties, processing, applications, and regulations. Carl Hanser Verlag GmbH Co KG, 2016.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√					√	√				
CO2	√	√	√		√	√	√	√	√	√		√
CO3	√	√	√	√	√	√	√		√	√		√
CO4	√	√	√	√	√	√	√	√	√	√		√
CO5	√	√	√	√	√	√	√	√	√	√		√

MF5072 SUSTAINABLE MANUFACTURING L T P C
3 0 0 3

COURSE OBJECTIVES:

- To impart knowledge on sustainable manufacturing polices
- To introduce the best practices for sustainable manufacturing,
- To introduce lean manufacturing practices
- To be acquainted with selection of sustainable machinery with lower energy consumption.
- To provide knowledge in hazardous management and recyclability.

UNIT I SUSTAINABLE MANUFACTURING AND POLICIES 9

Introduction to sustainable manufacturing - Origins of sustainable manufacturing - Sustainable manufacturing concepts - Indian/European/US environmental policies - Legislative, cultural, societal and political issues - Sustainable quality systems - Emission less manufacturing - Comparison between green, eco-manufacturing, eco- machining, clean manufacturing and sustainable manufacturing.

UNIT II SUSTAINABILITY MANUFACTURING BEST PRACTICES 9

Introduction to best practices of sustainability manufacturing – Manufacturability issues in sustainable product design - Environmentally conscious design/manufacturing processes - Societal impact - Product functionality, serviceability, maintainability, upgradability - Innovative product/process designs for sustainability - Preservation of sustainable development.

UNIT III LEAN MANUFACTURING AND GREEN ENERGY 9

Introduction to lean Manufacturing - Lean manufacturing tools - Comparison of conventional manufacturing and lean Manufacturing - Advantages and Limitations of lean Manufacturing. Introduction to green energy concepts - Green house effect - Global warming - Climate change - Environmental degradation– Environmental pollution – Pollution due to manufacturing industries - Remedies.

UNIT IV SUSTAINABLE MACHINERY AND ENERGY CONSUMPTION 9

Selection of appropriate machine, materials, energy, resource utilisation for sustainability manufacturing – Performance evaluation of different machinery and its components in terms of energy consumption - Causes for inefficient operations of machinery – Scope for energy conservation - World energy consumption - Determination of power demand and consumption - Comparison of power generation cost using renewable and non- renewable sources.

UNIT V HAZARDOUS MANAGEMENT AND RECYCLABILITY 9

Introduction to hazardous management in industries – Need for hazardous waste management - Appropriate method of collection, storage, transport and disposal of hazardous waste - Hazardous waste prevention and Life cycle assessment - Advantages and limitations of hazardous management - Recyclability: Recycling, recharging, disassembly, recovery, remanufacturing - End-of-life and product take-back issues - Training of next generation workforces for sustainable manufacturing.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

At the end of this course the student shall be able to:

- CO1: Identify the best practices for sustainable manufacturing in industries,
- CO2: Describe the various policies for sustainability manufacturing.
- CO3: Implement lean principles to reduce industrial wastes
- CO4: look for selection of sustainable machinery with lower energy consumption.
- CO5: Recognize hazardous management techniques and safe practices.

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	0.6					0.6	0.9	0.9					0.9	0.3	0.6
2						0.6	0.9	0.9					0.9	0.3	0.6
3	0.6	0.6	0.6	0.6	0.6	0.6	0.9	0.9					0.9	0.9	0.9
4	0.6	0.6	0.6	0.6	0.6	0.6	0.9	0.9					0.9	0.9	0.9
5	0.6	0.6	0.6	0.6	0.6	0.6	0.9	0.9					0.9	0.9	0.9

TEXT BOOKS:

1. Davim, J.P., “Sustainable Manufacturing”, John Wiley & Sons.,United States, 2010,ISBN: 978-1-848-21212-1,
2. Günther Seliger, Marwan M.K. Khraisheh and JawahirI.S., “Advances in Sustainable Manufacturing”, Springer Berlin Heidelberg., London, ISBN 978-3-642-20183-7,2011.

REFERENCES:

1. Clive George and Colin Kirkpatrick., “Impact Assessment and Sustainable Development”, Edward Elgar Publishing Ltd., United States, 2007,ISBN: 978 1 84542 787 0
2. Craig B. Smith , Kelly E. Parmenter., “Energy Management Principles: Applications, Benefits,Savings”,2nd edition, Elsevier;,2015.ISBN: 9780128026441,9780128025062.
3. Davim J. Pauls, “Green Manufacturing Processes and Systems”, Springer.,Germany 2013,ISBN: 9783642337925.
4. Dornfield David, “Green Manufacturing”, Springer., Germany,2012, ISBN 978-1-4419-6016-0.
5. Günther Seliger, “Sustainability in Manufacturing: Recovery of Resources in Product and Material Cycles”, Springer Berlin Heidelberg,2010., ISBN 978-3-540-49871-1.

PT5018 **SPECIALITY PRINTING** **L T P C**
3 0 0 3

OBJECTIVES:

- To discuss the advanced reproduction techniques in printing.
- To explain the graphic design concepts for different applications.
- To compare and discuss various unconventional printing processes
- To describe and explain the various aspects of aesthetic improvement
- To describe and discuss speciality printing finishing operation.

UNIT I INTRODUCTION 9

Different types of specialty printing, Functions, Anti- counterfeiting features, Currency printing, Intaglio printing, Postage Stamp printing, Map printing, MICR, Hologram, Semiconductor lithography, Advance printing techniques.

UNIT II SPECIALITY DESIGN 9

Graphic Design - concept, graphic, logo, page, product, brand, label and advanced concepts; Digital printing techniques; prototypes

UNIT III SPECIALITY PRINTING 9

Concepts, techniques and applications - Pad printing, textile printing, tissue paper printing; printed electronics - solar cell, talking book, visiting cards; POD, direct mailers, thermography, lenticular printing, Braille printing; security printing- overt and covert printing, Water transfer printing, 3D printing, Decals,

UNIT IV VALUE ADDITION PROCESSES 9

UV coating- matt, gloss, cold, textured, metallic coating, applications; varnishes- types, selection, blind emboss, de-bossing; laminations –types, materials , techniques; Foiling - Hot, cold;

UNIT V SPECIALITY FINISHING OPERATIONS 9

Menu card printing and folding, value added features- phaidon mailer, z-bind, greeting card with special fold, reception cards- valley and mountain fold, duplexing, perforation, brochures ; Diecut- Hugo Boss, etched and laser, kiss cut cards – security features. Premium packages

TOTAL : 45 PERIODS

OUTCOMES:

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

1. Outline the basic concepts of speciality printing
2. Compare and contrast innovative design for printed products using specialty printing techniques.
3. Compare and contrast various types of speciality printing processes
4. Plan and compose value addition to existing print design
5. Compare and contrast various specialtiy print finishing operations

TEXT BOOKS:

1. Megan Fishpool,” Hybrid Prints Printmaking Handbooks ”, A&C Black, 2009
2. Poppy Evans, Aaris Sherin, Irina Lee,” The Graphic Design Reference & Specification Book: Everything Graphic Designers Need to Know Every Day ”, Rockport Publishers, 2013.

REFERENCES:

1. Helmut Kipphan, "Handbook of Print Media", GATF, 2001
2. Jutta E. M Rasp, "Flexible and Printed Electronics Explained: Technology and Commercial Applications", John Wiley & Sons, Limited, 2015.

3. John Dawson, ”The Complete guide to prints and printmaking: techniques and materials”, Excalibur Books, 1981, digitized Jun 2010.
4. Jessica C. White, ” Letterpress Now: A DIY Guide to New & Old Printing Methods”, Sterling Publishing Company, Incorporated, 2013.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓			✓	✓	✓					
CO2	✓		✓			✓			✓			
CO3	✓					✓			✓			
CO4	✓					✓			✓			
CO5	✓					✓			✓			

PT5019 PACKAGE DESIGN AND STANDARDS L T P C
3 0 0 3

OBJECTIVES:

- To discuss about the basics of packaging and merchandising
- To discuss on the basic concepts in package designing, design considerations and design workflow.
- To discuss and illustrate the components of package graphic designs
- To discuss and illustrate the components of package structural designs
- To discuss about the package designing and performance simulation software

UNIT I INTRODUCTION 9

Packaging and Modern Merchandising, Marketing Requirements, Brand Management, Product Lifecycle, Planning for change, Basic considerations of package development –structural development, packaging coordination, graphics, packaging line engineering, cost of development; Economic considerations: package cost vs. product cost

UNIT II PACKAGE DEVELOPMENT 9

Managing the Packaging Function, Project Scope, Consumer Research, Behavioral Measures, Eye Tracking and the features of a package, Optimizing Package Design, Package Development Process, Specifications, Benchmarks, Package Designer’s, Checklist, Introduction of testing and evaluation methods.

UNIT III GRAPHIC DESIGN 9

Demographics and Psychographics, The Retail Environment, Fundamental Messages, Equity and Brand Names, Role of Graphics, Text, Colour, Graphic Design Basics, Package Design and Marketing Studies, Package Aesthetics, Decoration Aspects, Layout and Feature Selection.

UNIT IV STRUCTURAL DESIGN 9

Predicting package performance, Role of Structure, Structural Design – folding cartons, cans, glass containers, plastic containers, bags and pouches; Die-making, Drawing, Moulds, Prototypes, Samples, Design Standards.

UNIT V SOFTWARES FOR DESIGNING 9

CAD software for Package Designing, drafting, mould design; Simulation software for package performance and manufacturing.

TOTAL: 45 PERIODS

OUTCOMES

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

1. Explain the basic concepts of packaging and merchandising
2. Explain and illustrate the package development process
3. Explain and illustrate the graphic designing process with respect to various relevant factors
4. Explain and illustrate various structural aspects of package designing
5. Explain and utilize package designing and performance simulation software

TEXT BOOKS

1. Marianne R. Klimchuk and Sandra A. Krasovec, “Packaging Design: Successful Product Branding from Concept to Shelf”, Wiley, 2006,
2. Walter Soroka, “Fundamentals of packaging technology”, 3rd Edition, Institute of packaging professionals, Naperville, Illinois, USA, 2002

REFERENCES

1. Aaron L. Brody and Kenneth S. Marsh, “The Wiley Encyclopedia of Packaging Technology”, 1997
2. Giles Calver, “What is Packaging Design?: Essential design handbook”, Rotovision, 2004
3. Steven DuPuis, John Silva, ”Package Design Workbook: The Art and Science of Successful Packaging”, Rockport Publishers, 2008

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓				✓	✓	✓			✓	
CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO3	✓		✓	✓		✓			✓	✓		
CO4	✓	✓	✓	✓		✓	✓	✓		✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

PT5020 CREATIVITY AND INNOVATION IN PRINTING AND PACKAGING L T P C
3 0 0 3

OBJECTIVES:

- Understand the nuances involved in Creativity & Innovation.
- Describe the applications of thinking and visualization in printing and packaging
- Get hands on experience in applying creativity in problem solving.
- Produce creative ideas using Brainstorming
- Explain the various methods of innovation in the Printing and packaging industry

UNIT I INTRODUCTION 9

Need for Creative and innovative thinking for quality, components of Creativity, Methodologies and approaches, individual and group creativity, organizational role in creativity, types of innovation, barriers to innovation, innovation process, establishing criterion for assessment of creativity & innovation.

UNIT II THINKING AND VISUALIZATION 9

Definitions and theory of functioning of mind heuristics and models: attitudes, Approaches and Actions that support creative thinking - Advanced study of visual elements and principles- line, plane, shape, form, pattern, texture gradation, colour psychology & symmetry. Techniques to enhance visualization – provocation, cross fertilize, mastermind, OPV, Brain gym.

UNIT III CREATIVITY 9

Methods and tools for Directed Creativity – Basic Principles – Tools that prepare the mind for creative thought – stimulation – creativity techniques in Package design– Inspiration, Clarification, Distillation, Perspiration, Evaluation and Incubation – Creativity and Motivation.

UNIT IV CREATIVE PROBLEM SOLVING 9

Generating and acquiring new ideas, product design, service design – case studies and hands-on exercises, stimulation tools and approaches, six thinking hats, lateral thinking – Individual activity, group activity, Brainstorming, Brain writing, Design thinking in Printing and Packaging

UNIT V INNOVATION 9

Achieving Creativity – Introduction- the essential factors – Innovator's solution – creating and sustaining successful growth – Disruptive Innovation models – Patents, IPR methods laws and regulations

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Overcome barriers and blocks in creative thinking process
2. Combine the different techniques in creative thinking and its applications
3. Discover creative ways of designing packages
4. Design new products in Printing and packaging using creativity tools
5. Discuss innovation and the ways and means of obtaining patents

TEXT BOOKS :

1. Think!: Before It's Too Late by Edward de Bono, Random House books, 2017
2. Mastering the Dynamics of Innovation by James M. Utterback, Harvard Business School Papper back 2017

REFERENCES:

1. The Creative Mind: Myths and Mechanisms by Margaret A. Boden, Routlege Publishers London, 2018
2. Creative Cognition: Theory, Research, and Applications by Ronald A. Finke, Thomas B. Ward, and Steven M. Smith, MIT Press Papaerback edition, 2018
3. The Accidental Creative: How to Be Brilliant at a Moment's Notice By, Todd Henry, Penguin Publishers, 2017

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓							
CO2	✓	✓	✓	✓	✓							
CO3	✓	✓	✓	✓	✓							
CO4	✓	✓	✓	✓	✓							
CO5	✓	✓	✓	✓	✓							

PT5021 PRINTING AND PACKAGING MACHINERY MAINTENANCE L T P C
3 0 0 3

OBJECTIVES:

- To provide an overview about maintenance management.
- To impart knowledge on maintenance activities & its schedule.
- To learn about the concepts of total productive maintenance.
- To understand the procedures involved in erection and techniques to evaluate machine condition.
- To comprehend the factors to be considered for replacement and reconditioning.

UNIT I MAINTENANCE MANAGEMENT PERSPECTIVE 9

Objectives and functions, Problems and challenges, Organisation, Maintenance methods, Criticality determination, Categorization, Economic aspects of maintenance. Emerging trends.

UNIT II TOTAL PLANNED MAINTENANCE 9

System components, documentation, facility register, records, safety related issues. Spare parts management. Maintenance schedules and control system. Inspection and lubrication, purpose, lubricants, lubricating systems.

UNIT III TOTAL PRODUCTIVE MAINTENANCE 9

Six big losses, measuring the losses. Evaluating equipment effectiveness. Prepress maintenance, Press maintenance, Printing and packaging equipment maintenance. Electrical components maintenance: Motors, Electric brakes. Mechanical components maintenance: types of gears, cams, levers, Bearings, Clutches, Drives, printing and packaging machines.

UNIT IV ERECTION AND TESTING 9

Foundation requirements, Condition based maintenance: Condition monitoring, Techniques, Vibration analysis, Thermography, Non destructive testing methods and diagnostic instruments.

UNIT V RECONDITIONING AND REPLACEMENT THEORY 9

Repairs and reconditioning methods for various parts, roller copperising, re-rubberizing. Replacement models - Replacement policy, replacement of items, Determination of average life.

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Analyze the basic concepts of maintenance management
2. Create a maintenance schedule based on criticality and economics
3. Evaluate equipment effectiveness
4. Identify the stages of machine erection and testing
5. Determine the replacement policy

TEXT BOOKS:

1. P.Goplakrishnan, A.K.Banerji, Maintenance and Spare Parts Management, Prentice-Hall of India, 2013
2. Venkataraman.K, Maintenance Engineering and Management, Prentice-Hall of India, Private Limited., 2007.

REFERENCES:

1. H.P.Garg, Industrial Maintenance, S.Chand & Company Ltd., 1990.
2. Herschell L. Apfelberg, Maintaining Printing Equipment, GATF Press,1984
3. Keith Mobley, Lindley Higgins, Darrin Wikoff, Maintenance Engineering Handbook, McGraw– Hill,2008
4. Kenneth E.Rizzo, Total Production Management, Second Edn., GATF Press, 2008
5. N.D.Vohra, Quantitative Techniques in Management, Tata McGraw – Hill Publishing Co. Ltd, 2006

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓	✓	✓	✓								
CO3	✓	✓	✓	✓	✓							
CO4	✓	✓	✓	✓	✓							
CO5	✓	✓	✓	✓								

ME5075 ENTREPRENEURSHIP DEVELOPMENT L T P C
3 0 0 3

COURSE OBJECTIVES: The main learning objective of this course is to prepare the students for:

1. Explaining the types, characteristics of entrepreneurship and its role in economic development.
2. Applying the theories of achievement motivation and the principles of entrepreneurship development program to enterprise.
3. Selecting the appropriate form of business ownership in setting up an enterprise.
4. Applying the fundamental concepts of finance and accounting to enterprise.
5. Identifying sickness in industry, selecting the appropriate corrective measures, and identifying the growth strategies in enterprise.

UNIT I ENTREPRENEURSHIP 9

Entrepreneur – Characteristics – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur – Role of Entrepreneurship in Economic Development – Factors Affecting Entrepreneurial Growth – Economic, Non Economic, Government Actions.

UNIT II MOTIVATION 9

Entrepreneurial Motivation: Theories and Factors, Achievement Motivation –Entrepreneurial Competencies – Entrepreneurship Development Programs – Need, Objectives – Business Game, Thematic Apperception Test, Self Rating, Stress management.

UNIT III BUSINESS 9

Small Enterprises – Definition, Characteristics, Project Identification and selection – Project Formulation: Significance, content, formulation of project report – Project Appraisal: Concept and method – Ownership Structures: Selection & Pattern.

UNIT IV FINANCING AND ACCOUNTING 9

Finance: Need, Sources, Capital Structure, Term Loans – Accounting: Need, Objectives, Process, Journal, Ledger, Trial Balance, Final Accounts – Working Capital Management: Significance, Assessment, Factors, Sources, Management.

UNIT V SUPPORT TO ENTREPRENEURS 9

Sickness in small Business: Concept, Signals, Symptoms, Magnitude, Causes and Consequences, Corrective Measures – Government Policy for Small Scale Enterprises – Growth Strategies in Small Scale Enterprise – Institutional Support to Entrepreneurs: Need and Support – Taxation Benefits to Small Scale Industry: Need, Depreciation, Rehabilitation, Investment.

TOTAL = 45 PERIODS

COURSE OUTCOMES:

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

1. Explain the types, characteristics of entrepreneurship and its role in economic development.
2. Apply the theories of achievement motivation and the principles of entrepreneurship development program.
3. Select the appropriate form of business ownership in setting up an enterprise.
4. Apply the fundamental concepts of finance and accounting to enterprise.
5. Identify sickness in industry, select the appropriate corrective measures, and identify the growth strategies in enterprise.

TEXT BOOKS:

1. S.S.Khanka, "Entrepreneurial Development" S.Chand& Co. Ltd. Ram Nagar New Delhi,1999.
2. Kurahko&Hodgetts, " Entrepreneurship – Theory, process and practices", Thomson learning 6th edition.

REFERENCES:

1. Charantimath, P. M., Entrepreneurship Development and Small Business Enterprises, Pearson, 2006.
2. Hisrich R D and Peters M P, "Entrepreneurship" 5th Edition Tata McGraw-Hill, 2002.
3. Mathew J Manimala," Entrepreneurship theory at cross roads: paradigms and praxis" Dream tech, 2nd edition 2006.
4. Rabindra N. Kanungo, "Entrepreneurship and innovation", Sage Publications, New Delhi, 1998.
5. Singh, A. K., Entrepreneurship Development and Management, University Science Press, 2009.

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1						0.6		0.3	0.3	0.3		0.3			
2						0.6		0.3	0.3	0.3		0.3		0.3	
3						0.6	0.6	0.6	0.3	0.3	0.9	0.3		0.3	
4						0.6	0.3	0.6		0.3	0.3	0.3		0.3	
5						0.6	0.6	0.3		0.3		0.3		0.3	

AD5091 CONSTITUTION OF INDIA L T P C
3 0 0 0

OBJECTIVES:

- Teach history and philosophy of Indian Constitution.
- Describe the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- Summarize powers and functions of Indian government.
- Explain emergency rule.
- Explain structure and functions of local administration.

UNIT I INTRODUCTION 9

History of Making of the Indian Constitution-Drafting Committee- (Composition & Working) - Philosophy of the Indian Constitution-Preamble-Salient Features

UNIT II CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES 9

Fundamental Rights-Right to Equality-Right to Freedom-Right against Exploitation Right to Freedom of Religion-Cultural and Educational Rights-Right to Constitutional Remedies Directive Principles of State Policy-Fundamental Duties

UNIT III ORGANS OF GOVERNANCE 9

Parliament-Composition-Qualifications and Disqualifications-Powers and Functions-Executive President-Governor-Council of Ministers-Judiciary, Appointment and Transfer of Judges, Qualifications Powers and Functions

UNIT IV EMERGENCY PROVISIONS 9

Emergency Provisions - National Emergency, President Rule, Financial Emergency

UNIT V LOCAL ADMINISTRATION 9

District's Administration head- Role and Importance-Municipalities- Introduction- Mayor and role of Elected Representative-CEO of Municipal Corporation-Pachayati raj- Introduction- PRI- Zila Pachayat-Elected officials and their roles- CEO ZilaPachayat- Position and role-Block level-Organizational Hierarchy (Different departments)-Village level- Role of Elected and Appointed officials-Importance of grass root democracy

TOTAL: 45 PERIODS

OUTCOMES:

CO1: Able to understand history and philosophy of Indian Constitution.
CO2: Able to understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
CO3: Able to understand powers and functions of Indian government.
CO4: Able to understand emergency rule.
CO5: Able to understand structure and functions of local administration.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1									✓			✓
CO2									✓			✓
CO3									✓			✓
CO4									✓			✓
CO5									✓			✓

TEXT BOOKS:

1. Basu D D, Introduction to the Constitution of India, Lexis Nexis, 2015.
2. Busi S N, Ambedkar B R framing of Indian Constitution, 1st Edition, 2015.
3. Jain M P, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. The Constitution of India (Bare Act), Government Publication,1950

AD5092 VALUE EDUCATION L T P C

3 0 0 0

OBJECTIVES:

- Develop knowledge of self-development
- Explain the importance of Human values
- Develop the overall personality through value education
- Overcome the self destructive habits with value education
- Interpret social empowerment with value education

UNIT I INTRODUCTION TO VALUE EDUCATION 9

Values and self-development –Social values and individual attitudes, Work ethics, Indian vision of humanism, Moral and non- moral valuation, Standards and principles, Value judgements

UNIT II IMPORTANCE OF VALUES 9

Importance of cultivation of values, Sense of duty, Devotion, Self-reliance, Confidence, Concentration, Truthfulness, Cleanliness. Honesty, Humanity, Power of faith, National Unity, Patriotism, Love for nature, Discipline

UNIT III INFLUENCE OF VALUE EDUCATION 9

Personality and Behaviour development - Soul and Scientific attitude. Positive Thinking, Integrity and discipline, Punctuality, Love and Kindness, Avoid fault Thinking, Free from anger, Dignity of labour, Universal brotherhood and religious tolerance, True friendship Happiness Vs suffering, love for truth.

UNIT IV REINCARNATION THROUGH VALUE EDUCATION 9

Aware of self-destructive habits, Association and Cooperation, Doing best for saving nature Character and Competence –Holy books vs Blind faith, Self-management and Good health, Science of reincarnation

UNIT V VALUE EDUCATION IN SOCIAL EMPOWERMENT 9

Equality, Non violence, Humility, Role of Women, All religions and same message, Mind your Mind, Self-control, Honesty, Studying effectively

TOTAL: 45 PERIODS

OUTCOMES:

CO1 – Gain knowledge of self-development
CO2 – Learn the importance of Human values
CO3 – Develop the overall personality through value education
CO4 – Overcome the self destructive habits with value education
CO5 – Interpret social empowerment with value education

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							√	√				√
CO2							√	√	√			√
CO3							√	√	√			√
CO4							√	√				√
CO5							√	√				√

REFERENCES:

1. Chakroborty , S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press ,New Delhi

AD5093 **PEDAGOGY STUDIES** **L T P C**
3 0 0 0

OBJECTIVES:

- Understand the methodology of pedagogy.
- Compare pedagogical practices used by teachers in formal and informal classrooms in developing countries.
- Infer how can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy.
- Illustrate the factors necessary for professional development.
- Identify the Research gaps in pedagogy.

UNIT I INTRODUCTION AND METHODOLOGY 9

Aims and rationale, Policy background, Conceptual framework and terminology - Theories of learning, Curriculum, Teacher education - Conceptual framework, Research questions **-** Overview of methodology and Searching.

UNIT II THEMATIC OVERVIEW 9

Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries - Curriculum, Teacher education.

UNIT III EVIDENCE ON THE EFFECTIVENESS OF PEDAGOGICAL PRACTICES 9

Methodology for the in depth stage: quality assessment of included studies - How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? - Theory of change - Strength and nature of the body of evidence for effective pedagogical practices - Pedagogic theory and pedagogical approaches - Teachers' attitudes and beliefs and Pedagogic strategies.

UNIT IV PROFESSIONAL DEVELOPMENT 9

Professional development: alignment with classroom practices and follow up support - Peer support - Support from the head teacher and the community - Curriculum and assessment - Barriers to learning: limited resources and large class sizes

UNIT V RESEARCH GAPS AND FUTURE DIRECTIONS 9

Research design – Contexts – Pedagogy - Teacher education - Curriculum and assessment - Dissemination and research impact.

TOTAL: 45 PERIODS

OUTCOMES:

- Understand the methodology of pedagogy.
- Understand Pedagogical practices used by teachers in formal and informal classrooms in developing countries.
- Find how can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy.
- Know the factors necessary for professional development.
- Identify the Research gaps in pedagogy.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												√
CO2												√
CO3												√
CO4												√
CO5												√

REFERENCES:

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.

AD5094 STRESS MANAGEMENT BY YOGA L T P C
3 0 0 0

OBJECTIVES:

- Develop healthy mind in a healthy body thus improving social health also improve efficiency
- Invent Do's and Don't's in life through Yam
- Categorize Do's and Don't's in life through Niyam
- Develop a healthy mind and body through Yog Asans
- Invent breathing techniques through Pranayam

UNIT I INTRODUCTION TO YOGA 9

Definitions of Eight parts of yog. (Ashtanga)

UNIT II YAM 9

Do`s and Don't's in life.
Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

UNIT III NIYAM 9

Do`s and Don't's in life.
Ahinsa, satya, astheya, bramhacharya and aparigraha

UNIT IV ASAN 9

Various yog poses and their benefits for mind & body

UNIT V PRANAYAM 9

Regularization of breathing techniques and its effects-Types of pranayam

TOTAL: 45 PERIODS

OUTCOMES:

CO1 – Develop healthy mind in a healthy body thus improving social health also improve efficiency
CO2 – Learn Do's and Don't's in life through Yam
CO3 – Learn Do's and Don't's in life through Niyam
CO4 – Develop a healthy mind and body through Yog Asans
CO5 – Learn breathing techniques through Pranayam

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							√	√				√
CO2							√	√				√
CO3							√	√				√
CO4							√	√				√
CO5							√	√				√

REFERENCES:

1. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata
2. 'Yogic Asanas for Group Tarining-Part-I" : Janardan Swami Yogabhyasi Mandal, Nagpur

AD5095 PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS **L T P C 3 0 0 0**

OBJECTIVES:

- Develop basic personality skills holistically
- Develop deep personality skills holistically to achieve happy goals
- Rewrite the responsibilities
- Reframe a person with stable mind, pleasing personality and determination
- Discover wisdom in students

UNIT I NEETISATAKAM-HOLISTIC DEVELOPMENT OF PERSONALITY - I 9

Verses- 19,20,21,22 (wisdom) - Verses- 29,31,32 (pride & heroism) – Verses- 26,28,63,65 (virtue)

UNIT II NEETISATAKAM-HOLISTIC DEVELOPMENT OF PERSONALITY - II 9

Verses- 52,53,59 (dont's) - Verses- 71,73,75,78 (do's)

UNIT III APPROACH TO DAY TO DAY WORK AND DUTIES 9

Shrimad Bhagwad Geeta: Chapter 2-Verses 41, 47,48 - Chapter 3-Verses 13, 21, 27, 35 Chapter 6-Verses 5,13,17,23, 35 - Chapter 18-Verses 45, 46, 48

UNIT IV STATEMENTS OF BASIC KNOWLEDGE – I 9

Statements of basic knowledge - Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68 Chapter 12 -Verses 13, 14, 15, 16,17, 18

UNIT V PERSONALITY OF ROLE MODEL - SHRIMAD BHAGWADGEETA 9

Chapter2-Verses 17, Chapter 3-Verses 36,37,42 - Chapter 4-Verses 18, 38,39 Chapter18 – Verses 37,38,63

TOTAL: 45 PERIODS

OUTCOMES:

CO1: To develop basic personality skills holistically

CO2: To develop deep personality skills holistically to achieve happy goals

CO3: To rewrite the responsibilities

CO4: To reframe a person with stable mind, pleasing personality and determination

CO5: To awaken wisdom in students

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1									✓			✓
CO2									✓			✓
CO3									✓			✓
CO4									✓			✓
CO5									✓			✓

REFERENCES:

1. Gopinath,Rashtriya Sanskrit Sansthanam P, Bhartrihari's ThreeSatakam , Niti-sringar-vairagya, New Delhi,2010
2. Swami Swarupananda , Srimad Bhagavad Gita, Advaita Ashram,Publication Department, Kolkata,2016.

AD5098 SANGA TAMIL LITERATURE APPRECIATION L T P C
3 0 0 0

COURSE OBJECTIVES:

The main learning objective of this course is to make the students an appreciation for:

1. Introduction to Sanga Tamil Literature.
2. 'Agathinai' and 'Purathinai' in Sanga Tamil Literature.
3. 'Attruppadai' in Sanga Tamil Literature.
4. 'Puranaanuru' in Sanga Tamil Literature.
5. 'Pathitrupaththu' in Sanga Tamil Literature.

UNIT I SANGA TAMIL LITERATURE AN INTRODUCTION 9

Introduction to Tamil Sangam – History of Tamil Three Sangams – Introduction to Tamil Sangam Literature – Special Branches in Tamil Sangam Literature - Tamil Sangam Literature's Grammar - Tamil Sangam Literature's parables.

UNIT II 'AGATHINAI' AND 'PURATHINAI' 9

Tholkappiyar's Meaningful Verses – Three literature materials – Agathinai's message - History of Culture from Agathinai – Purathinai – Classification – Mesaage to Society from Purathinai.

UNIT III 'ATTRUPPADAI'. 9

Attruppadai Literature – Attruppadai in 'Puranaanuru' - Attruppadai in 'Pathitrupaththu' – Attruppadai in 'Paththupaattu'.

UNIT IV 'PURANAANURU' 9

Puranaanuru on Good Administration, Ruler and Subjects – Emotion & its Effect in Puranaanuru.

UNIT V 'PATHITRUPATHTHU' 9

Pathitrupaththu in 'Ettuthogai' – Pathitrupaththu's Parables – Tamil dynasty: Valor, Administration, Charity in Pathitrupaththu - Mesaage to Society from Pathitrupaththu.

TOTAL (L: 45) = 45 PERIODS

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

1. Appreciate and apply the messages in Sanga Tamil Literature in their life.
2. Differentiate 'Agathinai' and 'Purathinai' in their personal and societal life.
3. Appreciate and apply the messages in 'Attruppadai' in their personal and societal life.
4. Appreciate and apply the messages in 'Puranaanuru' in their personal and societal life.
5. Appreciate and apply the messages in 'Pathitrupaththu' in their personal and societal life.

REFERENCES:

1. Sivaraja Pillai, The Chronology of the Early Tamils, Sagwan Press, 2018.
2. Hank Heifetz and George L. Hart, The Purananuru, Penguin Books, 2002.
3. Kamil Zvelebil, The Smile of Murugan: On Tamil Literature of South India, Brill Academic Pub, 1997.
4. George L. Hart, Poets of the Tamil Anthologies: Ancient Poems of Love and War, Princeton University Press, 2015.
5. Xavier S. Thani Nayagam, Landscape and poetry: a study of nature in classical Tamil poetry, Asia Pub. House, 1967.

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1									0.9						0.6
2									0.9						0.6
3									0.9						0.6
4									0.9						0.6
5									0.9						0.6

HSMC– ELECTIVES – HUMANITIES I (ODD SEMESTER)

HU5171 LANGUAGE AND COMMUNICATION L T P C
3 0 0 3

COURSE DESCRIPTION

This course offers an introduction to language and communication. The primary goal of this course is to familiarize students with key ideas related to communication using language as well as non verbal means. Ideas related to the use of language and the underlying power structures are also examined. The course also examines the role of media in communication and in the dissemination of ideas as well as opinions.

Objectives

- ✓ To familiarize students with the concept of communication using linguistic and non linguistic resources.
- ✓ To help students ask critical questions regarding facts and opinions.
- ✓ To provide students with the material to discuss issues such as language and power structures.
- ✓ To help students think critically about false propaganda and fake news.

Learning Outcomes

- ➢ Students will be able to use linguistic and non linguistic resources of language in an integrated manner for communication.
- ➢ Students will be able to analyse communication in terms of facts and opinions.
- ➢ Students will be able to discuss, analyse and argue about issues related to language and power.

UNIT I LINGUISTIC AND NON-LINGUISTIC RESOURCE OF COMMUNICATION: 9

a) Writing and Speech
b) Distinction between language structure and language use, form and function, acceptability and grammaticality
c) Gestures and Body language, pictures and symbols, cultural appropriacy
d) Communicative Competency, context and situation, combination of linguistic and non-linguistic elements of communication

UNIT II STRUCTURE OF WRITING/CONVERSATION: 9

a) Language skills and the communication cycle; speaking and listening, writing and reading
b) Initiating and closing conversations, intervention, turn taking
c) Writing for target reader, rhetorical devices and strategies
d) Coherence and Cohesion in speech and writing

UNIT III POWER STRUCTURE AND LANGUAGE USE: 9

a) Gender and language use
b) Politeness expressions and their use
c) Ethical dimensions of language use
d) Language rights as part of human rights

UNIT IV MEDIA COMMUNICATION: 9

a) Print media, electronic media, social media
b) Power of media
c) Manufacturing of opinion, fake news and hidden agendas

UNIT V PERSUASIVE COMMUNICATION AND MISCOMMUNICATION: 9

a) Fundamentals of persuasive communication
b) Persuasive strategies
c) Communication barriers

TOTAL : 45 PERIODS

TEXT BOOKS:

1. Austin, 1962, J.L. How to do things with words. Oxford: Clarendon Press. Grice, P.1989. Studies in the way of words. Cambridge, M.A: Harvard University Press.
2. Chomsky, N.1966. Aspects of the theory of syntax, The MIT press, Cambridge. Chomsky, N.2006. Language and Mind, Cambridge University Press.
3. Hymes. D.N. 1972, On communication competence in J.B. Pride and J.Holmes (ed), Sociolinguistics, pp 269-293, London Penguin.
4. Gilbert, H.Harman, 1976. Psychological aspect of the theory of syntax in Journal of Philosophy, page 75-87.
5. Stephen. C. Levenson, 1983, Pragmatics, Cambridge University press.
6. Stangley, J. 2007. Language in Context. Clarendon press, Oxford. 7. Shannon, 1942. A Mathematical Theory of Communication. 8. Searle, J.R. 1969. Speech acts: An essay in the philosophy of language. Cambridge: Cambridge University Press.

HU5172 VALUES AND ETHICS L T P C

3 0 0 3

OBJECTIVES:

- Teach definition and classification of values.
- Explain Purusartha.
- Describe Sarvodaya idea.
- Summarize sustenance of life.
- Conclude views of hierarchy of values.

UNIT I DEFINITION AND CLASSIFICATION OF VALUES 9

Extrinsic values- Universal and Situational values- Physical- Environmental-Sensuous-Economic-Social-Aesthetic-Moral and Religious values

UNIT II CONCEPTS RELATED TO VALUES 9

Purusartha-Virtue- Right- duty- justice- Equality- Love and Good

UNIT III IDEOLOGY OF SARVODAYA 9

Egoism- Altruism and universalism- The Ideal of Sarvodaya and Vasudhaiva Kutumbakam

UNIT IV SUSTENANCE OF LIFE 9

The Problem of Sustenance of value in the process of Social, Political and Technological Changes

UNIT V VIEWS ON HIERARCHY OF VALUES 9

The Problem of hierarchy of values and their choice, The views of Pt. Madan Mohan Malviya and Mahatma Gandhi

TOTAL: 45 PERIODS

OUTCOMES:

CO1: Able to understand definition and classification of values.
CO2: Able to understand purusartha.
CO3: Able to understand sarvodaya idea.
CO4: Able to understand sustenance of life.
CO5: Able to understand views of hierarchy of values.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								✓	✓			✓
CO2								✓	✓			✓
CO3								✓	✓			✓
CO4								✓	✓			✓
CO5								✓	✓			✓

TEXT BOOKS:

1. AwadeshPradhan :MahamanakeVichara. (B.H.U., Vanarasi-2007)
2. Little, William, : An Introduction of Ethics (Allied Publisher, Indian Reprint 1955)
3. William, K Frankena : Ethics (Prentice Hall of India, 1988)

HU5173 HUMAN RELATIONS AT WORK L T P C
3 0 0 3

OBJECTIVES:

- Illustrate human relations at work its relationship with self.
- Explain the importance of interacting with people at work to develop teamwork.
- Infer the importance of physical health in maintaining human relations at work.
- Describe the importance of staying psychologically healthy.
- Identify the essential qualities for progressing in career.

UNIT I UNDERSTANDING AND MANAGING YOURSELF 9

Human Relations and You: Self-Esteem and Self-Confidence: Self-Motivation and Goal Setting; Emotional Intelligence, Attitudes, and Happiness; Values and Ethics and Problem Solving and Creativity.

UNIT II DEALING EFFECTIVELY WITH PEOPLE 9

Communication in the Workplace; Specialized Tactics for Getting Along with Others in the Workplace; Managing Conflict; Becoming an Effective Leader; Motivating Others and Developing Teamwork; Diversity and Cross-Cultural Competence.

UNIT III STAYING PHYSICALLY HEALTHY 9

Yoga, Pranayam and Exercise: Aerobic and anaerobic.

UNIT IV STAYING PSYCHOLOGICALLY HEALTHY 9

Managing Stress and Personal Problems, Meditation.

UNIT V DEVELOPING CAREER THRUST 9

Getting Ahead in Your Career, Learning Strategies, Perception, Life Span Changes, and Developing Good Work Habits.

TOTAL: 45 PERIODS

OUTCOMES:

Students will be able to
CO1: Understand the importance of self-management.
CO2: Know how to deal with people to develop teamwork.
CO3: Know the importance of staying healthy.
CO4: Know how to manage stress and personal problems.
CO5: Develop the personal qualities essential for career growth.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						✓		✓	✓			✓
CO2									✓	✓		✓
CO3						✓		✓	✓			✓
CO4								✓				✓
CO5								✓	✓	✓		✓

TEXT BOOK:

1. Dubrien, A. J. (2017). Human Relations for Career and Personal Success: Concepts, Applications, and Skills, 11th Ed. Upper Saddle River, NJ: Pearson.

REFERENCES:

1. Greenberg, J. S. (2017). Comprehensive stress management (14th edition), New York: McGraw Hill.
2. Udai, Y. (2015). Yogasanaurpranayam. New Delhi: N.S. Publications.

HU5174 PSYCHOLOGICAL PROCESSES L T P C
3 0 0 3

COURSE DESCRIPTION

Psychological Processes course is designed for students to be aware of the basic principles of psychology for the better understanding of people's psyche and behaviour around them. This course enables learners to use the optimal use of different forms of thinking skills and thereby results in effective communication in diverse situations. Every unit of the syllabus highlights the psychological process of people, the most powerful and constructive use of perceptions.

OBJECTIVES

The major objectives of this course is

- To develop students' awareness – on psychology, learning behavior and usage of perception effectively.
- To learn to use the various kinds of thinking in a formal context.
- To critically evaluate content and comprehend the message on the bases of perception, personality and intelligence.

UNIT I INTRODUCTION

What is psychology? - Why study psychology? - Psychology as science – Behavior and its role in human communication – socio-cultural bases of behaviour – Biological bases of behavior - Brain and its functions – Principles of Heredity – Cognition and its functions Fields of psychology – Cognitve and Perceptual – Industrial and Organizational.

UNIT II SENSORY & PERCEPTUAL PROCESSES

Some general properties of Senses: Visual system – the eye, colour vision – Auditory system – Hearing, listening, Sounds - Other senses - Selective attention; physiological correlates of attention; Internal influences on perception learning – set - motivation & emotion - cognitive styles; External influences on perception figure and ground separation – movement – organization – illusion; Internal- external interactions: Constancy - Depth Perception- Binocular & Monocular Perception; Perceptual defense & Perceptual vigilance; Sensory deprivation - Sensory bombardment; ESP - Social Perception.

UNIT III COGNITION & AFFECT

Learning and memory – philosophy of mind – concepts - words – images – semantic features – Association of words – Repetition – Retrieval – Chunking - Schemata - Emotion and motivation – nature and types of motivation – Biological & Psychosocial motivation – nature and types of emotions – physiological & cognitive bases of emotions – expressions of emotions – managing negative emotions - enhancing positive emotions.

UNIT IV THINKING, PROBLEM-SOLVING & DECISION MAKING

Thinking skills – Types of thinking skills – Concrete & Abstract thinking – Convergent & Divergent - Analytical & Creative thinking – Problem & Possibility thinking – Vertical & Lateral thinking – Problem solving skills – stages of problem solving skills – Decision making - intuition and reasoning skills - Thinking and language - The thinking process- concepts, problem solving, decision-making, creative thinking; language communication.

UNIT V PERSONALITY & INTELLIGENCE

Psychological phenomena & Attributes of humans - cognition, motivation, and behavior - thoughts, feelings, perceptions, and actions – personality dimensions, traits, patterns - Specialized knowledge, performance accomplishments, automaticity or ease of functioning, skilled performance under challenge - generative flexibility, and speed of learning or behavior change.

REFERENCES

1. Morgan, C.T.and King, R.A (1994) Introduction to Psychology, Tata McGraw Hill Co Ltd, New Delhi.
2. Robert A. Baron (2002), Psychology, 5th Edition, Prentice Hall, India.
3. Michael W.Passer, Ronald E.smith (2007), Psychology: The science of mind and Behavior,3rd Edition Tata McGraw-Hill Edition.
4. Robert S.Feldman (2004) Understanding Psychology 6th Edition Tata McGraw – Hill.
5. Endler, N. S., & Summerfeldt, L. J. (1995). Intelligence. personality. psychopathology. and adjustment. In D. H. Saklofske & M. Zeidner (Eds.). International handbook of personality and intelligence (pp. 249-284). New York: Plenum Press.
6. Ford, M. E. (1994). A living systems approach to the integration of personality and intelligence. In R. J. Sternberg. & P. Ruzgis (Eds.). Personality and intelligence (pp. 188-21 7). New York: Cambridge University Press.
7. De Bono, E (1990) Lateral Thinking, Harper Perennial, New York.

HU5175 EDUCATION, TECHNOLOGY AND SOCIETY L T P C

3 0 0 3

COURSE DESCRIPTION

This course introduces students to multidisciplinary studies in Education, Technology and Society. Students will get an understanding of the relationship between education, technology and society. They will also learn about the long lasting impact of good education in a technologically advanced society.

COURSE OBJECTIVES:

The course aims

- To help learners understand the basics of different types of technology utilised in the field of education
- To make them realize the impact of education in society
- To make them evolve as responsible citizen in a technologically advanced society

LEARNING OUTCOMES

By the end of the course, learners will be able to

- Understand the various apps of technology apps and use them to access, generate and present information effectively.
- Apply technology based resources and other media formats equitably, ethically and legally.
- Integrate their technical education for betterment of society as well as their personal life.

UNIT I INDIAN EDUCATION SYSTEM

Gurukul to ICT education – Teacher as facilitator – Macaulay's Minutes – English medium vs Regional medium – Importance of Education in Modern India - Challenges in Education

UNIT II LEARNING THEORIES

Learning Theories – Behaviorism – Cognitivism – Social Constuctivism – Humanism Learning Styles – Multiple Intelligences – Emotional Intelligence – Blooms Taxonomy

UNIT III TECHNOLOGICAL ADVANCEMENTS

Web tools – Social media in education – elearning – MOOCs – Mobile assisted learning – Learning Apps – Blended learning - Self-directed learning

UNIT IV EDUCATIONAL TECHNOLOGY

Technological implications on Education – Teaching, Learning & Testing with Technology - Advantages and drawbacks – Critical analysis on the use of technology

UNIT V ETHICAL IMPLICATIONS

Plagiarism – Online Copyright issues – Ethical and value implications of education and technology on individual and society.

TOTAL:45 PERIODS

TEACHING METHODS

Teaching modes include guest lectures, discussion groups, presentations, visual media, and a practicum style of learning.

EVALUATION

As this is course is not a content based course, it focuses more on the ethical use of technology in education and society, and so, evaluation can be based on assignments and discussions. So there is no need for an end semester examination. Internals marks can be taken for the total marks.

INTERNAL (100 % WEIGHTAGE)

(a) Written Test (40 marks)

(b) Assignment: Write a real time report of the technology use in any school / college (15 marks)

(c) Presentation: Students choose any one of the technological tools and present its relevance to education and society (15 marks)

(d) Group discussion: Students discuss in groups on case studies relating to various challenges in education and technology use in society (20 marks)

(e) Blog entry: Making weekly blog posts in Class Blog on the topics related to the course posted by the instructor and commenting on others' posts. (10 marks)

REFERENCES

1) Education and Social order by Bertrand Russel
2) Theories of learning by Bower and Hilgard
3) Technology and Society by Jan L Harrington

HU5176 PHILOSOPHY L T P C
3 0 0 3

OBJECTIVES

- To create a new understanding by teaching philosophy through a comparison of Indian and Western traditions.
- To Fosters critical thinking and imagination by dealing with inter-related concepts in literature and science.
- To bridge the gap between the sciences and humanities through introspective analyses.
- To nurture an understanding of the self and elucidates ways to progress towards a higher understanding of one's self and others.

UNIT I KNOWLEDGE 9

Knowledge (Vidya) Versus Ignorance (Avidya)- Brihadaranyaka Upanishad. Unity and Multiplicity – Isha Upanishad. What is True Knowledge? Ways to True Knowledge. Introduction to Philosophy of Yoga, Socratic Debate, Plato's Views. Asking and Answering Questions to Stimulate Critical Thinking and to Draw Ideas. Argumentative Dialogues. Dialectical Methods to Arrive at Conclusions.

UNIT II ORIGIN 9

Origin of Universe And Creation – 'Nasidiya Sukta' in Relation With Big Bang Theory. Greek Concept of Chaos. The Concept of Space – Space as the Final Goal – Udgitha. Relationship Between Teacher And Student – The Knowledge Of Combinations, Body And Speech – Siksha Valli – Taittriya Upanishad.

UNIT III WORD 9

Aum- Speech and Breath as Pair – Chandogya Upanishad and Brihadaryanaka Upanishad. Significance of Chants, Structure of Language and Cosmic Correspondences. The Non-Dual Word – Bhartrihari's Vakyapadiyam. Sphota-Ultimate Reality Expressed Through Language. Intention. Thought 'Sabdanaor' and Speaking.

UNIT IV KNOWLEDGE AS POWER/OPPRESSION 9

Power- as Self-Realization in Gita. Krishna's Advice to Arjuna on How to Conquer Mind. Francis Bacon – Four Idols – What Prevents One From Gaining Knowledge? Michel Foucault-Knowledge as Oppression. Panopticon. Rtam (Truth) and Satyam (Eternal Truth).

UNIT V SELF KNOWLEDGE/BRAHMAN 9

Knowledge about Self, Transcendental Self. The Different Chakras and the Stages of Sublimation. Philosophy of Yoga and Siva for Union of Mind and Body. Concept of Yin/Yang. Aspects of the Feminine / Masculine.

TOTAL : 45 PERIODS

OUTCOMES:

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

1. Think sceptically, ask questions and to arrive at deductions.
2. Connect and relate different branches of thought.
3. Comprehends the relation between language, thought and action.
4. Arrive at a better understanding of self and others and forms a new outlook.

REFERENCES:

1. Swami Nikhilananda: The Upanishads, Swami Nikhilananda, Advaita Ashrama, Kolkata.
2. Swamy Tapasyananda: Srimad Bhagavad Gita, The Scripture of Mankind, Sri Ramakrishna Math, Chennai.
3. Subrahmanyam, Korada: Vakyapadiyam of Bhartrhari Brahmakanda, Sri Garib Dass series.

4. Swami Lokeswarananda: Chandogya Upanishad, Swami Lokeswarananda, Ramakrishna Mission Institute of Culture, Kolkata.
5. Brahma, Apuruseya: The Four Vedas: Translated in English.
6. Haich, Elizabeth: Sexual Energy and Yoga.
7. Bacon, Francis: Power as Knowledge
8. Vlastos, Gregory: Socrates Ironist and Moral Philosopher.
9. Plato: The Republic, Penguin.
10. Gutting, Garry: Foucault A Very Short Introduction, Oxford.

HU5177 APPLICATIONS OF PSYCHOLOGY IN EVERYDAY LIFE L T P C
3 0 0 3

UNIT I INTRODUCTION 7
Nature and fields.

UNIT II PSYCHOLOGY IN INDUSTRIES AND ORGANIZATIONS 9
Job analysis; fatigue and accidents; consumer behavior.

UNIT III PSYCHOLOGY AND MENTAL HEALTH 11
Abnormality, symptoms and causes psychological disorders

UNIT IV PSYCHOLOGY AND COUNSELING 7
Need of Counseling, Counselor and the Counselee, Counseling Process, Areas of Counseling.

UNIT V PSYCHOLOGY AND SOCIAL BEHAVIOUR 11
Group, group dynamics, teambuilding, Prejudice and stereotypes; Effective Communication, conflict and negotiation.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Schultz, D. & Schultz, S.E. (2009). Psychology and Work Today (10th ed.). New Jersey:Pearson/Prentice Hall
2. Butcher, J. N., Mineka, S., & Hooley, J. M. (2010). Abnormal psychology (14th ed.). New York: Pearson
3. Gladding, S. T. (2014). Counselling: A comprehensive profession. New Delhi: Pearson Education
4. Aronson, E., Wilson, T. D., & Akert, R. M. (2010). Social Psychology (7th Ed.). Upper Saddle River, NJ: Prentice Hall

HSMC– ELECTIVES – HUMANITIES II (EVEN SEMESTER)

HU5271 GENDER, CULTURE AND DEVELOPMENT L T P C
3 0 0 3

COURSE DESCRIPTION

This course offers an introduction to Gender Studies that asks critical questions about the meanings of sex and gender in Indian society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary drawing from Indian literature and media studies, to examine cultural assumptions about sex, gender, and sexuality. This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with class, caste and other social identities. This course also seeks to build an understanding of the concepts of gender, gender-based violence, sexuality, and rights and their impact on development through a number of discussions, exercises and reflective activities.

Objectives

- ✓ To familiarize students with the concepts of sex and gender through literary and media texts.
- ✓ To help students ask critical questions regarding gender roles in society.
- ✓ To provide students with the material to discuss gender issues such as gender based discrimination, violence and development.
- ✓ To help students think critically about gender based problems and solutions.

Learning Outcomes

- ➢ Students will be able to critically read literary and media texts and understand the underlying gender perspectives in them.
- ➢ Students will be able to analyse current social events in the light of gender perspectives.
- ➢ Students will be able to discuss, analyse and argue about issues related to gender and their impact on society, culture and development.

UNIT I: Introduction to Gender

- Definition of Gender
- Basic Gender Concepts and Terminology
- Exploring Attitudes towards Gender
- Social Construction of Gender

Texts:

1. Sukhu and Dukhu (Amar Chitra Katha)
2. The Cat who Became a Queen (Folk tale, J. Hinton Knowles, Folk-Tales of Kashmir. London: Kegan Paul, Trench, Trübner, and Company, 1893, pp. 8-10.)

UNIT II: Gender Roles and Relations

- Types of Gender Roles
- Gender Roles and Relationships Matrix
- Gender-based Division and Valuation of Labour

Texts:

1. Muniyakka (Short Story, Lakshmi Kannan, Nandanvan and Other Stories, Hyderabad: Orient Blackswan, 2011)
2. Video: Witness: Freeing Women From Cleaning Human Waste (2014, HRW, Manual Scavenging, India)

UNIT III: Gender Development Issues

- Identifying Gender Issues
- Gender Sensitive Language
- Gender, Governance and Sustainable Development
- Gender and Human Rights
- Gender and Mainstreaming

Texts:
1. The Many Faces of Gender Inequality (Essay, Amartya Sen, Frontline, Volume 18 - Issue 22, Oct. 27 - Nov. 09, 2001)
2. Tell Us Marx (Poem, Mallika Sengupta, Translated by Sanjukta Dasgupta)

UNIT IV: Gender-based Violence

- The concept of violence
- Types of Gender-based violence
- The relationship between gender, development and violence
- Gender-based violence from a human rights perspective

Texts:
1. Lights Out (Play, Manjula Padmanabhan)
2. Lights Out (Video of play enacted)

UNIT V: Gender and Culture

- Gender and Film
- Gender, Media and Advertisement

Texts:
1. Mahanagar (Movie: Satyajit Ray)
2. Beti Bachao Beti Padhao Advertisements

READINGS: Relevant additional texts for readings will be announced in the class. Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments.

ASSESSMENT AND GRADING:
Discussion & Classroom Participation: 20%
Project/Assignment: 30%
End Term Exam: 50%

HU5272 ETHICS AND HOLISTIC LIFE L T P C
3 0 0 3

OBJECTIVES:

- To emphasize the meaning and nature of ethics, human values and holistic life for leading a good, successful and happy life through continuous examination of thoughts and conduct in day to day life.
- To understand the status and responsible role of individual in abatement of value crisis in contemporary world in order to develop a civilized and human society. Understanding the process of ethical decision making through critical assessment of incidents/cases of ethical dilemmas in personal, professional and social life.
- To view the place of Ethics and Human Values in the development of individual and society through identification and cross examination of life values and world view of his/her role models in society.

UNIT I HUMAN LIFE, ITS AIM AND SIGNIFICANCE

The concept of a successful life, happy life and a meaningful life, Ethical and decision making capability and its development: Meaning of Ethical dilemma, sharing real life experiences.

UNIT II CREATIVE AND LEADERSHIP ABILITY AND THEIR DEVELOPMENT

Intellectual, Emotional, Creative, Ethico - spiritual development, Aesthetic sense, Self-dependency, Activeness, Development of positive attitude.

UNIT III HARMONY IN PERSONAL AND SOCIAL LIFE:

Concept of personal and group Ethics; Balance between - rights and duties-welfare of self and welfare of all, Creating a value based work culture in hostel, classroom and other places in the campus and society.

UNIT IV CHARACTER, RIGHTEOUSNESS AND VIRTUES FOR A MEANINGFUL LIFE

Egolessness, Humility, Righteousness, Purity, Truthfulness, Integrity, Self-restraint, Self-control, Sense of responsibility, Empathy, Love, Compassion, Maitri / Comradeship, Cooperation, Tolerance.

UNIT V DILEMMA BETWEEN MATERIALISTIC DEVELOPMENT AND HUMAN WELFARE

Science, Technology, Consumerism, Relation with Nature and Environment, New dimension of Global Harmony: Democracy, Equality, Social Justice

TOTAL: 45 PERIODS

OUTCOMES:

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

1. Enable students to understand the concept of contemporary ethics at different levels: Individual, local and Global and enable them to cross examine the ethical and social consequences of the decisions of their life-view and world view.
2. Develop the ability of students to create a balance between their individual freedom and social responsibilities and enable them to identify the personal, professional and social values and integrate them in their personality after cross examination.
3. Enable students to cross examine their earlier decisions taken in life and understand the meaning of ethical dilemma to overcome the ethical dilemmas and engage in critical reflection.
4. Develop positive habits of thought and conduct and work cohesively with fellow beings who have variety of strengths, experiences, shortcomings and challenges, hence to enable them to handle diverse type of personalities.
5. Enable students to develop a method for making ethically sound decisions for themselves, within hostels, classrooms, university campus and society.

HU5273 LAW AND ENGINEERING L T P C

3 0 0 3

UNIT I THE LEGAL SYSTEM: SOURCES OF LAW AND THE COURT STRUCTURE 9

Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law- Principles taken from decisions of judges constitute binding legal rules. The Court System in India and Foreign Courtiers. (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court) Arbitration: As an alternative to resolving disputes in the normal courts, parties who are in dispute can agree that this will instead be referred to arbitration.

UNIT II LAWS 9

Basic principles of contract law, sale of goods law, laws relating to industrial pollution, accident, environmental protection, health and safety at work, patent law, constitutional law: the supreme law of the land, Information technology law and cyber crimes.

UNIT III BUSINESS ORGANISATIONS 9

Sole traders (Business has no separate identity from you, all business property belongs to you). Partnerships: Types of Partnerships - Limited Liability Partnership, General Partnership, Limited Partnerships. Companies: The nature of companies, Classification of companies, Formation of companies, Features of a public company, Carrying on business, Directors– Their Powers and Responsibilities/Liabilities.

UNIT IV LAW AND SOCIETY 9

Interdisciplinary nature of law, legal ideologies/philosophy/ schools of jurisprudence**.**

UNIT V CASE STUDIES 9

Important legal disputes and judicial litigations

TOTAL: 45 PERIODS

HU5274 FILM APPRECIATION L T P C
3 0 0 3

COURSE DESCRIPTION

This is an intensive course designed to promote comprehensive understanding and insights into the nature of cinema and other related forms and practices. Movies, though at times are used more as escapism, they are also a true art form and expressive tool used by writers, directors and actors. This course will explore the aesthetics of cinema, the concepts behind storytelling and various other elements of a film. It will also explore the impact of movies in our society and in our lives. It also encourages students to use films as a medium to analyse visual texts and read underlying messages.

OBJECTIVES:

- To help learners understand the various movie genres and its types.
- To understand various elements that contributes to film making.
- To make them realize the impact of film in society.
- To analyse the visual media and interpret the underlying messages.

UNIT I THE COMPONENTS OF FILMS 9

Story, Screenplay & Script – Actors – Director – Crew Members – Mis En Scene – Structure of A Film – Narrative Elements – Linear & Non-Linear – Types of Movie Genres: Mysteries, Romantic Comedies, Horror Etc.

UNIT II EVOLUTION OF FILM 9

History of Films – Early Cinema – Silent Movies – Talkies – Film Language, Form, Movement – Film Theories – Realist, Auteurists, Feminist, Psychonalyic, Idealogical Theories.

UNIT III FILMS ACROSS THE WORLD 9

European Films – Russian Films – Japanese Films – Korean Films – Hollywood Film – Studio Culture – All Time Great Movies.

UNIT IV INDIAN FILMS 9

The Early Era – History Of Indian Cinema – Movies for Social Change – Hindi Movies that Created Impact – Regional Movies – Documentaries – Cultural Identity.

UNIT V INTERPRETING FILMS 9

Film Criticism & Appreciation – Censorship in Movies – Cultural Representation in Movies – Television – New Media & Online Media – Films Beyond Entertainment.

TOTAL: 45 PERIODS

OUTCOMES

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

- Recognize types of films, their impact on society and their roles in our lives.
- Have an understanding of the concepts of storytelling, Mise en Scene, and other elements of film making.
- Interpret the underlying messages in the movies.

Teaching Methods

- Each unit consists of reading materials, learning activities videos, websites. Students are expected to watch movies sometimes in class and at times at home and discuss in class.

Evaluation

- As this is course is critical appreciation course on films, there is no written end semester examination. The course is more on learning how to critically analyse a movie and appreciate its finer elements. Therefore evaluation can be based on assignments and discussions. Internals marks can be taken for the total marks.

Internal (100 % weightage)

- Assignment 1: Write a movie review with critical analysis (20 marks).
- Assignment 2 : Write a script for a scene taken from a short story / novella (20 marks).
- Presentation: Students choose any one topic related to films and present it to the audience. (25 marks)
- Group discussion: Students discuss in groups on the various aspects of movies and its impact on society. (25 marks)
- Blog entry: Making weekly blog posts in Class Blog on the topics related to the course posted by the instructor and commenting on others' posts. (10 marks)

REFERENCES

1. A Biographical Dictionary of Film by David Thomson, Secker & Warburg, 1975
2. Signs and Meaning in the Cinema by Peter Wollen, Secker & Warburg, 1969
3. The World Viewed by Stanley Cavell 1971
4. Film Style and Technology: History and Analysis by Barry Salt, Starword, 1983
5. The Encyclopedia of Indian Cinema Edited by Ashish Rajadhyaksha and Paul Willemen, BFI, 1994.

HU5275 FUNDAMENTALS OF LANGUAGE AND LINGUISTICS L T P C

3 0 0 3

OBJECTIVES

- To broadly introduce students to the formal and theoretical aspects of linguistics.
- To enable learners to understand the various practical applications of language and recent findings in the field of applied linguistics.

CONTENTS: -

UNIT I LANGUAGE AND LINGUISTICS: AN OVERVIEW 9

Language and Linguistics-Linguistic Knowledge-Knowledge of Sound Systems & Words – Creativity of Language – Relationship of form and meaning. Grammar – descriptive, prescriptive, universal-Human Language – Animal Language – Sign Language- Computers and Language.

UNIT II MORPHOLOGY - WORDS OF LANGUAGE 9

Content and function words – morphemes -free & bound –prefixes – suffixes – roots and stems –inflectional and derivational morphology-compound words and their formation – malapropisms – slips of the tongue.

UNIT III SYNTAX- THE SENTENCE PATTERNS OF LANGUAGE AND SEMANTICS-THE MEANING OF LANGUAGE 9

Syntax : Rules of Syntax- Sentence Structure-Structural Ambiguity-Syntactic Categories. Semantics: Lexical Semantics – Anomaly-Metaphors- Idioms- Synonyms – Antonyms – Homonyms -Pragmatics– Speech Acts

UNIT IV PHONETICS – THE SOUNDS OF LANGUAGE 9

Speech sounds- Introduction to branches of Phonetics- The Phonetic Alphabet – IPA – Consonants - Vowels – Diphthongs- Tone and Intonation.

UNIT V APPLIED LINGUISTICS - THE PRACTICAL APPLICATIONS OF LANGUAGE 9

Language learning and teaching (ELT)- lexicography-translation studies-computational linguistics-neurolinguistics (speech pathology and language disorders)- forensic linguistics – sociolinguistics.

TOTAL : 45 PERIODS

Teaching Methods:

Lectures, discussion.

Evaluation Internal and External:

Internal: 2 written tests + assignments, seminars, project (50+15+15+20).
External: A 3 hour written exam (50 marks)

REFERENCES:

1.Victoria Fromkin, Robert Rodman, Nina Hyams.2019.An Introduction to Language.USA.CENGAGE.11th edition
2. Cook. G,2003. Applied linguistics.UK: Oxford University Press.

HU5276 UNDERSTANDING SOCIETY AND CULTURE THROUGH LITERATURE L T P C
3 0 0 3

OBJECTIVES

- To internalize the importance of language by understanding its role in the transformation of man.
- To look at language, literature and culture as locus of identity and change.
- To extract meaning from existing literatures and cultures.
- To identify meanings in modern life by reconnecting with lost cultures.

UNIT I INTRODUCTION

Why study literature? Tracing the origin – pictures. Tokens as precursors of writing. Movement from three dimensions to two dimensions- Pictography. From visual to oral - Logography. Reading out literature to young children- Edmund J Farrell.

UNIT II READING CULTURE

Reading culture through language, signs and consumables- Roland Barthes. Culture through poems- Nissim Ezekiel's 'The night of the Scorpion' . 'Nothing's Changed'- Tatamkhulu Afrika- Apartheid. Ruskin Bond- 'Night train at Deoli'- How real life is different from movies.

UNIT III IDENTIFYING MEANING

Searching and locating meaning through literature. Looking for order in a chaotic world. The Myth of Sisyphus (Albert Camus) and Adi Shankar's 'Jagat Mithya'- the world as an illusion. The Indian version as 'meaningless meaning'.

UNIT IV POST MODERNISM

'If on a winter's night a traveler'- Italo Calvino. The book about the reader- the experience of reading as reading. Metafiction. Selfie Culture. Visual Culture as purpose of modern life.

UNIT V RETURNING TO PICTURES

Literature of the present- Emphasis on the visual world. Twitterature. SMS. Whatsapp language. Consumer culture. Change in fixed gender notions. Interactive sessions. Introspection.

Reading list

1. Bond, Ruskin: 'Night train at Deoli'
2. Ezekiel, Nissim: 'The Night of the Scorpion'
3. Afrika,Tatamkhulu: 'Nothing's Changed'
4. Barthes, Roland: *Mythologies*
5. Shankaracharya: *Viveka Chudamani*
6. Camus, Albert- *The Myth of Sisyphus*
7. Calvino, Italo: *If on a winter's night a traveler*
8. Farrell, Edmund J: 'Listen, my children, and you shall read'

OUTCOMES

- Can identify the connections among language, literature and culture.
- Is able to relate between seemingly different aspects of life.
- Understands the fractions in modern life and can assimilate meanings.