ANNA UNIVERSITY, CHENNAI

UNIVERSITY DEPARTMENTS

REGULATIONS – 2015

CHOICE BASED CREDIT SYSTEM

B.E. PRINTING TECHNOLOGY

Program Educational Objectives:

The curriculum of Bachelors in Printing Technology is designed to prepare the graduates having knowledge and wisdom to

1. Have successful professional and technical careers in the industry that meets the needs of Indian and multinational printing, packaging and allied organizations.
2. Have strong foundation in mathematical, scientific and engineering fundamentals.
3. Understand and analyze the theory and practices in the field of printing, packaging and allied areas.
4. Engage in life-long learning experience to keep themselves abreast of new developments and future trends.
5. Practice and inspire high ethical values and technical standards.

Program Outcomes:

a) Ability to apply knowledge of mathematics, sciences and engineering.
b) Ability to design and conduct experiments, interpret and analyze data and report results.
c) Ability to identify, formulate, and solve printing and packaging technology problems.
d) Ability to understand and apply engineering software tools and equipments to analyze printing and packaging technology problems.
e) Ability to function with engineering and science laboratory teams as well as interdisciplinary groups.
f) Ability to understand ethical and professional responsibilities.
g) Ability to communicate effectively in verbal and written forms.
h) Ability to review, comprehend and report technological developments.
i) Ability to apply engineering solutions in global and social context.
j) Ability to innovate for creating new products for printing industrial development.

Program Educational Objectives	Programme Outcomes									
	a	b	c	d	e	f	g	h	i	j
1	√	√	√	√	√					√
2	√		√	√	√					√
3		√	√	√						√
4				√				√	√	√
5						√	√	√		

Attested

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MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:												
			POa	POb	POc	POd	POe	POf	POg	POh	POi	POj
YEAR 1	SEM 1	Foundational English							✓	✓		
		Mathematics I	✓				✓					
		Engineering Physics	✓				✓					
		Engineering Chemistry	✓				✓					
		Engineering Graphics	✓				✓					
		Basic Sciences Laboratory	✓	✓			✓		✓			
		Engineering Practices Laboratory	✓	✓			✓		✓			
	SEM 2	Technical English							✓	✓		
		Mathematics II	✓				✓					
		Basic Electrical Engineering and Measurement	✓				✓					
		Computing Techniques	✓				✓					
		Engineering Mechanics	✓				✓					
		Basic of Electronics Engineering	✓				✓					
		Electrical and Electronics Engineering Laboratory	✓	✓			✓		✓			
		Computer Practices Laboratory	✓	✓			✓		✓			
YEAR 2	SEM 3	Transform Techniques and Partial Differential Equations	✓				✓					
		Strength of Materials	✓				✓					
		Mechatronics	✓				✓					
		Principles of Printing Engineering and Technology	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Prepress and Imaging Technology	✓	✓	✓	✓				✓	✓	✓
		Chemistry for Printing Technology	✓	✓	✓	✓	✓					
		Strength of Materials Laboratory	✓	✓			✓		✓			
		Creative Graphic Design Laboratory	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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	SEM 4	Applied Statistics	✓				✓					
		Mechanics of Machines	✓				✓					
		Flexographic Printing	✓	✓	✓	✓				✓	✓	✓
		Colour Reproduction	✓	✓	✓	✓				✓	✓	✓
		Paper and Paper Board	✓	✓	✓	✓	✓	✓		✓	✓	✓
		Gravure and Screen Printing	✓	✓	✓	✓				✓	✓	
		Graphic Design and Image Editing Laboratory			✓	✓			✓			✓
		Digital Page Layout Design Laboratory		✓	✓	✓			✓			✓
YEAR 3	SEM 5	Offset Printing Technology	✓	✓	✓	✓			✓	✓		
		Cost Estimation for Printing	✓	✓	✓	✓					✓	
		Printing Inks and Coatings	✓	✓	✓	✓		✓		✓	✓	✓
		Packaging Materials			✓		✓					✓
		Professional Elective - I										
		Open Elective -I										
		Communication Skills and Soft Skills							✓	✓		
		Digital Workflow and Image Carrier Preparation Laboratory	✓	✓	✓	✓	✓	✓		✓	✓	
		Printing Machine Laboratory	✓	✓	✓	✓			✓			
	SEM 6	Packaging Technology		✓		✓	✓			✓		✓
		Web Offset Technology	✓	✓	✓	✓		✓	✓	✓		
		Print Operations Management	✓	✓	✓			✓	✓	✓	✓	✓
		Professional Elective - II										
		Open Elective - II										
		Environmental Science and Engineering	✓					✓				
		Color Reproduction and Management Laboratory	✓	✓	✓	✓			✓	✓	✓	✓
		Package Design and Testing Laboratory	✓	✓	✓	✓	✓	✓				✓
		Mini Project	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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YEAR 4	SEM 7	Electronic Publishing		✓		✓	✓		✓	✓	✓	
		Print Finishing	✓	✓	✓	✓				✓	✓	✓
		Professional Elective - III										
		Professional Elective - IV										
		Professional Elective - V										
		Print Production Project Work	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Cross media Publishing Laboratory		✓		✓	✓		✓		✓	✓
		Print Finishing Laboratory	✓	✓	✓	✓				✓	✓	✓
		Industrial Training	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	SEM 8	Professional Elective - VI										
		Professional Elective - VII										
		Project Work	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

ANNA UNIVERSITY, CHENNAI

UNIVERSITY DEPARTMENTS

B.E. PRINTING TECHNOLOGY

REGULATIONS – 2015

CHOICE BASED CREDIT SYSTEM

CURRICULA AND SYLLABI I - VIII SEMESTERS

SEMESTER I

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS7151	Foundational English	HS	4	4	0	0	4
2.	MA7151	Mathematics I	BS	4	4	0	0	4
3.	PH7151	Engineering Physics	BS	3	3	0	0	3
4.	CY7151	Engineering Chemistry	BS	3	3	0	0	3
5.	GE7152	Engineering Graphics	ES	5	3	2	0	4
PRACTICAL								
6.	BS7161	Basic Sciences Laboratory	BS	4	0	0	4	2
7.	GE7162	Engineering Practices Laboratory	ES	4	0	0	4	2
			TOTAL	**27**	**17**	**2**	**8**	**22**

SEMESTER II

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS7251	Technical English	HS	4	4	0	0	4
2.	MA7251	Mathematics II	BS	4	4	0	0	4
3.	EE7251	Basic Electrical Engineering and Measurements	ES	3	3	0	0	3
4.	GE7151	Computing Techniques	ES	3	3	0	0	3
5.	GE7153	Engineering Mechanics	ES	4	4	0	0	4
6.	EE7152	Basic of Electronics Engineering	ES	3	3	0	0	3
PRACTICAL								
7.	EE7261	Electrical and Electronics Engineering Laboratory	ES	4	0	0	4	2
8.	GE7161	Computer Practices Laboratory	ES	4	0	0	4	2
			TOTAL	**29**	**21**	**0**	**8**	**25**

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SEMESTER III

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	CE7251	Strength of Materials	ES	3	3	0	0	3
2.	CY7301	Chemistry for Printing Technology	BS	3	3	0	0	3
3.	MA7358	Transform Techniques and Partial Differential Equations	BS	4	4	0	0	4
4.	ME7354	Mechatronics	ES	3	3	0	0	3
5.	PT7301	Prepress and Imaging Technology	PC	3	3	0	0	3
6.	PT7302	Principles of Printing Engineering and Technology	PC	3	3	0	0	3
PRACTICAL								
7.	CE7261	Strength of Materials Laboratory	ES	4	0	0	4	2
8.	PT7311	Creative Graphic Design Laboratory	PC	4	0	0	4	2
			TOTAL	**27**	**19**	**0**	**8**	**23**

SEMESTER IV

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA7352	Applied Statistics	BS	4	4	0	0	4
2.	ME7353	Mechanics of Machines	ES	3	3	0	0	3
3.	PT7401	Colour Reproduction	PC	3	3	0	0	3
4.	PT7402	Flexographic Printing	PC	3	3	0	0	3
5.	PT7403	Gravure and Screen Printing	PC	3	3	0	0	3
6.	PT7404	Paper and Paper Board	PC	3	3	0	0	3
PRACTICAL								
7.	PT7411	Digital Page Layout Design Laboratory	PC	4	0	0	4	2
8.	PT7412	Graphic Design and Image Editing Laboratory	PC	4	0	0	4	2
			TOTAL	**27**	**19**	**0**	**8**	**23**

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SEMESTER V

S. No.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	PT7501	Cost Estimation for Printing	PC	3	3	0	0	3
2.	PT7502	Offset Printing Technology	PC	3	3	0	0	3
3.	PT7503	Packaging Materials	PC	3	3	0	0	3
4.	PT7504	Printing Inks and Coatings	PC	3	3	0	0	3
5.		Professional Elective I	PE	3	3	0	0	3
6.		Open Elective I*	OE	3	3	0	0	3
PRACTICAL								
7.	HS7561	Communication Skills and Soft Skills	HS	3	1	0	2	2
8.	PT7511	Digital Workflow and Image Carrier Preparation Laboratory**	PC	2	0	0	2	1
9.	PT7512	Printing Machine Laboratory	PC	4	0	0	4	2
			TOTAL	**27**	**19**	**0**	**8**	**23**

SEMESTER VI

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	GE7251	Environmental Science and Engineering	HS	3	3	0	0	3
2.	PT7601	Packaging Technology	PC	3	3	0	0	3
3.	PT7602	Print Operations Management	PC	3	3	0	0	3
4.	PT7603	Web Offset Technology	PC	3	3	0	0	3
5.		Professional Elective II	PE	3	3	0	0	3
6.		Open Elective II	PE	3	3	0	0	3
PRACTICAL								
7.	PT7611	Colour Reproduction and Management Laboratory	PC	4	0	0	4	2
8.	PT7612	Package Design and Testing Laboratory	PC	4	0	0	4	2
9.	PT7613	Mini Project**	EEC	2	0	0	2	1
			TOTAL	**28**	**18**	**0**	**10**	**23**

SEMESTER VII

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	PT7701	Electronic Publishing	PC	3	3	0	0	3
2.	PT7702	Print Finishing	PC	3	3	0	0	3
3.		Professional Elective III	PE	3	3	0	0	3
4.		Professional Elective IV	PE	3	3	0	0	3
5.		Professional Elective V	PE	3	3	0	0	3
PRACTICAL								
6.	PT7711	Crossmedia Publishing Laboratory	PC	4	0	0	4	2
7.	PT7712	Print Finishing Laboratory	PC	4	0	0	4	2
8.	PT7713	Print Production Project Work**	EEC	8	0	0	8	4
9.	PT7714	Industrial Training**	EEC	0	0	0	0	2
			TOTAL	**31**	**15**	**0**	**16**	**25**

4 Weeks of Industrial Training; 2 weeks each during the 2nd & 3rd year summer vacations

SEMESTER VIII

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.		Professional Elective VI	PE	3	3	0	0	3
2.		Professional Elective VII	PE	3	3	0	0	3
PRACTICAL								
3.	PT7811	Project Work	EEC	20	0	0	20	10
			TOTAL	**26**	**6**	**0**	**20**	**16**

TOTAL NO. OF CREDITS: 180

***Course from the curriculum of other UG Programmes**

**** The contact periods will not appear in the slot time table**

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HUMANITIES AND SOCIAL SCIENCES (HS)

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS7151	Foundational English	HS	4	4	0	0	4
2.	HS7251	Technical English	HS	4	4	0	0	4
3.	GE7251	Environmental Science and Engineering	HS	3	3	0	0	3
4.	HS7561	Communication Skills and Soft Skills	HS	3	1	0	2	2

BASIC SCIENCES (BS)

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MA7151	Mathematics I	BS	4	4	0	0	4
2.	PH7151	Engineering Physics	BS	3	3	0	0	3
3.	CY7151	Engineering Chemistry	BS	3	3	0	0	3
4.	BS7161	Basic Sciences Laboratory	BS	4	0	0	4	2
5.	MA7251	Mathematics II	BS	4	4	0	0	4
6.	MA7358	Transform Techniques and Partial Differential Equations	BS	4	4	0	0	4
7.	CY7301	Chemistry for Printing Technology	BS	3	3	0	0	3
8.	MA7352	Applied Statistics	BS	4	4	0	0	4

ENGINEERING SCIENCES (ES)

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	GE7152	Engineering Graphics	ES	5	3	2	0	4
2.	GE7162	Engineering Practices Laboratory	ES	4	0	0	4	2
3.	EE7251	Basic Electrical Engineering and measurement	ES	3	3	0	0	3
4.	GE7151	Computing Techniques	ES	3	3	0	0	3
5.	GE7153	Engineering Mechanics	ES	4	4	0	0	4
6.	EE7152	Basic of Electronics Engineering	ES	3	3	0	0	3
7.	EE7261	Electrical and Electronics Engineering Laboratory	ES	4	0	0	4	2
8.	GE7161	Computer Practices Laboratory	ES	4	0	0	4	2
9.	CE7251	Strength of Materials	ES	3	3	0	0	3
10.	ME7354	Mechatronics	ES	3	3	0	0	3
11.	CE7261	Strength of Materials Laboratory	ES	4	0	0	4	2
12.	ME7353	Mechanics of Machines	ES	3	3	0	0	3

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PROFESSIONAL CORE (PC)

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	PT7302	Principles of Printing Engineering and Technology	PC	3	3	0	0	3
2.	PT7301	Prepress and Imaging Technology	PC	3	3	0	0	3
3.	PT7311	Creative Graphic Design Laboratory	PC	4	0	0	4	2
4.	PT7402	Flexographic printing	PC	3	3	0	0	3
5.	PT7401	Colour Reproduction	PC	3	3	0	0	3
6.	PT7404	Paper and Paper Board	PC	3	3	0	0	3
7.	PT7403	Gravure and Screen Printing	PC	3	3	0	0	3
8.	PT7412	Graphic Design and Image Editing Laboratory	PC	4	0	0	4	2
9.	PT7411	Digital Page Layout Design Laboratory	PC	4	0	0	4	2
10.	PT7502	Offset Printing Technology	PC	3	3	0	0	3
11.	PT7501	Cost Estimation for Printing	PC	3	3	0	0	3
12.	PT7504	Printing Inks and Coatings	PC	3	3	0	0	3
13.	PT7503	Packaging Materials	PC	3	3	0	0	3
14.	PT7511	Digital Workflow and Image carrier Preparation Laboratory	PC	4	0	0	4	2
15.	PT7512	Printing Machine Laboratory	PC	4	0	0	4	2
16.	PT7601	Packaging Technology	PC	3	3	0	0	3
17.	PT7603	Web Offset Technology	PC	3	3	0	0	3
18.	PT7602	Print Operations Management	PC	3	3	0	0	3
19.	PT7611	Colour Reproduction and Management Laboratory	PC	4	0	0	4	2
20.	PT7612	Package Design and Testing Laboratory	PC	4	0	0	4	2
21.	PT7701	Electronic Publishing	PC	3	3	0	0	3
22.	PT7702	Print Finishing	PC	3	3	0	0	3
23.	PT7711	Crossmedia Publishing Laboratory	PC	4	0	0	4	2
24.	PT7712	Print Finishing Laboratory	PC	4	0	0	4	2

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PROFESSIONAL ELECTIVES (PE)

S.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS7023	Knowledge Management	PE	3	3	0	0	3
2.	CS7071	Data Warehousing and Data Mining	PE	3	3	0	0	3
3.	CS7073	Multimedia Tools and Techniques	PE	3	3	0	0	3
4.	CS7075	Web Design and Management	PE	3	3	0	0	3
5.	GE7071	Disaster Management	PE	3	3	0	0	3
6.	GE7074	Human Rights	PE	3	3	0	0	3
7.	GE7652	Total Quality Management	PE	3	3	0	0	3
8.	IE7071	Human Resource Management	PE	3	3	0	0	3
9.	IE7072	Metrology and Inspection	PE	3	3	0	0	3
10.	IE7073	Project Management	PE	3	3	0	0	3
11.	IE7074	Safety Engineering and Management	PE	3	3	0	0	3
12.	IT7071	Digital Image Processing	PE	3	3	0	0	3
13.	ME7076	Energy Conservation in Industries	PE	3	3	0	0	3
14.	ME7077	Entrepreneurship Development	PE	3	3	0	0	3
15.	ME7078	Introduction to Operations Research	PE	3	3	0	0	3
16.	ME7079	Lean Six Sigma	PE	3	3	0	0	3
17.	ME7080	Marketing Management	PE	3	3	0	0	3
18.	ME7083	Sustainable and Green Manufacturing	PE	3	3	0	0	3
19.	MF7075	Industrial Robotics	PE	3	3	0	0	3
20.	MF7076	Nanotechnology	PE	3	3	0	0	3
21.	MF7077	Total Productive Maintenance	PE	3	3	0	0	3
22.	PT7001	3D Printing	PE	3	3	0	0	3
23.	PT7002	Advertising Techniques	PE	3	3	0	0	3
24.	PT7003	Book Publishing	PE	3	3	0	0	3
25.	PT7004	Colour Management	PE	3	3	0	0	3
26.	PT7005	Digital Data Handling	PE	3	3	0	0	3
27.	PT7006	Digital Media Management	PE	3	3	0	0	3
28.	PT7007	Digital Printing	PE	3	3	0	0	3
29.	PT7008	Display and Signage Printing	PE	3	3	0	0	3
30.	PT7009	Mass Communication	PE	3	3	0	0	3
31.	PT7010	Newspaper and Periodical Publishing	PE	3	3	0	0	3

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32.	PT7011	Physics for Printing Technology	PE	3	3	0	0	3
33.	PT7012	Printed Electronics	PE	3	3	0	0	3
34.	PT7013	Printing Machine Design	PE	3	3	0	0	3
35.	PT7014	Printing Machinery Maintenance	PE	3	3	0	0	3
36.	PT7015	Quality Control in Printing	PE	3	3	0	0	3
37.	PT7016	Security Printing	PE	3	3	0	0	3
38.	PT7017	Speciality Printing	PE	3	3	0	0	3
39.	PT7018	Visual Communication	PE	3	3	0	0	3
40.	GE7072	Foundation Skills in Integrated Product Development	PE	3	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	PT7613	Mini Project	EEC	2	0	0	2	1
2.	PT7713	Print Production Project Work**	EEC	8	0	0	8	4
3.	PT7714	Industrial Training	EEC	0	0	0	0	2
4.	PT7811	Project Work	EEC	20	0	0	20	10

SUMMARY

S.NO.	SUBJECT AREA	CREDITS AS PER SEMESTER								CREDITS TOTAL
		I	II	III	IV	V	VI	VII	VIII	
1.	HS	4	4	00	00	02	3	00	00	11
2.	BS	12	4	7	4	00	00	00	00	27
3.	ES	6	17	8	3	00	00	00	00	34
4.	PC	00	00	8	16	15	13	10	00	63
5.	PE	00	00	00	00	3	6	6	3	18
6.	OE	00	00	00	00	3	00	3	3	9
7.	EEC	00	00	00	00	0	1	6	10	18
	Total	22	25	23	23	23	23	25	16	180
8.	Non Credit / Mandatory									

HS7151 FOUNDATIONAL ENGLISH L T P C
4 0 0 4

COURSE DESCRIPTION:
This course aims at developing the language skills necessary for the first year students of Engineering and Technology.

OBJECTIVES:
- To develop the four language skills – Listening, Speaking, Reading and Writing.
- To improve the students' communicative competence in English.
- To teach students the various aspects of English language usage.

UNIT I GREETING AND INTRODUCING ONESELF 12
Listening- Types of listening – Listening to short talks, conversations; **Speaking** – Speaking about one's place, important festivals etc. – Introducing oneself, one's family/ friend;**Reading** – Skimming a passage– Scanning for specific information;**Writing**- Guided writing - Free writing on any given topic (My favourite place/ Hobbies/ School life, writing about one's leisure time activities, hometown, etc.); **Grammar** – Tenses (present and present continuous) -Question types - Regular and irregular verbs; **Vocabulary** – Synonyms and Antonyms.

UNIT II GIVING INSTRUCTIONS AND DIRECTIONS 12
Listening – Listening and responding to instructions; **Speaking** – Telephone etiquette - Giving oral instructions/ Describing a process – Asking and answering questions; **Reading** – Reading and finding key information in a given text - Critical reading - **Writing –**Process description(non-technical)- **Grammar** – Tense (simple past& past continuous) - Use of imperatives – Subject – verb agreement – Active and passive voice; - **Vocabulary** – Compound words – Word formation – Word expansion (root words).

UNIT III READING AND UNDERSTANDING VISUAL MATERIAL 12
Listening- Listening to lectures/ talks and completing a task; **Speaking** –Role play/ Simulation – Group interaction; **Reading** – Reading and interpreting visual material;**Writing**- Jumbled sentences – Discourse markers and Cohesive devices – Essay writing (cause & effect/ narrative);**Grammar** – Tenses (perfect), Conditional clauses –Modal verbs; **Vocabulary** –Cause and effect words; Phrasal verbs in context.

UNIT IV CRITICAL READING AND WRITING 12
Listening- Watching videos/ documentaries and responding to questions based on them; **Speaking**Informal and formal conversation;**Reading** –Critical reading (prediction & inference);**Writing**–Essay writing (compare & contrast/ analytical) – Interpretation of visual materials;**Grammar** – Tenses (future time reference);**Vocabulary** – One word substitutes (with meanings) – Use of abbreviations & acronyms – Idioms in sentences.

UNIT V LETTER WRITING AND SENDING E-MAILS 12
Listening- Listening to programmes/broadcast/ telecast/ podcast;**Speaking** – Giving impromptu talks, Making presentations on given topics- Discussion on the presentation;**Reading** –Extensive reading;**Writing**- Poster making – Letter writing (Formal and E-mail) ;**Grammar** – Direct and Indirect speech – Combining sentences using connectives; **Vocabulary** –Collocation;

TEACHING METHODS:
Interactive sessions for the speaking module.
Use of audio – visual aids for the various listening activities.
Contextual Grammar Teaching.

EVALUATION PATTERN:
Internals – 50%
End Semester – 50%

TOTAL:60 PERIODS

OUTCOMES:

- Students will improve their reading and writing skills
- Students will become fluent and proficient in communicative English
- Students will be able to improve their interpersonal communication

TEXTBOOK:

1. Richards, Jack.C with Jonathan Hull and Susan Proctor **New Interchange : English for International Communication. (level2, Student's Book)** Cambridge University Press,New Delhi: 2010.

REFERENCES:

1. Bailey, Stephen. **Academic Writing: A practical guide for students**. New York: Rutledge,2011.
2. Morgan, David and Nicholas Regan. **Take-Off: Technical English for Engineering**. London: Garnet Publishing Limited, 2008.
3. Redston, Chris & Gillies Cunningham **Face2Face** (Pre-intermediate Student's Book& Workbook) Cambridge University Press, New Delhi: 2005
4. Comfort, Jeremy, et al. **Speaking Effectively : Developing Speaking Skillsfor Business English.** Cambridge University Press, Cambridge: Reprint 2011.

MA7151	MATHEMATICS – I (Common to all branches of B.E. / B.Tech. Programmes in I Semester)	L	T	P	C
		4	0	0	4

OBJECTIVES:

- The goal of this course is for students to gain proficiency in calculus computations. In calculus, we use three main tools for analyzing and describing the behavior of functions: limits, derivatives, and integrals. Students will use these tools to solve application problems in a variety of settings ranging from physics and biology to business and economics.
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I DIFFERENTIAL CALCULUS 12

Representation of functions - New functions from old functions - Limit of a function - Limits at infinity - Continuity - Derivatives - Differentiation rules - Polar coordinate system - Differentiation in polar coordinates - Maxima and Minima of functions of one variable.

UNIT II 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 III 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 IV 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.

UNIT V DIFFERENTIAL EQUATIONS 12

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

TOTAL: 60 PERIODS

OUTCOMES:

- Understanding of the ideas of limits and continuity and an ability to calculate with them and apply them.
- Improved facility in algebraic manipulation.
- Fluency in differentiation.
- Fluency in integration using standard methods, including the ability to find an appropriate method for a given integral.
- Understanding the ideas of differential equations and facility in solving simple standard examples.

TEXTBOOKS:

1. James Stewart, "Calculus with Early Transcendental Functions", Cengage Learning, New Delhi, 2008.
2. Narayanan S. and Manicavachagom Pillai T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2007.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, 9th Edition, New Delhi, 2014.
4. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.

REFERENCES:

1. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., New Delhi, 11th Reprint, 2010.
2. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.
3. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
4. Greenberg M.D., "Advanced Engineering Mathematics", Pearson Education, New Delhi, 2nd Edition, 5th Reprint, 2009.
5. Peter V.O'Neil, "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi, 2007.

PH7151 **ENGINEERING PHYSICS** **L T P C**

(Common to all branches of B.E / B.Tech programmes) **3 0 0 3**

OBJECTIVE:

- To introduce the concept and different ways to determine moduli of elasticity and applications.
- To instill the concept of sound, reverberation, noise cancellation, and ultrasonic generation, detection and applications
- To inculcate an idea of thermal properties of materials, heat flow through materials and quantum physics
- To promote the basic understanding of interferometers, principles and applications of lasers, optical fibers and sensors
- To establish a sound grasp of knowledge on the basics, significance and growth of single crystals

UNIT I PROPERTIES OF MATTER **9**

Elasticity – Poisson's ratio and relationship between moduli (qualitative) - stress-strain diagram for ductile and brittle materials, uses - factors affecting elastic modulus and tensile strength - bending of beams - cantilever - bending moment - Young's modulus determination - theory and experiment - uniform and non-uniform bending - I shaped girders - twisting couple - hollow cylinder - shaft - torsion pendulum - determination of rigidity modulus- moment of inertia of a body (regular and irregular).

UNIT II ACOUSTICS AND ULTRASONICS **9**

Classification of sound - loudness and intensity - Weber-Fechner Law - standard intensity and intensity level - decibel - reverberation - reverberation time - calculation of reverberation time for different types of buildings – sound absorbing materials - factors affecting acoustics of buildings : focussing, interference, echo, echelon effect, resonance - noise and their remedies. Ultrasonics: production - magnetostriction and piezoelectric methods - detection of ultrasound - acoustic grating – ultrasonic interferometer - industrial applications – Non-destructive testing - ultrasonic method: scan modes and practice.

UNIT III THERMAL AND MODERN PHYSICS **9**

Thermal expansion - thermal stress - expansion joints - bimetallic strips - thermal conductivity- heat conductions in solids – flow of heat through compound media - Forbe's and Lee's disc method: theory and experiment- Black body radiation – Planck's theory (derivation) – Compton effect – wave model of radiation and matter – Schrödinger's wave equation – time dependent and independent equations – Physical significance of wave function – particle in a one dimensional box.

UNIT IV APPLIED OPTICS **9**

Interference - Michelson interferometer: construction, working, determination of wave length and thickness - anti-reflection coating - air wedge and its applications - Lasers – principle and applications – Einstein's coefficients – CO_2 and Nd:YAG laser - semiconductor lasers: homo junction and hetro junction - construction and working – applications. Optical fibres - classification (index & mode based) - principle and propagation of light in optical fibres - acceptance angle and numerical aperture - fibre optic communication system - active and passive sensors.

UNIT V CRYSTAL PHYSICS **9**

Single crystalline, polycrystalline and amorphous materials – Single crystals: unit cell, crystal systems, Bravais lattices, ditections and planes in a crystal, Miller indices - interplanar distance for a cubic crystal - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - structure and significance of NaCl, CsCl, ZnS and graphite - crystal imperfections: point defects, line defects – Burger vectors, dislocations and stacking faults – Growth of single crystals: Bridgman and Czochralski methods.

TOTAL: 45 PERIODS

OUTCOME:

- The students will understand different moduli of elasticity, their determination and applications.
- The students will gain knowledge on the properties of sound, noise cancellation, and production, detection and applications of ultrasonics
- The students will acquire sound knowledge on thermal expansion and thermal conductivity of materials. Further they will gain an idea of quantum physics.
- The students will gain knowledge on interferometers, lasers and fiber optics
- The students will secure knowledge on the basics of crystal structures and their significance. Further they gain basic ideas of growing single crystals.

TEXTBOOKS:

1. Gaur R.K. and Gupta S.L., "Engineering Physics", Dhanpat Rai Publications (2013)
2. Palanisamy P.K., "Engineering Physics", Scitech Publications (P) Ltd. (2006).
3. Arumugam M., "Engineering Physics", Anuradha Publications (2000)

REFERENCES:

1. Serway R.A. and Jewett, J.W. "Physics for Scientists and Engineers with Modern Physics". Brooks/cole Publishing Co. (2010).
2. Tipler P.A. and Mosca, G.P., "Physics for Scientists and Engineers with Modern Physics". W.H.Freeman, (2007).
3. Markert J.T.,Ohanian, H. and Ohanian, M. "Physics for Engineers and Scientists". W.W.Norton & Co. (2007).

CY7151	ENGINEERING CHEMISTRY	L	T	P	C
		3	0	0	3

OBJECTIVE

- To develop an understanding about fundamentals of polymer chemistry.
- Brief elucidation on surface chemistry and catalysis.
- To develop sound knowledge photochemistry and spectroscopy.
- To impart basic knowledge on chemical thermodynamics.
- To understand the basic concepts of nano chemistry.

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.

UNIT II SURFACE CHEMISTRYAND CATALYSIS 9

Adsorption-Types of adsorption-adsorption of gases on solids- adsorption from solutions-Types of isotherms–Frendlich adsorption isotherm,Langmuir adsorption isotherm.Industrial applications of adsorption. Catalysis: Characteristics and types of catalysts-homogeneous and heterogeneous, auto catalysis. Enzyme catalysis -factors affecting enzyme catalysis, Michaelis-Menton equation.Industrial applications of catalysts.

UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY 9

Photochemistry: Laws of photochemistry-Grotthuss-Draper law, Stark-Einstein law and Lambert-Beer Law. Photo processes-internal conversion, inter-system crossing, fluorescence, phosphorescence, chemiluminescence and photo-sensitization. Spectroscopy: Electromagnetic spectrum-absorption of radiation-electronic, vibrational and rotational transitions. Width and intensities of spectral lines.Spectrophotometric estimation of iron.UV-Vis and IR spectroscopy- principles, instrumentation (Block diagram) and applications.

UNIT IV CHEMICAL THERMODYNAMICS 9

Second law: Entropy-entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Free energy and work function: Helmholtzand Gibbs free energy functions; Criteria of spontaneity; Gibbs-Helmholtz equation; Clausius Clapeyron equation; Maxwell relations-Van't Hoff isotherm and isochore. Chemical potential; Gibbs-Duhem equation- variation of chemical potential with temperature and pressure.

UNIT V NANOCHEMISTRY 9

Basics-distinction between molecules, nanoparticles and bulk materials; size-dependent properties.Preparation of nanoparticles – sol-gel and solvothermal.Preparation of carbon nanotube by chemical vapour deposition and laser ablation.Preparation of nanowires by VLS growth, electrochemical deposition and electro spinning.Properties and uses of nanoparticles, nanoclusters, nanorods, nanotubes and nanowires.

TOTAL: 45 PERIODS

OUTCOME

- Will be familiar with polymer chemistry, surface chemistry and catalysis.
- Will know the photochemistry, spectroscopy and chemical thermodynamics.
- Will know the fundamentals of nano chemistry.

TEXTBOOKS

1. Jain P. C. & Monica Jain., "Engineering Chemistry", DhanpatRai Publishing Company (P) Ltd, New Delhi, 2014.
2. Kannan P., Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hitech Publishing Company Pvt. Ltd. Chennai, 2014

REFERENCES

1. Pahari A., Chauhan B., "Engineering Chemistry", Firewall Media, New Delhi, 2012.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2012.
3. AshimaSrivastava. Janhavi N N, Concepts of Engineering Chemistry", ACME Learning Private Limited., New Delhi., 2010.
4. Vairam S., Kalyani P., Suba Ramesh., "Engineering Chemistry", Wiley India Pvt Ltd., New Delhi., 2011.

GE7152 ENGINEERING GRAPHICS L T P C
3 2 0 4

OBJECTIVES

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.

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 eccentricity method – 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 14

Orthographic projection- principles-Principal 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 14

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 14

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 15

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.

L=45+T=30, TOTAL: 75 PERIODS

OUTCOMES:

On Completion of the course the student will be able to

- Perform free hand sketching of basic geometrical shapes and multiple views of objects.
- Draw orthographic projections of lines, planes and solids
- Obtain development of surfaces.
- Prepare isometric and perspective views of simple solids.

TEXT BOOK:

1. N.D.Bhatt and V.M.Panchal, “Engineering Drawing”, Charotar Publishing House, 50th Edition, 2010.

REFERENCES:

1. K.R.Gopalakrishna., “Engineering Drawing” (Vol I&II combined) Subhas Stores, Bangalore, 2007
2. Luzzader, Warren.J., and Duff,John M.,,’’ Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production”, Eastern Economy Edition, Prentice Hall of India Pvt Ltd, New Delhi, 2005

3. M.B.Shah and B.C.Rana, “Engineering Drawing”, Pearson, 2nd Edition, 2009
4. K.Venugopal and V.Prabhu Raja, “Engineering Graphics”, New Age International (P)Limited ,2008.
5. K. V.Natarajan, “A text book of Engineering Graphics”, 28th Edition, Dhanalakshmi Publishers, Chennai, 2015.
6. BasantAgarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
7. N.S Parthasarathy and Vela Murali, “ Engineering Drawing”, Oxford University Press, 2015

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. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day.

BS7161	**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)

OBJECTIVE:

- 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, band gap determination and viscosity of liquids.

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. Viscosity of liquids - Determination of co-efficient of viscosity of a liquid by Poiseuille‟s flow

OUTCOME:

- 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)

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 poly vinyl alcohol using Ostwald viscometer.
12. Pseudo first order kinetics-ester hydrolysis.
13. Corrosion experiment-weight loss method.
14. Determination of CMC.
15. Phase change in a solid.

TOTAL: 60 PERIODS

TEXTBOOKS

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

GE7162	ENGINEERING PRACTICES LABORATORY	L	T	P	C
	(Common to all Branches of B.E. / B.Tech. Programmes)	0	0	4	2

OBJECTIVES

- To provide exposure to the students with hands-on experience on various Basic Engineering Practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP – A (CIVIL & ELECTRICAL)

1. CIVIL ENGINEERING PRACTICES **15**

PLUMBING

Basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings. Preparation of plumbing line sketches.

• Laying pipe connection to the suction side of a pump.
• Laying pipe connection to the delivery side of a pump.
• Practice in connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK

Sawing, planing and making joints like T-Joint, Mortise and Tenon joint and Dovetail joint.

STUDY
• Study of joints in door panels and wooden furniture
• Study of common industrial trusses using models.

2. ELECTRICAL ENGINEERING PRACTICES **15**
• Basic household wiring using Switches, Fuse, Indicator and Lamp etc.,
• Stair case light wiring
• Tube – light wiring
• Preparation of wiring diagrams for a given situation.
• Study of Iron-Box, Fan Regulator and Emergency Lamp

GROUP – B (MECHANICAL AND ELECTRONICS) **15**

3. MECHANICAL ENGINEERING PRACTICES

WELDING
• Arc welding of Butt Joints, Lap Joints, and Tee Joints
• Gas welding Practice.
• Basic Machining - Simple turning, drilling and tapping operations..
• Study and assembling of the following:
a. Centrifugal pump
b. Mixie
c. Air Conditioner.

DEMONSTRATION ON FOUNDRY OPERATIONS.

4. ELECTRONIC ENGINEERING PRACTICES **15**
• Soldering simple electronic circuits and checking continuity.
• Assembling electronic components on a small PCB and Testing.
• Study of Telephone, FM radio and Low Voltage Power supplies.

TOTAL: 60 PERIODS

OUTCOMES
- Ability to fabricate carpentry components and to lay pipe connections including plumbing works.
- Ability to use welding equipments to join the structures
- Ability to do wiring for electrical connections and to fabricate electronics circuits.

HS7251 **TECHNICAL ENGLISH** **L T P C**
4 0 0 4

OBJECTIVES
- To enable students acquire proficiency in technical communication.
- To enhance their reading and writing skills in a technical context.
- To teach various language learning strategies needed in aprofessional environment.

CONTENTS

UNIT I ANALYTICAL READING **12**
Listening- Listening to informal and formal conversations; **Speaking** – Conversation Skills(opening, turn taking, closing)-explaining how something works-describing technical functions and applications;**Reading** –Analytical reading, Deductive and inductive reasoning; **Writing**- vision statement–structuring paragraphs.

UNIT II SUMMARISING 12

Listening- Listening to lectures/ talks on Science & Technology;**Speaking** –Summarizing/ Oral Reporting, **Reading** – Reading Scientific and Technical articles; **Writing**- Extended definition –Lab Reports – Summary writing.

UNIT III DESCRIBING VISUAL MATERIAL 12

Listening- Listening to a panel discussion; **Speaking** – Speaking at formal situations; **Reading** – Reading journal articles - Speed reading;**Writing**-data commentary-describing visual material-writing problem-process- solution-the structure of problem-solution texts- writing critiques

UNIT IV WRITING/ E-MAILING THE JOB APPLICATION 12

Listening- Listening to/ Viewing model interviews; **Speaking** –Speaking at different types of interviews – Role play practice (mock interview); **Reading** – Reading job advertisements and profile of the company concerned;**Writing**- job application – cover letter –Résumé preparation.

UNIT V REPORT WRITING 12

Listening- Viewing a model group discussion;**Speaking** –Participating in a discussion - Presentation;**Reading** – Case study - analyse -evaluate – arrive at a solution;**Writing**– Recommendations- Types of reports (feasibility report)- designing and reporting surveys- – Report format.- writing discursive essays.

TEACHING METHODS:

Practice writing
Conduct model and mock interview and group discussion.
Use of audio – visual aids to facilitate understanding of various forms of technical communication.
Interactive sessions.

EVALUATION PATTERN:

Internals – 50%
End Semester – 50%

TOTAL:60 PERIODS

LEARNING OUTCOMES

- Students will learn the structure and organization of various forms of technical communication.
- Students will be able to listen and respond to technical content.
- Students will be able to use different forms of communication in their respective fields.

TEXTBOOK:

1. Craig,Thaine**. Cambridge Academic English: An integrated skills course for EAP(Student's Book)Level: Intermediate** Cambridge University Press, New Delhi: 2012

REFERENCES:

1. Laws, Anne. **Presentations.** Hyderabad: Orient Blackswan, 2011.
2. Ibbotson, Mark. **Cambridge English for Engieering**. Cambridge University Press, Cambridge,New Delhi: 2008
3. Naterop, Jean B. and Rod Revell. **Telephoning in English**. Cambridge: Cambridge University Press, 2004.
4. Rutherford, Andrea J. **Basic Communication Skills for Technology**. New Delhi: Pearson Education, 2001.
5. Bailey, Stephen. **Academic Writing A practical Guide for Students**. Routledge, London: 2004
6. Hewings, Martin**. Cambridge Academic English: An integrated skills course for EAP(Student's Book)Level: Intermediate** Cambridge University Press, New Delhi: 2012.

Attested

DIRECTOR
Centre For Academic Courses
Anna University, Chennai-600 025.

MATHEMATICS - II **L T P C**

MA7251

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

OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow of the electric current.
- To make the student 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 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 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, Gauss divergence and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III ANALYTIC FUNCTION **12**

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

UNIT IV 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 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

OUTCOMES:

- Upon successful completion of the course, students should be able to:
- Evaluate real and complex integrals using the Cauchy integral formula and the residue theorem
- Appreciate how complex methods can be used to prove some important theoretical results.
- Evaluate line, surface and volume integrals in simple coordinate systems
- Calculate grad, div and curl in Cartesian and other simple coordinate systems, and establish identities connecting these quantities

- Use Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.

TEXTBOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, 9th Edition, New Delhi, 2014.
2. Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 43rd Edition, 2014.

REFERENCES:

1. Ramana, B.V. “Higher Engineering Mathematics”, Tata McGraw Hill, New Delhi, 2010.
2. Glyn James, “Advanced Modern Engineering Mathematics”, Pearson Education, New Delhi, 2007.
3. Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 3rd Edition, 2007.
4. Bali N., Goyal M. and Watkins C., “Advanced Engineering Mathematics”, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
5. Peter V. O’Neil , “Advanced Engineering Mathematics”, Cengage Learning India Pvt., Ltd, New Delhi, 2007.

EE7251 BASIC ELECTRICAL ENGINEERING AND MEASUREMENTS L T P C
3 0 0 3

OBJECTIVE:

To impart knowledge on

- Electric circuit laws and working principles of electrical machines
- Various types of measurement devices and transducers
- Fundamentals of signal conditioning and displays

UNIT I ELECTRICAL CIRCUITS 9

Ohms Law – Kirchhoff’s Law-Steady state solution of DC circuits – introduction to AC circuits – waveforms and RMS value – Power and power factor- Three phase balanced and unbalanced circuits-Three phase Power measurement.

UNIT II ELECTRICAL MACHINES 9

Construction and Principle of operation DC machines- performance Characteristics , Construction and Principle of operation of single phase transformers, synchronous machines, three-phase and single-phase induction motors

UNIT III MEASUREMENT AND INSTRUMENTATION 9

Classification of instruments – moving coil and moving iron meters – Multimeters – dynamometer type wattmeter– energy meter – Megger – Instrument transformers (CT & PT)-Wheatstone’s bridge ,Maxwell’s bridge ,Schering Bridge

UNIT IV TRANSDUCERS 9

Classification of transducers, strain, RTD, thermocouples, Piezo-electric transducer, LVDT,Turbine and electromagnetic flow meters, level transducers ultrasonic and fiber optic transducers, type of sensors, elastic sensors, viscosity, moisture and pH sensors, Digital transducers, vibrating wire instruments like load cells, stress meter, etc.

UNIT V SIGNAL CONDITIONING AND DISPLAY 9

Instrumentation amplifiers- Filters- A/D and D/A converters - Multiplexing and data acquisition - LED, LCD and CRT displays.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Understand electric circuits and working principles of electrical machines
- Choose appropriate instruments for electrical measurement for a specific application
- Understand the concepts of various transducers and signal conditioning.

TEXT BOOKS

1. Del Toro 'Electrical Engineering Fundamentals' Pearson Education, New Delhi, 2007.
2. V.KMehta and RohitMehta'PrincipleofElectricalEngineering'SChand&Company,2008
3. Alan S. Moris, Principles of Measurements and Instruments, Printice-Hall of India Pvt. Ltd., New Delhi, 1999.
4. Smarjit Ghosh 'Fundmentals of Electrical and Electronics Engineering, Second Edition 2007

REFERENCES

1. Rajendra Prasad 'Fundamentals of Electrical engineering' Prentice Hall of India, 2006.
2. Thereja .B.L 'Fundamentals of Electrical Engineering and Electronics' S chand & Co Ltd, 2008.
3. Sanjeev Sharma 'basics of Electrical Engineering' S.K International Publishers, New Delhi 2007.
4. John Bird, Electrical Circuits theory and Technology, Elsevier, First India Edition, 2006.
5. E O Doebelin, Dhanesh N Manik," measurement Systems", Tata McGrawHill Publishing Co, 2011

GE7151 COMPUTING TECHNIQUES L T P C

(Common to all branches of Engineering and Technology) 3 0 0 3

OBJECTIVE

- To learn programming using a structured programming language.
- To provide C programming exposure.
- To introduce foundational concepts of computer programming to students of different branches of Engineering and Technology.

UNIT I INTRODUCTION 9

Introduction to Computers – Computer Software – Computer Networks and Internet - Need for logical thinking – Problem formulation and development of simple programs - Pseudo code - Flow Chart and Algorithms.

UNIT II C PROGRAMMING BASICS 9

Introduction to C programming – Fundamentals – Structure of a C program – Compilation and linking processes - Constants, Variables – Data Types – Expressions - Operators –Decision Making and Branching – Looping statements – Solving Simple Scientific and Statistical Problems.

UNIT III ARRAYS AND STRINGS 9

Arrays – Initialization – Declaration – One dimensional and two dimensional arrays - Strings- String operations – String Arrays - simple programs- sorting- searching – matrix operations.

UNIT IV POINTERS 9

Macros - Storage classes –Basic concepts of Pointers– Pointer arithmetic - Example Problems - Basic file operations

UNIT V FUNCTIONS AND USER DEFINED DATA TYPES 9

Function – definition of function – Declaration of function – Pass by value – Pass by reference – Recursion –Enumerators – Structures - Unions

TOTAL : 45 PERIODS

OUTCOME

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

- Write C program for simple applications
- Formulate algorithm for simple problems
- Analyze different data types and arrays
- Perform simple search and sort**.**
- Use programming language to solve problems.

TEXTBOOKS:

1. Pradip Dey, Manas Ghosh, “Computer Fundamentals and Programming in C”, Second Edition, Oxford University Press, 2013
2. Ashok N. Kamthane, “Computer programming”, Pearson Education, 2007.
3. Yashavant P. Kanetkar. “Let Us C”, BPB Publications, 2011.

REFERENCES:

1. Kernighan,B.W and Ritchie,D.M, “The C Programming language”, Second Edition, Pearson Education, 2006
2. Byron S Gottfried, “Programming with C”, Schaums Outlines, Second Edition, Tata McGraw-Hill, 2006.
3. R.G. Dromey, “How to Solve it by Computer”, Pearson Education, Fourth Reprint, 2007

GE7153 ENGINEERING MECHANICS L T P C

4 0 0 4

OBJECTIVE :

- The objective of this course is to inculcate in the student the ability to analyze any problem in a simple and logical manner and to predict the physical phenomena and thus lay the foundation for engineering applications.

UNIT I STATICS OF PARTICLES 12

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.

UNIT II EQUILIBRIUM OF RIGID BODIES 12

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.

UNIT III DISTRIBUTED FORCES 16

Centroids of lines and areas – symmetrical and unsymmetrical shapes, Determination of Centroids by Integration , Theorems of Pappus-Guldinus, Distributed Loads on Beams, Center 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 8

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

UNIT V DYNAMICS OF PARTICLES 12

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.

L – 45 + T – 15 TOTAL: 60 PERIODS

OUTCOMES:

- Upon completion of this course, students will be able to construct meaningful mathematical models of physical problems and solve them.

TEXT BOOK

1. Beer,F.P and Johnson Jr. E.R, "Vector Mechanics for Engineers", McGraw-Hill Education (India) Pvt. Ltd. 10th Edition, 2013.

REFERENCES

1. Hibbeller, R.C., Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics, 13th edition, Prentice Hall, 2013.
2. J.L. Meriam & L.G. Karige, Engineering Mechanics: Statics (Volume I) and Engineering Mechanics: Dynamics, 7th edition, Wiley student edition, 2013.
3. P. Boresi & J. Schmidt, Engineering Mechanics: Statics and Dynamics, 1/e, Cengage learning, 2008.
4. Irving H. Shames, G. Krishna Mohana Rao, Engineering Mechanics - Statics and Dynamics, Fourth Edition – PHI / Pearson Education Asia Pvt. Ltd., 2006.
5. Vela Murali, "Engineering Mechanics", Oxford University Press (2010)

EE7152 BASIC OF ELECTRONICS ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

- To provide knowledge in the basic concepts of Electronics Engineering including semiconductors, transistors, electronic devices, signal generators and digital electronics.

UNIT I SEMICONDUCTORS AND RECTIFIERS 9

Classification of solids based on energy band theory, Intrinsic semiconductors, Extrinsic semiconductors – P-type and N-type, P-N junction, VI Characteristics of PN junction diode, Half and Full wave rectifiers, Zener effect, Zener diode, Zener diode Characteristics, Zener diode as a regulator.

UNIT II TRANSISTOR AND AMPLIFIERS 9

Bipolar junction transistors – CB, CE, CC configurations and characteristics, Biasing circuits – Fixed bias, Voltage divider bias, CE amplifier, Concept of feedback, Negative feedback, voltage series feedback amplifier, Current series feedback amplifier.

UNIT III FET AND POWER ELECTRONIC DEVICES 9

FET – Configuration and characteristics, FET amplifier, Characteristics and simple applications of SCR, Diac, Triac and UJT.

UNIT IV SIGNAL GENERATORS AND LINEAR ICS 9

Positive feedback, Sinusoidal oscillators – RC phase shift, Hartley, Colpitts, Wein bridge oscillators, Operational amplifier – Adder, Inverting and Non-inverting amplifiers, integrator and differentiator, IC 555 based Astable and Monostable Multivibrators.

UNIT V DIGITAL ELECTRONICS 9

Boolean algebra, Logic Gates, , Half and Full adders, Decoder, Encoder, Multiplexer, Demultiplexer, Flip flops, Digital to Analog converters - R-2R and weighted resistor types, Analog to Digital converters - Successive approximation and Flash types.

TOTAL: 45 PERIODS

OUTCOMES:

- Ability to identify electronics components and use them to design circuits.

TEXT BOOK:

1. Malvino, 'Electronic Principles', McGraw Book Co., 1993.

REFERENCES:

1. Grob. B and Schultz. M.E. 'Basic Electronics', Tata Mcgraw Hill, 2003.
2. Thomas L. Floyd, 'Electronics Devices', Pearson Education, 2002.
3. Thomas L. Floyd, 'Digital Fundamentals', Pearson Education, 2003.
4. Millman, Halkias Jacob, Jit Christos and Satyabrata, 'Electronic devices and Circuits', Tata McGraw Hill, 2nd Edition.

EE7261 ELECTRICAL AND ELECTRONIC ENGINEERING LABORATORY L T P C 0 0 4 2

OBJECTIVE:

- To train the students in performing various tests on electrical drives, sensors and circuits.

LIST OF EXPERIMENTS:

1. Load test on separately excited DC shunt generator
2. Load test on DC shunt moor
3. Load test on S Transformer
4. Load test on Induction motor
5. Regulation of 3 Alternator
6. Study of CRO
7. Logic gates
8. Operational amplifiers

9. Time constant of RC circuit
10. Characteristics of LVDT
11. Calibration of Rotometer
12. RTD and Thermistor
13. Flapper Nozzle system

TOTAL :60 PERIODS

OUTCOMES:

- Ability to perform speed characteristic of different electrical machine
- Ability to use of diodes, transistors for rectifiers
- Ability to use of operational amplifiers

GE7161	COMPUTER PRACTICES LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES

- To understand the basic programming constructs and articulate how they are used to develop a program with a desired runtime execution flow.
- To articulate where computer programs fit in the provision of computer-based solutions to real world problems.
- To learn to use user defined data structures.

LIST OF EXPERIMENTS

1. Search, generate, manipulate data using MS office/ Open Office
2. Presentation and Visualization – graphs, charts, 2D, 3D
3. Problem formulation, Problem Solving and Flowcharts
4. C Programming using Simple statements and expressions
5. Scientific problem solving using decision making and looping.
6. Simple programming for one dimensional and two dimensional arrays.
7. Solving problems using String functions
8. Programs with user defined functions
9. Program using Recursive Function
10. Program using structures and unions.

TOTAL: 60 PERIODS

OUTCOMES

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

- Write and compile programs using C programs.
- Write program with the concept of Structured Programming
- Identify suitable data structure for solving a problem
- Demonstrate the use of conditional statement.

LABORATORY REQUIREMENTS FOR BATCH OF 30 STUDENTS

30 Systems with C compiler

CE7251 STRENGTH OF MATERIALS

L	T	P	C
3	0	0	3

OBJECTIVE:

- To understand the stresses developed in bars, compounds bars, beams, shafts, cylinders and spheres.

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 – Stresses on inclined planes – principal stresses and principal planes – Mohr's circle of stress.

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 – Load carrying capacity – Proportioning of sections – 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 THIN CYLINDERS, SPHERES AND THICk CYLINDERS 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.

TOTAL: 45 PERIODS

OUTCOMES:

- Upon completion of this course, the students can able to apply mathematical knowledge to calculate the deformation behavior of simple structures.
- Critically analyse problem and solve the problems related to mechanical elements and analyse the deformation behavior for different types of loads.

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. Subramanian R., Strength of Materials, oxford University Press, Oxford Higher Education Series, 2007.
3. Hibbeler, R.C., Mechanics of Materials, Pearson Education, Low Price Edition, 2007
4. Ferdinand P. Been, Russell Johnson, J.r. and John J. Dewole Mechanics of Materials, Tata Mcgraw Hill publishing 'co. Ltd., New Delhi.

CY7301 CHEMISTRY FOR PRINTING TECHNOLOGY L T P C
3 0 0 3

OBJECTIVE

- The students should be conversant with
- Treatment of water for domestic and industrial purpose
- Applications of different kinds of polymers, lubricants and adhesives.
- Different kinds of alloys and powder metallurgy involving condensed systems.
- Principles and instrumentation of spectroscopic and microscopic analysis.

UNIT I WATER TECHNOLOGY AND CORROSION 9

Water-sources, properties, characteristics imparted by impurities in water, significance of water quality parameters in terms of pH, conductivity, hardness, alkalinity, COD, BOD, iron, chloride and sulphate, Water treatment-reverse osmosis, ion exchange demineralization and zeolite processes; 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, specialty-polyether 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: iron-carbon phase diagram-heat treatment of steel- significance of the phases and microstructures in imparting characteristic properties to steels, alloy steels; Non-ferrous 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, Scanning Tunneling Microscopy and Atomic Force Microscopy. Thermal methods: Differential Scanning Calorimetry, Thermo-gravimetric analysis, Differential thermal analysis. Chromatography-column chromatography, TLC, HPLC.

TOTAL: 45 PERIODS

OUTCOME

- Will be familiar with corrosion and its control.
- Will know the characterization techniques.
- Will know the water quality analysis for industrial applications.

TEXTBOOKS

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.

MA7358 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 apart from its use in solving boundary value problems;
- 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 – Singular solutions – Lagrange's Linear equation – Integral surface passing through a given curve – Classification of partial differential equations - 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

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

OUTCOMES :

- The students can able to solve the partial differential equations, find the Fourier series analysis and solve the problems by using Fourier transform and Z transform techniques.

TEXTBOOKS:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.
2. Erwin kreyszig, "Advanced Engineering Mathematics",John Wiley & Sons, 9th Edition, , New Delhi, 2014

REFERENCES:

1. Glyn James, "Advanced Modern Engineering Mathematics", Pearson Education, New Delhi, 2007.
2. Ramana, B.V. "Higher Engineering Mathematics", Tata McGraw Hill, New Delhi, 11th Reprint , 2010.
3. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
4. Peter V.O'Neil, "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi, 2007.

ME 7354	MECHATRONICS	L	T	P	C
		3	0	0	3

OBJECTIVE:

- To impart knowledge about the elements and techniques involved in Mechatronics systems in understanding the concept of automation.

UNIT I INTRODUCTION **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

Attested

DIRECTOR
Centre For Academic Courses
Anna University, Chennai-600 025.

OUTCOME:

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

- Design Mechatronics systems with the help of Microprocessor, PLC and other Electrical and Electronics Circuits.

TEXT BOOKS:

1. Bolton W., "Mechatronics", Pearson Education, 4th Edition, 2011.
2. Ramesh S Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085", Penram International Publishing Private Limited, 6th Edition, 2015.

REFERENCES:

1. Smaili.A and Mrad.F, "Mechatronics Integrated Technologies for Intelligent Machines", Oxford University Press, 2007.
2. Davis G.Alciatore and Michael B.Histand, "Introduction to Mechatronics and Measurement systems", McGraw Hill Education, 2011.
3. Bradley D.A., Dawson D., Buru N.C. and Loader A.J., "Mechatronics", Chapman and Hall, 1993.
4. Nitaigour Premchand Mahalik, "Mechatronics Principles, Concepts and Applications", McGraw Hill Education, 2015.
5. Devadas Shetty and Richard A. Kolk, "Mechatronics Systems Design", Cengage Learning, 2010.

PT7301 PREPRESS AND IMAGING TECHNOLOGY L T P C
3 0 0 3

OBJECTIVES:

- To understand the fundamental principles of conventional and digital imaging and screening technologies
- To comprehend the stages in conventional and digital prepress workflow
- To learn the working principle of imaging and output devices in prepress

UNIT I THEORY OF IMAGING 9

Properties of Light, Optical Density, Photographic films, Exposure, Image Transfer properties of photographic films, Continuous tone, Halftone, Conventional Screening methods - Single color, Multicolor; Halftone value calculations - Neugebauer, Murray Davies equations, Densitometry; Densitometer - Components, Working principle.

UNIT II CONVENTIONAL PREPRESS WORKFLOW 9

Printer's measurement system; Typographic Parameters; Text Input methods; Copy mark-up; Casting off; Copy editing; Proof reading; Originals for reproduction; Repro Cameras, Photographic Film - Types; Line reproduction; Halftone reproduction; Film Imposition; Proofing; Plate exposing and Developing.

UNIT III DIGITAL IMAGING AND SCREENING 9

Digital Image acquisition; Image sensors - PMT, CCD, CMOS; Scanner - Working Principle, Types; Digital Camera - Working Principle, types; Image acquisition factors - Dynamic range, Resolution, Storage, Compression Techniques, File formats; Digital Image Processing; Image processing software - features; Digital Halftoning - Thresholding, Dithering, Clustered dots, Dispersed dots, Error diffusion; Digital Screening technologies - Dot shapes, Dot angles, Screen rulings, AM, FM, Rational Tangent, Supercell, Irrational; Fonts – Outline, Truetype, Opentype, Postscript;

UNIT IV PREPRESS OUTPUT DEVICES 9

Laser sources - Types of lasers used in imaging, Choice and Selection of laser; Modulation - Direct laser modulation, Acousto-optic modulation, Electro-Optic Modulation; Deflection methods – Mechanical deflectors. Holographic deflectors, Solid state deflectors, Polygon Scanning, Facet tracing optics and Scan-end detection mechanism; Lens and lens aberrations; Imagesetters - Principle, Types; Platesetters - Principle, Types.

UNIT V DIGITAL PREPRESS WORKFLOW 9

Workflow system - Components; Data Receiving and verification, Page Layout Design, PDF creation, Trapping, Pre-flighting, Proofing, Imposition, Raster image processors, Archiving, Versioning, Digital Asset Management; Management Information Systems - CIP4, JDF;

TOTAL: 45 PERIODS

OUTCOMES:

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

- Explain how continuous tone originals are converted into halftones in conventional and digital methods.
- Identify the job sequence in prepress and the software and hardware requirements
- Analyze the features of workflow systems, imaging devices and output devices

TEXT BOOKS:

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

REFERENCES:

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

PT7302 PRINCIPLES OF PRINTING ENGINEERING AND TECHNOLOGY L T P C

3 0 0 3

OBJECTIVES:

- To understand the roles and responsibilities of engineers in the development of the society.
- To learn the basics of graphic design.
- To be familiar with various printing processes and stages in printing workflow.

UNIT I PRINCIPLES OF ENGINEERING 9

Engineers as Problem Solvers-Past, Present and Future; Engineering Team; Careers in Engineering; Engineering, Technology, Distinction between Engineering and Technology, Sketching, Technical Writing, Technical Reports, Data Representation and Presentation, Presentations; Design Process – Problem Identification, Design Brief, Problem Analysis, Information Gathering, Alternative Solutions and Optimization, Modeling, Testing and Evaluation, Presentation of Solution.

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, Case studies.

UNIT III DESIGNING FOR MEDIA **9**

Designing for Newspapers, Booklets, Magazines, Business publications, Banners & Posters, Advertising, Transit, Interactive, Web and Maps. Case studies.

UNIT IV 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 V DESIGN MANAGEMENT & PRODUCTION PLANNING **9**

Relationship between designer, customer and printer; selection and co-ordination of production process; Limitation of printing process, binding, finishing and ancillary processes on design; selection and specification of ink, paper and other materials; production strategy

TOTAL: 45 PERIODS

OUTCOMES:

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

- Create layouts and designs for various print products.
- Learn the key identifying characteristics of each printing process.
- Comprehend the relationship between designer, customer and printer

TEXT BOOKS:

1. Aaris Sherin, Irina Lee, Poppy Evans, The Graphic Design Reference & Specification Book, Rockport Publishers, 2013
2. Poppy Evans and Mark A.Thomas, Exploring the Elements of Design, Delmar Publishers, 2004

REFERENCES:

1. Pamela Mortimer, Document Design Primer, GATF, 2003
2. Helmutt Kipphan, Handbook of Print Media, Springer, Heidelberg, 2000
3. T. M. Adams, D.D. Faux and L. T. Ricber, Printing Technology, Delmar Publications Inc., 1996
4. Robin McAllister, Design for Production, Delmar Publishers, 1997.

CE7261 STRENGTH OF MATERIALS LABORATORY **L T P C**
0 0 4 2

OBJECTIVES:

- To study the mechanical properties of materials subjected to different types of loading.

LIST OF EXPERIMENTS

1. Tension test on mild steel rod
2. Compression test on wood
3. Double shear test on metal
4. Torsion test on mild steel rod
5. Impact test on metal specimen (Izod and Charpy)
6. Hardness test on metals (Rockwell and Brinell Hardness Tests)
7. Deflection test on metal beam
8. Compression test on helical spring
9. Deflection test on carriage spring

TOTAL: 60 PERIODS

OUTCOMES:

- The students will have the knowledge in the area of testing of materials

REFERENCES:

1. Strength of Materials Laboratory Manual, Anna University, Chennai-600 025.
2. IS 432(Part I) -1992 – Specification for mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement

PT7311 CREATIVE GRAPHIC DESIGN LABORATORY L T P C
0 0 4 2

OBJECTIVE:

- To understand the concepts of design and promote lateral thinking

EXERCISES:

1. Thumbnails and Rough sketches of logos
2. Thumbnails and Rough sketches of advertisements
3. Thumbnails and Rough sketches of lettering
4. Prepare layouts for magazine
5. Prepare layouts for newspaper
6. Prepare layouts for books
7. Prepare layouts for web publishing
8. To develop artworks and design print products using collage and paint
9. To develop a drawing folio and keep a sketch book as a record of ideas
10. To develop designs using digital art techniques

TOTAL: 60 PERIODS

OUTCOMES:

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

- Create layout designs for books, newspaper and magazines
- Understand the concepts of logos and symbols
- Develop creative artworks

MA7352 APPLIED STATISTICS L T P C
4 0 0 4

OBJECTIVE:

- The students will have a fundamental knowledge of the concepts of statistical inference and apply the tools in management problems.

UNIT I TESTS OF SIGNIFICANCE 12

Sampling distributions – Central limit theorem-Tests for single mean, proportion and difference of means, proportions (large and small samples) - Tests for single variance and equality of variances- χ^2 - test for goodness of fit - Independence of attributes.

UNIT II NON - PARAMETRIC TESTS 12

Advantages and drawbacks over parametric methods – Sign test - Median test – Mann-Whitney Wilcoxon U-test – Wald-Wolfowitz run test.

UNIT III DESIGN OF EXPERIMENTS 12

Completely randomized design - Randomized block design - Latin square design - 2^2 factorial design - Taguchi's robust parameter design.

UNIT IV STATISTICAL QUALITY CONTROL 12

Control charts for variables - Control charts for attributes - Tolerance limits - Acceptance sampling by attributes.

UNIT V TIME SERIES 12

Components of time series - Analysis of time series - Measurement of trend - Measurement of seasonal fluctuations.

TOTAL : 60 PERIODS

OUTCOMES :

- The students can independently participate in the processes of analysis, planning, formulating strategies of development, decision-making, governing and management, and independent making of tactical and strategic decisions related to the statistics.

TEXTBOOKS:

1. Walpole R.E., Myers R.H., Myers S.L. and Keying Ye, "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 8th Edition 2007.
2. Gupta S.C. and Kapoor V.K., "Fundamentals of Applied Statistics", Sultan Chand and Sons, New Delhi, 2nd Edition, Reprint, 2002.

REFERENCES:

1. Johnson R.A., "Miller and Freund's Probability and Statistics for Engineers", PHI Learning Pvt. Ltd., New Delhi, 8th Edition, 2011.
2. Devore, J.L., "Probability and Statistics for Engineering and the Sciences", Thomson Brooks/Cole, International Student Edition, New Delhi, 7th Edition, 2008.
3. Milton, J. S. and Arnold, J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, New Delhi, 4th Edition, 3rd Reprint, 2008.

ME7353 MECHANICS OF MACHINES L T P C
3 0 0 3

OBJECTIVES:

- To understand the principles in the formation of mechanisms and their kinematics.
- To understand the effect of friction in different machine elements.
- To analyze the forces and torque acting on simple mechanical systems
- To understand the importance of balancing and vibration.

UNIT I KINEMATICS OF MECHANISMS 9

Mechanisms – Terminology and definitions – kinematics inversions of 4 bar and slide crank chain – kinematics analysis in simple mechanisms – velocity and acceleration polygons– Analytical methods – computer approach – cams – classifications – displacement diagrams - layout of plate cam profiles – derivatives of followers motion – circular arc and tangent cams.

UNIT II GEARS AND GEAR TRAINS 9

Spur gear – law of toothed gearing – involute gearing – Interchangeable gears – Gear tooth action interference and undercutting – nonstandard teeth – gear trains – parallel axis gears trains – epicyclic gear trains – automotive transmission gear trains.

UNIT III FRICTION IN MACHINE ELEMENTS 9

Surface contacts – Sliding and Rolling friction – Friction drives – Friction in screw threads – Bearings and lubrication – Friction clutches – Belt and rope drives – Friction aspects in brakes– Friction in vehicle propulsion and braking.

UNIT IV FORCE ANALYSIS 9

Applied and Constrained Forces – Free body diagrams – static Equilibrium conditions – Two, Three and four members – Static Force analysis in simple machine members – Dynamic Force Analysis – Inertia Forces and Inertia Torque – D'Alembert's principle – superposition principle – dynamic Force Analysis in simple machine members

UNIT V BALANCING AND VIBRATION 9

Static and Dynamic balancing – Balancing of revolving and reciprocating masses – Balancing machines – free vibrations – Equations of motion – natural Frequency – Damped Vibration – bending critical speed of simple shaft – Torsional vibration – Forced vibration – harmonic Forcing – Vibration isolation.

TOTAL: 45 PERIODS

OUTCOME:

- The course will enable the student to understand the forces and torque acting on simple mechanical systems and also the importance of balancing and vibration and the effect of friction in different machine parts of practical significance.

TEXT BOOK:

1. Uicker, J.J., Pennock G.R and Shigley, J.E., "Theory of Machines and Mechanisms", 3rd Edition, Oxford University Press, 2009.

REFERENCES:

1. Rattan, S.S, "Theory of Machines", 3rd Edition, Tata McGraw-Hill, 2009.
2. Thomas Bevan, 'Theory of Machines', 3rd Edition, CBS Publishers and Distributors,2005.
3. Cleghorn. W. L, "Mechanisms of Machines", Oxford University Press, 2005
4. Benson H. Tongue, "Principles of Vibrations", Oxford University Press, 2nd Edition,2007
5. Robert L. Norton, Kinematics and Dynamics of Machinery, Tata McGraw-Hill, 2009.
6. Ghosh. A and Mallick, A.K., "Theory of Mechanisms and Machines', Affiliated East-West Pvt. Ltd., New Delhi, 1988.
7. Rao.J.S. and Dukkipati.R.V. 'Mechanisms and Machine Theory', Wiley-Eastern Ltd., New Delhi, 1992.
8. John Hannah and Stephens R.C., 'Mechanics of Machines', Viva Low-Prices Student Edition, 1999.
9. Grover. G.T., "Mechanical Vibrations", Nem Chand and Bros., 1996
10. William T. Thomson, Marie Dillon Dahleh, Chandramouli Padmanabhan, "Theory of Vibration with Application**",** 5th edition Pearson Education, 2011
11. V.Ramamurthi, Mechanics of Machines, Narosa Publishing House, 2002.
12. Allen S. Hall Jr., "Kinematics and Linkage Design", Prentice Hall, 1961

PT7401 COLOUR REPRODUCTION L T P C
3 0 0 3

OBJECTIVES:

- To learn the fundamental concepts of colour science, colour perception & measurement.
- To understand colour reproduction techniques in printing.
- To appreciate the impact of variables on colour reproduction.
- To learn the concepts behind colour correction for print production.

UNIT I COLOUR SCIENCE & MEASUREMENT 9

Light, colour, Light sources, Sample, Observer, Colour vision, Colour matching experiment, Tristimulus values, Chromaticity diagram, Colour spaces – CIELAB, CIELUV, CIELCH, Munsell; Colour difference equations, Spectrophotometer, Viewing conditions, ISO standards - measurement, viewing.

UNIT II PRINCIPLES OF COLOUR REPRODUCTION 9

Additive and Subtractive colour theory, Colour Fusion, Colour originals for reproduction. Image quality, Reproduction objectives, Image Acquisition – scanners, digital cameras; Colour reproduction techniques, Screen angles and moire patterns, Colour Specification, Spot colors, Extended gamut printing.

UNIT III COLOUR CORRECTION & IMAGE ADJUSTMENTS 9

Masking and its principles, Balanced inks, Tone reproduction, Gray balance, Color separation strategies - Graphical, mathematical, empirical; Black generation- Skeletal, UCR, GCR; Colour correction - White point & Black point setting, Colour cast removal, USM, UCA;

UNIT IV SPECTRAL SENSITIVITIES, INK & PAPER 9

Substrate – Whiteness, Brightness, Fluorescence, Gloss, Smoothness, Texture, Absorptivity; Ink – Pigment colour, transparency, opacity, masstone, undertone; Optics of ink film - first surface reflection, multiple internal reflections. Additivity and Proportionality rules; Printing inks - Classification of colorants, Spectral match, Metameric match; Color matching - Kubelka Munk Theory, Color mixing laws, Visual based color matching, Instrumental based color matching.

UNIT V COLOUR CONTROL 9

Press standardization - Dot gain, Density, Trapping, Gray balance, Total Area Coverage; Colour Management – Need, Open loop, Closed loop, ICC, Profiles, Rendering intent, Calibration, Characterization, Conversion; Digital proofing – Need & issues, Soft proofing, Remote proofing; Colour Servers.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Evaluate colour originals and choose appropriate reproduction technique.
- Apply suitable compensation in prepress while color separation.
- Evaluate colour and other print attributes.
- Ensure color match between original and printed reproduction

TEXT BOOKS:

1. Gary G. Field, Color Printing Excellence, Printing Industries Press, 2013
2. Gary G. Field, Color and its Reproduction, 3rd edition, GATF Press, 2004

REFERENCES:

1. Abhay Sharma, Understanding Colour Management, Thomson Delmar, 2004
2. Phil Green, Understanding Digital Color, 2nd edition, GATF Press, 1999.
3. R. W. G. Hunt, The Reproduction of Colour, 6th Edition, Wiley, 2004.
4. Berns R S, Billmeyer & Saltzman ‘s Principle of Colour Technology, 3rd Edition, Wiley, 2000
5. 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

PT7402 FLEXOGRAPHIC PRINTING L T P C
3 0 0 3

OBJECTIVES:

- To learn the basic principles of flexographic printing
- To understand plate preparation and mounting methods
- To understand the flexographic press types and components

UNIT I INTRODUCTION 9

Flexography – Basic principle, advantages, limitations, applications; Designing for flexo - Type, Tint, Vignette, Reverse, Registration tolerances, Barcode design; Template/Dieline preparation; Preflighting; Proofing; Design considerations, Screening Technologies for flexo; Press types – stack, CI, inline, narrow web, wide web; Variations of press – coating, lamination, corrugated postprinting; 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 MOUNTING AND PROOFING 9

Plate mounting procedures - Optical, Pin Register, Microdot, Video, Sleeve; Mounting tapes - types, properties, selection; Improving press performance through mounting; Proofing procedure.

UNIT IV PRINTING PRESS 9

Printing station – fountain rollers, anilox rollers, doctor blades, plate cylinders, impression rollers; Automatic viscosity controls; Web Handling - Infeed, Outfeed, web guiding, pneumatic shafts and chucks; Web treatment and processing - Film treating, Dryers, Cooling rollers, static electricity, substrate cleaning, varnishing; Press Mechanics; Drives- Gear, Servo; Web inspection systems; Pressroom Practices

UNIT V QUALITY CONTROL 9

Plate Standardization, Flexo QC targets, Flexographic Print Evaluation, Job specific print variables, Color Matching, Press Optimization, Fingerprinting, Troubleshooting, Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

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

- State the factors influencing designing for flexography.
- Discuss about the working of flexographic press and its control.
- Identify and solve print problems
- 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. Frederick R.Boyle, The Flexo Environment, Foundation of Flexographic Technical Association, 2002.
2. Anthony White, High Quality Flexography,Pira reviews of Printing, Pira International,1999.
3. Helmut Kipphan, Handbook of Print Media, Springer-Verlag, 2001

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PT7403 GRAVURE AND SCREEN PRINTING L T P C
3 0 0 3

OBJECTIVES:

To impart knowledge on

- The principles of Gravure printing process, components of gravure printing machines and cylinder preparation techniques.
- The principles of Screen printing process, stencil preparation methods and types of presses.
- Print problems and quality control in Gravure and screen printing process

UNIT I GRAVURE PROCESS AND IMAGE CARRIER PREPARATION 10

Process characteristics, cylinder construction – design, balancing, copper plating and polishing; reuse of cylinder; well formation; film positives; cylinder layout and film assembly; cross line screen, image carrier preparation techniques – diffusion etch process, direct transfer process, electromechanical, laser and electron beam engraving process.

UNIT II GRAVURE PRINTING MACHINE 10

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 8

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 product

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 8

Print problems and remedies; quality control aids; maintenance; health and safety issues; waste disposal and environmental safeguards.

.TOTAL: 45 PERIODS

OUTCOMES:

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

- Acquire the basic principles of gravure and screen printing
- Compare and analyze the types of gravure and screen printing machines
- Identify and rectify 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. Samuel B. Hoff, Screen Printing – A Contemporary Approach, Delmar Publishers,1997.
3. Ingram, Samuel, Screen Printing Primer, GATF press, 2nd Edition, 1999.
4. William Appleton, Screen Printing, PIRA International, 1994.
5. NIIR Board, Screen Printing Technology Handbook, Asia Pacific Business Press Inc., 2004

PT7404 PAPER AND PAPER BOARD L T P C
3 0 0 3

OBJECTIVES:

- To understand about paper manufacturing processes
- To learn the properties of paper and paperboard and testing methods
- To be familiar with paper related problems in printing.

UNIT I RAW MATERIALS & PROCESSING 9

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

UNIT II MANUFACTURING 9

Paper making machines, Head boxes and inlets, Forming Section, Press and dryer section, wires, felts, automation; Calendaring – types. Board manufacturing – cylinder machines.

UNIT III COATING & CLASSIFICATION 9

Paper and board coating – Pigments, binders and additives– Techniques; 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; Mechanical – Tensile, burst, tear, internal bonding, fold endurance, stiffness, pick resistance, absorbency ; Paperboard - types, properties, applications;

UNIT V PAPER AND PAPERBOARD RELATED PROBLEMS IN PRINTING 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:

- Comprehend paper science and manufacturing process.
- Test the paper and paperboard for its compliance with standards and specifications
- Identify and solve paper related problems in printing.

TEXT BOOKS:

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

REFERENCES:

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

PT7411 DIGITAL PAGE LAYOUT DESIGN LABORATORY L T P C
0 0 4 2

OBJECTIVES:

- To learn typography and page layout designing
- To understand file preparation techniques and preflighting.

EXERCISES:

1. Create page layouts applying Typographic styles, Columns and tables.
2. Create layouts integrating text, graphics and images.
3. Create layouts for newspapers.
4. Create various layout styles for brochures.
5. Create bookwork with Tag/style formatting, TOC, Footnote, Index.
6. Create bookwork with References, Bibliography.
7. Output file preparation - File Packages, Exporting file in various PDF Versions.
8. Create Custom Preflighting Profiles and check output files.
9. Digital Proofing.
10. Template Creation.

TOTAL: 60 PERIODS

OUTCOMES:

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

- Effectively use Pagination software
- Apply appropriate typographic styles based on job requirement
- Create page layouts for various jobs.

PT7412 GRAPHIC DESIGN AND IMAGE EDITING LABORATORY L T P C
0 0 4 2

OBJECTIVES:

- To learn the basics of graphic design and image editing software.
- To understand the concept and application of layers in design.
- To learn to retouch and edit images

Graphic Design Software

1. Introduction to Vector Graphic Design Software Features and tools
2. Creation of shapes & objects using drawing tools
3. Logo Creation using Object Transformation tools
4. Graphic Design using layers
5. Wrapper Design

Image Editing and Colour Correction Software

1. Introduction to Raster Graphics Software Features and tools
2. Image acquisition from scanner and digital camera
3. File formats & Sampling
4. Tonal adjustment, Histogram analysis and equalization
5. Image editing using masking and special effects

TOTAL: 60 PERIODS

OUTCOMES:

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

- Design graphics for different media and applications.
- Edit and retouch graphics creatively.

PT7501 COST ESTIMATION FOR PRINTING L T P C
3 0 0 3

OBJECTIVES:

To impart knowledge on

- The basic concepts of costing, pricing, estimating and investment analysis
- Cost estimating for various print jobs

UNIT I COSTING AND PRICING 8

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 8

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

UNIT III ESTIMATING PRINTING MATERIALS FOR PROCESSES 10

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.

UNIT IV COST ANALYSIS 10

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

UNIT V INVESTMENT ANALYSIS 9

Time value of money, compound value, present value, annuities, pay back method, average rate of return and internal rate of return method; Depreciation, Return on Investment, Return On Capital Expenditure; Break even analysis – Calculation of break even 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:

- Estimate the cost of different materials used in printing
- Calculate the composite machine hour rate (CMHR) and budgeted hour rate (BHR) for the machines used in printing
- Do Investment analysis and break even analysis

TEXT BOOKS:

1. Hugh Speirs, Print Estimator's Handbook, 2nd edition, Pira International Ltd., 2004
2. Prasanna Chandra, Financial Management,Theory and Practice, TataMcGrawHill, New Delhi, 6th Ed., 2004.

REFERENCES:

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

PT7502 OFFSET PRINTING TECHNOLOGY L T P C
3 0 0 3

OBJECTIVE:
• To impart knowledge about offset printing and mechanisms of sheetfed offset printing machines

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.

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.

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of the course, the student will be able to:
- Describe the concepts of sheetfed offset printing
- Explain the sheetfed offset machine design and its mechanisms
- Identify factors influencing print quality
- Troubleshoot print problems

TEXT BOOKS:

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

REFERENCES:

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

PT7503 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.

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, Manufacturing, Properties, Specialty papers for Packaging, Folding board cartons and coated cartons, 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

Label – types, materials, Label adhesives –Types characteristic properties and uses, shrink wrapping, stretch wrapping, Collapsible tube – materials and properties. 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 test, OTR test, 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.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Select suitable packaging material for various applications.
- Select suitable ancillary materials for different applications.
- Ensure quality control standards used for testing of packaging materials

TEXT BOOKS:

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

REFERENCES:

1. A.S.Athayle, Handbook of Packaging Plastics, Multi-tech Publishing Co.,First Edition, 1999.
2. Aaron L.Brody& Kenneth S.Marsh, Encyclopedia of Packaging Technology,
3. John Wiley Interscience Publication, II Edition, 1997.
4. Gunilla Johnson, Corrugated Board Packaging, PIRA International, 1993.
5. Arthur Hirsch, Flexible Food Packaging, Van Nostor and Reinhold, 1991.
6. A.S.Athayle, Plastics in Flexible Packaging, Multi-tech Publishing Co., First Edition, 1992.

PT7504 PRINTING INKS AND COATINGS L T P C
3 0 0 3

OBJECTIVES:

- To study the raw materials, properties, manufacturing processes of printing inks
- To be familiar with print problems related to inks used for different printing processes

UNIT I RAW MATERIALS 9

Colorants – 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, EthylCellulose and Nitrocellulose; Additives– Properties and applications Driers, Waxes, Antioxidants, plasticizers, wetting agents, defoaming agents and Antiskinning agents.

UNIT II PRINTING INKS FOR DIFFERENT PROCESSES 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 – colorants, 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 – colorants, 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 INK 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.

UNIT IV SPECIALITY INKS AND INK DRYING MECHANISMS 9

Water based inks; Inkjet printing inks; Radiation curable inks-IR, UV & EB–Raw materials, equipment used for drying; Security inks– Thermochromic and Photochromic; Nanoinks; Ink drying mechanisms.

UNIT V COATINGS 9

Coating types - Oil based, water based, UV and EB coatings and nano emulsions, Roller coatings and Hybrid coatings - constituents, properties.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Comprehend the manufacturing process of Inks.
- Follow the standards used for testing of printing Inks.
- Rectify the problems related to printing inks on different printing process.
- Select inks for different applications

TEXT BOOKS:

1. R.H.Leach, The Printing Ink Manual, 5th Edn., Chapman & Hall, London, 2002.
2. Philip Ruxton, Printing Inks: Their Composition, Properties and Manufacture, General Books, 2010.

REFERENCES:

1. Cliffwoof, A Manual for Flexographic Inks, Fishbum Printing Ink Co.Ltd., Watford, 1979.
2. Charles Finley, Printing Paper and Ink, Delmar Publishers, 1997.
3. Nelson R.Eldred, What the Printer should Know about inks, 3rd Edition GATF Press,2001.
4. Bob Thompson, Printing materials Science and Technology, 2nd edition, 2004.
5. Arthur A. Tracton, Coatings technology handbook, Taylor & Francis, 2005.
6. Ronald E.Tood, Printing Inks – Formulation, Principles, Manufacture and Quality Control Testing, PIRA International 1996.

HS7561 COMMUNICATION SKILLS AND SOFT SKILLS L T P C
1 0 2 2

COURSE DESCRIPTION

This course aims to help engineering students acquire the employability skills necessary for the workplace. It also attempts to meet the expectations of the employers by giving special attention to presentation skills, group discussion skills and soft skills. This aim will be achieved through expert guidance and teaching activities focusing on the above listed skills and language skills in the Language Laboratory.

OBJECTIVES

- To enhance the employability skills of students with a special focus on presentation skills, group discussion skills and interview skills and soft skills.
- To help them improve their writing skills necessary for the workplace situation.

CONTENTS

UNIT I WRITING SKILLS

Preparing job applications – writing the cover letter and resume – applying for jobs online – e-mail etiquette – writing reports – collecting, analyzing and interpreting data.

UNIT II SOFT SKILLS

Hard skills & soft skills – soft skills: self-management skills & people skills – training in soft skills – persuasive skills – sociability skills – interpersonal skills – team building skills – leadership skills – problem solving skills – adaptability – stress management – motivation techniques – life skills.

UNIT III PRESENTATION SKILLS

Preparing slides using the computer– structuring the content (parts of a presentation)- body language – answering questions – individual presentation practice –– mini presentation (practice sessions)

UNIT IV GROUP DISCUSSION SKILLS

Participating in group discussions – understanding group dynamics – brainstorming – questioning and clarifying – GD strategies (expressing opinions, accepting or refusing others opinions, turn taking) – activities to improve GD skills – viewing recorded GD – mock GD.

UNIT V INTERVIEW SKILLS

Interview etiquette–technical Interview/HR Interview/body language – mock interview – attending job interviews – Types of interviews- telephone/skype interview – stress interview, one to one/panel interview – FAQs related to job interview.

TOTAL: 45 PERIODS

OUTCOMES

- Students will be able to make presentations and participate in group discussions with confidence.
- Students will be able to perform well in interviews.
- They will have adequate writing skills.

REFERENCES:

1. Downes, Colm. Cambridge English for Job Hunting. CUP, 2008
2. Corneilssen, Joep. How to Prepare for Group Discussion and Interview. New Delhi: Tata-McGraw-Hill, 2009.
3. Dabreo, Desmond A. Group Discussion and Team Building. Mumbai: Better Yourself Books, 2004.
4. Ramesh, Gopalswamy, and Mahadevan Ramesh. The ACE of soft skills. New Delhi: Pearson, 2010.
5. Gulati, Sarvesh. Corporate Soft skills. New Delhi: Rupa and Co. 2006.
6. Van Emden, Joan, and Lucinda Becker. Presentation Skills for Students. New York: Palgrave Macmillan, 2004.
7. Sarawati, V. and Revathi Vishwanathan, Soft Skills for Career Communication Preesat Publications, Chennai: 2011

EXTENSIVE READERS

1. Covey, Stephen R. The 7 Habits of Highly Effective People.New York: Free Press, 1989
2. Bagchi, Cubroto. The Professional. New Delhi: Penguin Books India, 2009.

WEB RESOURCES

1. www.humanresources.about.com
2. www.careerride.com
3. https://bemycareercoach.com/softskills

PT7511 DIGITAL WORKFLOW AND IMAGE CARRIER PREPARATION LABORATORY **L T P C 0 0 2 1**

OBJECTIVE:

To make imposition schemes, and prepare offset plates incorporating quality control aids.

EXERCISES:

1. Types of planning and layout preparation – Regular, Irregular images
2. Sheet work and Half sheet film assembly for 32,64 and 128 pages book work
3. Materials Requirement Planning
4. Introduction to various workflow software modules
5. PDF – Preparation, normalization and preflighting
6. PDF – Analyzing files for print production
7. Creating a digital imposition – Book Work, Multiple-Ups
8. Obtaining RIP output – Proofing, Plate
9. Exposure optimization and standardization
10. Preparing offset plates with quality aids

TOTAL : 30 PERIODS

OUTCOMES:

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

- Design and plan any print jobs for the commercial press.
- Estimate the plate and paper requirements for the jobs
- Adapt to any automatic workflow software in the industries.
- Understand the variables in plate making and standardize plate preparation

PT7512 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.

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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:

- Operate a sheetfed offset press
- Identify process control parameters
- Standardize the machine and evaluate print quality

GE7251 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C
3 0 0 3

OBJECTIVES:

To the study of nature and the facts about environment.

- To find and implement scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth's interior and surface.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

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 – biogeographical 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 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 production 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:

Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.

- Public awareness of environment at infant stage.
- Ignorance and incomplete knowledge has lead to misconceptions.
- Development and improvement in standard of living has lead to serious environmental disasters.

TEXT BOOKS:

1. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education 2004.
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.

REFERENCES:

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., 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.

PT7601 PACKAGING TECHNOLOGY 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

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, life cycle 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, corrugated board testing.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Articulate the types of packages and manufacturing processes.
- Comprehend the importance of package design for various applications
- Analyse various test methods for package suitability

TEXT BOOKS:

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

REFERENCES:

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

PT7602 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 of the various applications of inventory and project management with respect to the Printing Industry.

UNIT I INTRODUCTION 10

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 **10**

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 **8**

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

UNIT IV MATERIALS & CAPACITY REQUIREMENT PLANNING **8**

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:

- Discuss the working of printing organization
- Apply various management concepts in managing a print establishment.
- Critically analyze the print operations management concepts to solve management problems.

TEXT BOOKS:

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

REFERENCE:

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.

PT7603 WEB OFFSET TECHNOLOGY **L T P C**
3 0 0 3

OBJECTIVE:

- To understand the paper feeding mechanisms, web tension controls, dampening and inking systems, press configurations, registering mechanisms and settings involved in a web offset printing machine.

UNIT I PRESS CLASSIFICATION AND INFEED UNITS **10**

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 8

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

TOTAL: 45 PERIODS

OUTCOMES:

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

- Analyze different configurations, components and mechanisms of a web offset machine
- Identify and solve problems related to runnability and printability of substrates
- Ensure conformance to quality standards.

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. John MacPhee, Fundamentals of Lithographic Printing Vol.I Mechanics of Printing, GATF Press, 1998.
3. Helmutt Kipphan, Handbook of Print Media, Springer, Heidelberg, 2001

PT7611 COLOR 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 calibration, profiling and colour management settings in prepress software
2. Image editing using curves
3. Colour correction
4. Image Retouching
5. Colour management options in PDF and RIP software
6. Proofer Profiling, Proofing and Proof evaluation
7. Colour separation using UCR, GCR
8. Colour reproduction analysis using quality control aids
9. Colour reproduction comparison using various substrates
10. Colour reproduction evaluation - ISO standards

TOTAL: 60 PERIODS

OUTCOMES:

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

- Preflight and export colour documents into PDF
- Generate profiles for different devices
- Obtain proofs by mapping to destination device gamut.
- Ensure device independent colour reproduction with best possible color match

PT7612 PACKAGE DESIGN AND TESTING LABORATORY L T P C
0 0 4 2

OBJECTIVES:

Become acquainted with the nature and impact of visual communications in packaging design

- To familiarize with the various graphic design and 3D Modeling software
- To conduct various characterization tests for packaging materials

EXERCISES:

1. Graphic design for packaging applications
2. Structural design for packaging applications
3. Integration and visualization of structural and graphic designs
4. Designing for labels and folding cartons
5. Designing for flexible pouches and metal cans
6. Designing for multiple-ups
7. Determination of tensile and compression strength
8. Determination of stiffness and burst strength
9. Determination of Crush resistance, rub resistance and COBB value.
10. Determination of permeability of packaging materials

TOTAL: 60 PERIODS

OUTCOMES:

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

- Design different types of packages
- Test packaging materials
  Optimize material usage in package design

PT7613 **MINI PROJECT** **L T P C**
0 0 2 1

OBJECTIVE:

- To provide opportunity for the students to implement their skills acquired in the previous semesters to face practical problems.

The students in convenient group's not exceeding 4 members have to take one small work related to printing and its process. Every project work shall have a guide who is the member of the faculty of the institution and if possible with an industry guide also. The work chosen may be printing elements (Example-press, prepress, post press and etc). The students are required to demonstrate its working apart from submitting the project report.

TOTAL: 30 PERIODS

OUTCOME:

- On completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology

PT7701 **ELECTRONIC PUBLISHING** **L T P C**
3 0 0 3

OBJECTIVES:

- To understand the Print On-demand and online publishing concepts.
- To learn design concepts and styles of layout for various digital gadgets.
- To impart knowledge on different e-publishing and workflow software.
- To familiarize online publishing models and digital rights management.

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UNIT I INTRODUCTION **8**

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 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 etc. 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 **10**

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 EMERGING TRENDS 9

Future publishing Models, Digital Asset Management, Digital Rights Management, Business models in Internet, Marketing, Recent trends

TOTAL: 45 PERIODS

OUTCOMES:

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

- Apply different layouts design for various digital gadgets.
- Choose proper software for web presentation and transformation language.
- Construct different online publishing models.

TEXT BOOKS:

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

REFERENCES:

1. Rae A. Earnshaw, Huw Jones, John A. Vince, Digital Media and Electronic Publishing, Academic Press , 2007.
2. Richard Guthrie, Publishing: Principles and Practice, SAGE, 2011
3. Eric Ladd, Jim O' Donnel, Using HTML 4, XML and Java, Prentice Hall of India – QUE, 1999
4. Harold Henke, Electronic Books and ePublishing: A Practical Guide for Authors, Springer Science & Business Media,2001
5. Helmut Kiphhan, Handbook of Print Media, Springer Verlag, 2001

PT7702 PRINT FINISHING L T P C
3 0 0 3

OBJECTIVE:

- To impart knowledge on various finishing operations, machines and materials used for print finishing

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 Off-Line 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:

- Choose appropriate materials and print finishing operations for different applications
- Analyze the mechanism and maintenance activities of the print finishing machines
- Identify suitable type of binding based on application

TEXT BOOKS:

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

REFERENCES:

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

PT7711 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 Simple web page design with CSS
2. Scripting – Simple applet design
3. Animation techniques
4. Creating 2D animation
5. 3D animation
6. Audio & Video editing
7. Authoring software
8. Cross Media designing and publishing
9. Online publishing- blog, forum and newsletter
10. Creating templates for e-learning

TOTAL: 60 PERIODS

DIRECTOR
Centre For Academic Courses
Anna University, Chennai-600 025.

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

- Design simple and dynamic web pages
- Build complete website with database on back end.
- Build and embed the web page with many media
- Construct a style sheet for different gadgets.

PT7712 **PRINT FINISHING LABORATORY** **L T P C**
0 0 4 2

OBJECTIVES:

- To impart practical knowledge on various securing operations, case making
- To study 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:

- Do various print finishing and binding processes
- Operate print finishing machines and analyze their mechanisms

PT7713 **PRINT PRODUCTION PROJECT WORK** **L T P C**
0 0 8 4

OBJECTIVES:

- To integrate the knowledge acquired in previous theory & practical courses & implement them by producing printed products

The students should work in convenient groups of not more than four members in a group to design and produce printed products right from premedia to finishing; including planning, material selection, designing, image carrier preparation, scheduling, printing, quality assurance, finishing and cost estimation.

The training will be coordinated by a faculty member of the Department. Eight periods per week shall be allotted in the time table. Each student shall finally produce printed products and

comprehensive report. The continuous assessment and semester evaluation will be based on the regulation.

TOTAL: 120 PERIODS

OUTCOMES:

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

- Plan, estimate and design optimal job sequence for commercial printing.
- Produce innovative printed products by using optimum print production stages.
- Evaluate the printed products as per quality standards.

PT7714	INDUSTRIAL TRAINING	L	T	P	C
		0	0	0	2

OBJECTIVE:

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

DURATION:

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. Personnel welfare schemes
7. Details of the training undergone
8. Projects undertaken during the training, if any
9. Learning points.

II. End Semester examination will be a Viva-Voce Examination

OUTCOME:

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

- Be aware of various new technologies and process involved in printing and packaging industries

PT7811	PROJECT WORK	L	T	P	C
		0	0	20	10

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.

The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated jointly by external and internal examiner

TOTAL: 300 PERIODS

OUTCOME:

- On completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology

CS7023	**KNOWLEDGE MANAGEMENT**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

- To learn about Knowledge Engineering Methodology
- To understand organizational context and identify knowledge bottlenecks
- To know about Knowledge Model Construction
- To Understand the techniques of Knowledge Management and Implementation

UNIT I INTRODUCTION **9**

The value of Knowledge – Knowledge Engineering Basics – The Task and Organizational Content – Knowledge Management – Knowledge Management Ontology.

UNIT II KNOWLEDGE MODELS **9**

Knowledge Model Components – Template Knowledge Models –Reflective Knowledge Models– Knowledge Model Construction – Types of Knowledge Models.

UNIT III TECHNIQUES OF KNOWLEDGE MANAGEMENT **9**

Knowledge Elicitation Techniques – Modeling Communication Aspects – Knowledge Management and Organizational Learning.

UNIT IV KNOWLEDGE SYSTEM IMPLEMENTATION **9**

Case Studies – Designing Knowledge Systems – Knowledge Codification – Testing and Deployment – Knowledge Transfer and Knowledge Sharing – Knowledge System Implementation.

UNIT V ADVANCED KNOWLEDGE MANAGEMENT **9**

Advanced Knowledge Modeling – Value Networks – UML Notations – Project Management – Knowledge Management Tools.

TOTAL : 45 PERIODS

OUTCOMES:

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

- To Design Knowledge systems
- To Construct Common KADS model
- To implement knowledge management by Elucidating knowledge
- To develop an application using Knowledge Management Tools

TEXTBOOKS:

1. Guus Schreiber, Hans Akkermans, AnjoAnjewierden, Robert de Hoog, Nigel Shadl Walter Van de Velde and Bob Wielinga, —"Knowledge Engineering and Manageme Universities Press, 2001.
2. Elias M.Awad& Hassan M. Ghaziri, —"Knowledge Management", Pearson Education, 20(

REFERENCES:

1. C.W. Holsapple, —"Handbooks on Knowledge Management", International Handbooks on Information Systems, Vol 1 and 2, 2003.
2. http://www.epistemics.co.uk
3. http://depts.washington.edu/pettt/papers/WIN_poster_text.pdf

CS7071 DATA WAREHOUSING AND DATA MINING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To make the students to understand data mining principles and techniques
- To discover the knowledge imbibed in the high dimensional system.
- To study algorithms for finding the hidden interesting patterns in data.
- To expose the students to the concepts of Data warehousing Architecture and Implementation.
- To study the overview of developing areas – Web mining, Text mining and Big Data Mining Tools of Data mining.

UNIT I INTRODUCTION TO DATAWAREHOUSING 9

Evolution of Decision Support Systems- Data Warehousing Components –Building a Data Warehouse, Data Warehouse and DBMS, Data Marts, Metadata, Multidimensional Data Model, OLAP vs. OLTP, OLAP Operations, Data Cubes, Schemas for Multidimensional Database: Stars, Snowflakes and Fact Constellations.

UNIT II DATAWAREHOUSE PROCESS AND ARCHITECTURE 9

Types of OLAP Servers, 3 –Tier Data Warehouse Architecture, Distributed and Virtual Data Warehouses. Data Warehouse Implementation, Tuning and Testing of Data Warehouse. Data Staging (ETL) Design and Development, Data Warehouse Visualization, Data Warehouse Deployment, Maintenance, Growth, Business Intelligence Overview - Data Warehousing and Business Intelligence Trends - Business Applications - Tools - SAS

UNIT III INTRODUCTION TO DATA MINING 9

Data Mining - KDD versus Data Mining, Stages of the Data Mining Process- Task Primitives, Data Mining Techniques - Data Mining Knowledge Representation – Data Mining Query Languages, Integration of a Data Mining System with a Data Warehouse – Issues, Data preprocessing – Data Cleaning, Data Transformation, Feature Selection, Dimensionality Reduction, Discretization and Generating Concept Hierarchies - Mining Frequent Patterns Association- Correlation.

UNIT IV CLASSIFICATION AND CLUSTERING 9

Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods - Clustering techniques – Partitioning Methods - k-means- Hierarchical Methods - Distance-based Agglomerative and Divisible Clustering, Density-Based Methods – Expectation Maximization - Grid Based Methods – Model-Based Clustering Methods – Constraint – Based Cluster Analysis – Outlier Analysis.

UNIT V TRENDS IN DATAMINING AND BIG DATA MINING 9

Introduction to Big Data-Case Studies on Big Data Mining Tools: Apache Hadoop, Apache Mahout and R - Mining Complex Data Objects, Spatial Databases, Temporal Databases, Multimedia Databases, Time Series and Sequence Data; Text Mining – Web Mining- Application and Trends in Data Mining

TOTAL: 45 PERIODS

OUTCOMES:

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

- To build a data warehouse for a real-world system
- To write programs for classification and clustering
- To evaluate various mining techniques on complex data objects
- To develop applications using Big Data Mining Tools.

TEXTBOOKS:

1. Jiawei Han and Micheline Kamber, "Data Mining: Concepts and Techniques", Morgan Kaufmann Publishers, Third Edition, 2011.
2. Paul Zikopoulos, Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming", McGraw-Hill Osborne Media, First Edition, 2011.

REFERENCES:

1. Mehmed Kantardzic, "Datamining Concepts, Models, Methods, and Algorithms", Wiley Interscience, 2003.
2. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining and OLAP", Tata McGraw Hill Edition, Tenth Reprint 2007.
3. G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
4. Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, "An Introduction to Statistical Learning: with Applications in R", Springer, 2014.

CS7073 MULTIMEDIA TOOLS AND TECHNIQUES L T P C
3 0 0 3

OBJECTIVES:

- To comprehend the building blocks of multimedia, with emphasis on authoring, data compression, web and mobile applications of multimedia with an added exposure to some of the popular tools / software.

UNIT I BASIC ELEMENTS 9

Creation – Editing – Design – Usage – Tools and Hardware – File Formats for Text, Image / Graphics, Audio, Video, Animation. Color Models, Multimedia Data Structures, KD Trees – R Trees.

UNIT II MULTIMEDIA ON THE WEB 9

Hypertext, Hypermedia, Hypermedia Structures and Formats, Web Graphics, Web Design Guidelines, HTML5, Plugins, Multimedia Networking.

UNIT III AUTHORING and TOOLS 9

Authoring – Story Boarding, Metaphors - Card / Page, Icon, Timeline, Tools – Adobe Dream Weaver CC, Flash, Edge Animate CC, Camatasia Studio 8, Claro, E-Learning Authoring Tools – Articulate, Elucidate, Hot Lava.

UNIT IV DATA COMPRESSION 9

Text Compression – RLE, Huffman, Arithmetic, Dictionary Based, Image Compression – JPEG, JPEG 2000, JPEG – LS, Audio Compression – PCM, ADPCM, LPC, MPEG Audio, Video Compression – MPEG – 1,2,4

UNIT V MULTIMEDIA APPLICATIONS 9

Multimedia Databases – Content Based Information Retrieval, Multimedia Communications - Multimedia Information Sharing and Retrieval – Applications – Social Media Sharing, Online Social Networking - Virtual Reality - Multimedia for Portable Devices, Collaborative Multimedia Applications

TOTAL: 45 PERIODS

OUTCOMES:

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

- A grasp on basic elements of multimedia
- Explain the importance of web based multimedia usage
- Use and apply authoring tools for web and e-learning
- Learn the theory behind data compression both lossless and lossy
- implement applications

TEXTBOOKS:

1. Ze - Nian Li, Mark S Drew and Jiangchuan Liu “Fundamentals of Multimedia”, Second Edition, Springer, 2014.

REFERENCES:

1. Parag Havaldar and Gerard Medioni, “Multimedia Systems - Algorithms, Standards and Industry Practices”, Course Technology, Cengage Learning, 2010.
2. Nigel Chapman and Jenny Chapman, “Digital Multimedia”, Third Edition, Wiley, 2009
3. Ralf Steinmetz and Klara Nahrstedt, “Multimedia Computing, Communications and Applications”, First Edition, Pearson, 2005.
4. www.Webstyleguide.com

CS7075 WEB DESIGN AND MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVES:

- To learn the concepts of Web design patterns and page design.
- To understand and learn the scripting languages with design of web applications.
- To learn the maintenance and evaluation of web design management

UNIT I SITE ORGANIZATION AND NAVIGATION 9

User Centered Design–Web Medium–Web Design Process–Basics of Web Design – Introduction to Software used for Web Design – ADOBE IMAGE READY, DREAM WEAVER, FLASH – Evaluating Process – Site Types and Architectures – Navigation Theory – Basic Navigation Practices – Search – Sitemaps.

UNIT II ELEMENTS OF PAGEDESIGN 9

Browser Compatible Design Issues-Pages and Layout – Templates – Text – Color – Images – Graphics and Multimedia – GUI Widgets and Forms – Web Design Patterns – STATIC pages: Slice – URL in ADOBE IMAGE READY. Creation and Editing of site map – Layer, Tables, Frame set, - CSS style – Forms –Tools like Insert, Rollover etc., in DREAM WEAVER.

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UNIT III SCRIPTING LANGUAGES AND ANIMATION USING FLASHF 9

Client side scripting :XHTML – DHTML – JavaScript – XML Server Side Scripting: Perl–PHP–ASP/JSP Designing a Simple Web Application - Introduction to MACROMEDIA FLASH, Importing Other File Formats to Flash – Saving and Exporting Flash Files, Frame by Frame Animation–Motion Tweening – Shape Tweening.

UNIT IV PRE-PRODUCTION MANAGEMENT 9

Principles of Project Management – Web Project Method – Project Road Map – Project Clarification – Solution Definition – Project Specification – Content – Writing and Managing Content.

UNIT V PRODUCTION, MAINTENANCE AND EVALUATION 9

Design and Construction – Testing, Launch and Handover – Maintenance – Review and Evaluation – **Case Study:** Using the Skills and Concepts Learn with the ADOBE IMAGE READY, DREAM WEAVER, FLASH, 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 students will be able to:

- Identify the various issues of web design process and evaluation.
- Determine templates for web pages and layout.
- Develop simple web applications using scripting languages.
- Determine the various issues of web project development.
- Address the core issues of web page maintenance and evaluation.

TEXTBOOKS:

1. Themas A. Powell, “The Complete Reference–Web Design”, Tata McGraw Hill, Third Edition, 2003.
2. Ashley Friedlein, “Web Project Management”, Morgan Kaufmann Publishers, 2001.
3. H.M. Deitel, P.J. Deitel, A.B. Goldberg, “Internet and World Wide Web – How to Program”, Third Edition, Pearson Education, 2004.

REFERENCES:

1. Joel Sklar, “Principles of Web Design”, Thomson Learning, 2001.
2. Van Duyne, Landay and Hong, “The Design of Sites: Patterns for Creating Winning Websites”, Second Edition, Prentice Hall, 2006.
3. Lynch, Horton and Rosenfeld, “Web Style Guide: Basic Design Principles for Creating Websites”, Second Edition, Yale University Press, 2002.
4. Deke McClelland, “Photoshop 7 Bible”, Professional Edition, Wiley John and Son Inc., 2000.
5. Curtis Hillman, “Flash Web Design”, First Edition, New Riders Publishing, 2000.

GE7071 DISASTER MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
- To enhance awareness of institutional processes in the country and
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

UNIT I INTRODUCTION TO DISASTERS 9

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) 9

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processess and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA 9

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS 9

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to

- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Draw the hazard and vulnerability profile of India, Scenarious in the Indian context, Disaster damage assessment and management.

TEXTBOOKS:

1. Singhal J.P. "Disaster Management", Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
2. Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012. **ISBN-10:** 1259007367, **ISBN-13:** 978-1259007361]
3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
4. Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

REFERENCES

1. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005
2. Government of India, National Disaster Management Policy,2009.

Attested

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GE7074 **HUMAN RIGHTS** **L T P C**
3 0 0 3

OBJECTIVES :

- To sensitize the Engineering students to various aspects of Human Rights.

UNIT I **9**

Human Rights – Meaning, origin and Development. Notion and classification of Rights – Natural, Moral and Legal Rights. Civil and Political Rights, Economic, Social and Cultural Rights; collective / Solidarity Rights.

UNIT II **9**

Evolution of the concept of Human Rights Magana carta – Geneva convention of 1864. Universal Declaration of Human Rights, 1948. Theories of Human Rights.

UNIT III **9**

Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV **9**

Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V **9**

Human Rights of Disadvantaged People – Women, Children, Displaced persons and Disabled persons, including Aged and HIV Infected People. Implementation of Human Rights – National and State Human Rights Commission – Judiciary – Role of NGO's, Media, Educational Institutions, Social Movements.

TOTAL : 45 PERIODS

OUTCOME :

- Engineering students will acquire the basic knowledge of human rights.

REFERENCES:

1. Kapoor S.K., "Human Rights under International law and Indian Laws", Central Law Agency, Allahabad, 2014.
2. Chandra U., "Human Rights", Allahabad Law Agency, Allahabad, 2014.
3. Upendra Baxi, The Future of Human Rights, Oxford University Press, New Delhi.

GE7652 **TOTAL QUALITY MANAGEMENT** **L T P C**
3 0 0 3

AIM

- To provide comprehensive knowledge about the principles, practices, tools and techniques of Total quality management.

OBJECTIVES

- To understand the need for quality, its evolution, basic concepts, contribution of quality gurus, TQM framework, Barriers and Benefits of TQM.
- To understand the TQM Principles.
- To learn and apply the various tools and techniques of TQM.
- To understand 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--The 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 bench mark, Bench marking process, What to Bench Mark, Understanding Current Performance, Planning, Studying Others, Learning from the data, Using the findings, Pitfalls and Criticisms of Bench Marking – FMEA – Intent of FMEA, FMEA 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

OUTCOMES:

- Ability to apply TQM concepts in a selected enterprise.
- Ability to apply TQM principles in a selected enterprise.
- Ability to apply the various tools and techniques of TQM.
- Ability to apply QMS and EMS in any organization.

TEXT BOOK:

1. Dale H.Besterfiled, Carol B.Michna,Glen H. Besterfield,Mary B.Sacre,Hemant Urdhwareshe and Rashmi Urdhwareshe, “Total Quality Management”, Pearson Education Asia, Revised Third Edition, Indian Reprint, Sixth Impression,2013.

REFERENCES:

1. James R. Evans and William M. Lindsay, “The Management and Control of Quality”, (6th Edition), South-Western (Thomson Learning), 2005.
2. Oakland, J.S. “TQM – Text with Cases”, Butterworth – Heinemann Ltd., Oxford, Third Edition, 2003.
3. Suganthi,L and Anand Samuel, “Total Quality Management”, Prentice Hall (India) Pvt. Ltd., 2006 .
4. Janakiraman,B and Gopal, R.K, “Total Quality Management – Text and Cases”,Prentice Hall (India) Pvt. Ltd., 2006.

IE7071 HUMAN RESOURCE MANAGEMENT L T P C
3 0 0 3

OBJECTIVE:

- To introduce the basic principles of group dynamics and associated concepts required for Human resource management in organizations

UNIT I INDIVIDUAL BEHAVIOR 9

Personality –Types –Influencing Personality – Learning Process, Attribute – Perception – Motivation Theories

UNIT II GROUP BEHAVIOR 9

Group Organization, Group Dynamics, Emergence of Informal Leader, Leadership Styles-theories, Group decision making, Inter personal Relations, Communication -Team.

UNIT III DYNAMICS OF ORGANIZATIONAL BEHAVIOR 9

Organizational Climate, the Satisfactory – Organizational change – The Change Process and Change Management.

UNIT IV HUMAN RESOURCES PLANNING 9

Requirements of Human Resources – HR audit, Recruitment-Selection-Interviews

UNIT V HUMAN RESOURCES DEVELOPMENT 9

Employee Training-Career Development-Performance Appraisal- Compensation- safety and Health-Employee Relation-Management Development – Employee retention.

TOTAL : 45 PERIODS

OUTCOMES:

- To understand the process of effective Human Resource Management.

TEXT BOOK:

1. Stephen R. Robbins, “Organizational Behavior”, PHI, 1998.

REFERENCES:

1. David A. Decenzo & Stephen R. Robbins, “Personnel/Human Resources Management”,PHI, 1997.
2. Fred Lutherans, “Organizational Behavior”, Oxford University Press, 2000.

IE7072 METROLOGY AND INSPECTION L T P C
3 0 0 3

OBJECTIVE:

- To impart knowledge about linear and angular measuring Instruments.

UNIT I LINEAR MEASUREMENT AND ANGULAR MEASUREMENT 9

Accuracy, Precision, Readability, Sensitivity etc., Linear measuring instruments-vernier – micrometer-Gauge blocks- dial indicator-comparators – Angle standards – vernier bevel protector-sine bar – autocollimator.

UNIT II STANDARDS FOR LINEAR AND ANGULAR MEASUREMENTS 9

Shop floor standards and their calibration, light interference, Method of coincidence, Slip gauge calibration, Measurement errors, Limits, fits, Tolerance, Gauges, Gauge design.

UNIT III MEASUREMENT APPLICATION 9

Measurement of screw threads and gears – Radius measurement – surface finish measurement - Measurement of straightness-flatness-parallelism – squareness- roundness – circularity

UNIT IV MODERN CONCEPTS 9

Image processing and its application in Metrology, Co-ordinate measuring machine, Types of CMM, Probes used, Application, Non-contact CMM using Electro-optical sensors for dimensional metrology.

UNIT V INTRODUCTION TO MEASUREMENT SYSTEMS 9

System configuration, basic characteristics of measuring devices, Displacement, force and torque measurement, standards, Calibration, Sensors, Basic principles and concepts of temperature, Pressure and flow measurement, Destructive testing – Nondestructive testing.

TOTAL: 45 PERIODS

OUTCOMES:

The student must be able to

- Understanding the basic theoretical technical and legislative aspects of metrology and testing.
- Measure a variety of engineering parts using a variety of measuring techniques.
- Present and analyze measurement results obtained.
- Acquire capability to select right method of non-destructive testing.

TEXT BOOK:

1. Galyer J.F. and Shotbolt C.R, “Metrology for Engineers” ELBS, 1992.

REFERENCES:

1. Hune, K.J, “Engineering Metrology”, Kalyani Publishers, India, 1980.
2. Robinson, S.L. and Miller R.K, “Automated Inspection and Quality Assurance”, Marcel Dekker Inc.1989.
3. Stout, K. “Quality Control in Automation”, Prentice Hall, 1986.

IE7073 PROJECT MANAGEMENT L T P C

3 0 0 3

OBJECTIVES:

- To outline the need for Project Management
- To highlight different techniques of activity planning

UNIT I INTRODUCTION TO PROJECT MANAGEMENT AND PROJECT SELECTION 9

Objectives of Project Management- Importance of Project Management- Types of Projects- Project Management Life Cycle- Project Selection – Feasibility study: Types of feasibility- Steps in feasibility study.

UNIT II PROJECT PLANNING AND IMPLEMENTATION 9

Work break down structure- Estimate work packages – Identify task relationship – project schedule

UNIT III PROJECT MONITORING AND CONTROL 9

Resource aggregation - Resource leveling - limited resource allocation – project monitoring and control.

UNIT IV PROJECT CLOSURE 9

Process project audit – post project audit – normal project closure – premature closure – perpetual project - project closure process – Risk management.

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UNIT V SPECIAL TOPICS IN PROJECT MANAGEMENT 9

Project management for modern information system – critical success factors for IT project - software project selection and initiation - project management discipline – project overall planning

TOTAL : 45 PERIODS

OUTCOMES:

- Evaluate and select the most desirable projects.
- Apply appropriate approaches to plan a new project.
- Apply appropriate methodologies to develop a project schedule.
- Identify important risks facing a new project.

REFERENCES :

1. Arun Kanda, “Project Management A Life Cycle Approach”, Prentice Hall of India, 2011.
2. R.Panneerselvam and P.Senthilkumar, “Project Management”, Prentice Hall of India, 2009.
3. R.B.Khanna, “Project Management”, Prentice Hall of India, 2011.

IE7074 SAFETY ENGINEERING AND MANAGEMENT L T P C

3 0 0 3

OBJECTIVE:

- To impart knowledge on safety engineering fundamentals and safety management practices.

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

- Identify and prevent chemical, environmental mechanical, fire hazard
- Collect, analyze and interpret the accidents data based on various safety techniques.
- Apply proper safety techniques on safety engineering and management
- Design the system with environmental consciousness by implementing safety regulation

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REFERENCES:

1. John V.Grimaldi, “Safety Management”, AITB S Publishers, 2003.
2. Safety Manual, “EDEL Engineering Consultancy”, 2000.
3. David L.Goetsch, “Occupational Safety and Health for Technologists”, Engineers and Managers, Pearson Education Ltd. 5th Edition, 2005.

IT7071 DIGITAL IMAGE PROCESSING L T P C
3 0 0 3

OBJECTIVES:

- To learn about the basic concepts of digital image processing and various image transforms.
- To familiarize the student with the image enhancement techniques
- To expose the student to a broad range of image processing techniques and their applications.
- To appreciate the use of current technologies those are specific to image processing systems.
- To expose the students to real-world applications of image processing.

UNIT I FUNDAMENTALS OF IMAGE PROCESSING 9

Introduction – Applications of Image Processing - Steps in image processing Applications - Digital imaging system- Sampling and Quantization - Pixel connectivity – Distance measures - Color fundamentals and models - File Formats, Image operations.

UNIT II IMAGE ENHANCEMENT AND IMAGE RESTORATION 9

Image Transforms: Fast Fourier Transform and Discrete Fourier Transform. Image Enhancement in Spatial and Frequency domain - Gray level transformations - Histogram processing - Spatial filtering - Smoothing and sharpening - Frequency domain: Filtering in frequency domain. Image Restoration - Image degradation model - Noise modeling – Blur – Order statistic filters – Image restoration algorithms.

UNIT III MULTI RESOLUTION ANALYSIS AND COMPRESSION 9

Multi Resolution analysis: Image pyramids - Multi resolution expansion - Wavelet transforms Image compression : Fundamentals - Models - Elements of information theory - Error free compression - Lossy compression - Compression standards

UNIT IV IMAGE SEGMENTATION AND FEATURE EXTRACTION 9

Image Segmentation - Detection of discontinuities - Edge operators - Edge linking and boundary Detection - Thresholding - Region based segmentation. Image Features and Extraction – Image Features – Types of Features – Feature extraction - Texture - Feature reduction algorithms – PCA – Feature Description.

UNIT V IMAGE CLASSIFICATION AND APPLICATIONS OF IMAGE PROCESSING 9

Image classifiers – Bayesian Classification, nearest neighborhood algorithms - Support Vector Machines - Image Clustering Algorithms – Hierarchical and Partitional clustering algorithms. Case Studies in Image Security - Steganography and Digital watermarking - Visual effects and Digital compositing - Case studies in Medical Imaging and remote sensing.

TOTAL: 45 PERIODS

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OUTCOMES:

On Completion of the course, the students should be able to:

- Implement basic image processing algorithms
- Design an application that uses different concepts of Image Processing
- Apply and develop new techniques in the areas of image enhancement- restoration-segmentation- compression-wavelet processing and image morphology.
- Critically analyze different approaches to different modules of Image Processing.

TEXT BOOKS:

1. Rafael C.Gonzalez and Richard E.Woods, "Digital Image Processing", Third Edition, Pearson Education, 2009.
2. S.Sridhar, "Digital Image Processing", Oxford University Press, 2011.

REFERENCES:

1. Milan Sonka, Vaclav Hlavac and Roger Boyle, "Image Processing, Analysis and Machine Vision", Second Edition, Thompson Learning, 2007.
2. Anil K.Jain, "Fundamentals of Digital Image Processing", PHI, 2011.
3. Sanjit K. Mitra, & Giovanni L. Sicuranza, "Non Linear Image Processing", Elsevier, 2007.

ME 7076	ENERGY CONSERVATION IN INDUSTRIES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand and analyse the energy data of industries.
- To carryout energy accounting and balancing.
- To conduct energy audit and suggest methodologies for energy savings.
- To utilise the available resources in optimal ways.

UNIT I INTRODUCTION **9**

Energy - Power – Present scenario of World / Nation: Environmental aspects of Energy Generation – Energy Auditing: Need, Types, Methodology and Barriers. Role of Energy Managers. Basic instruments for Energy Auditing.

UNIT II ECONOMICS **9**

Energy / Cost index diagram – Energy Economics – Cost of production – Economic evaluation techniques – Return on investment, Payback Period, Internal Rate of Return, Net Present Value, Life Cycle Costing – ESCO concept

UNIT III ELECTRICAL SYSTEMS **9**

TANGEDCO Billing – HT and LT supply - Transformers - Efficiency - Power Factor - Harmonics, Electric Motors - Motor Efficiency Computation, Energy Efficient Motors, Illumination – Lux, Lumens, Types of lighting, Efficacy, LED Lighting and scope of Encon in Illumination.

UNIT IV THERMAL SYSTEMS **9**

Stoichiometry, Combustion principles, Boilers, Furnaces and Thermic Fluid Heaters – Efficiency Computation and Encon Measures - Steam Traps - Cogeneration - Waste heat recovery devices.

UNIT V ENERGY CONSERVATION IN MAJOR UTILITIES **9**

Pumps, Fans, Blowers, Compressed Air Systems, Refrigeration and Air Conditioning Systems - Cooling Towers – D.G. sets

TOTAL:45 PERIODS

OUTCOMES:

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

- Analyse the energy data of industries.
- Carry out energy accounting and balancing.
- Suggest methodologies for energy savings.

TEXT BOOK:

1. Guide book for National Certification Examination for “Energy Managers and Energy Auditors” (4 Volumes). Available at www.beeindia.in

REFERENCES:

1. L.C. Witte, P.S. Schmidt, D.R. Brown, “Industrial Energy Management and Utilisation” HemispherePubl, Washington, 1988.
2. Guide book for National Certification Examination for” Energy Managers and Energy Auditors” (4 Volumes). Available at www.beeindia.in
3. Callaghn, P.W. “Design and Management for Energy Conservation”, Pergamon Press, Oxford, 1981.
4. I.G.C. Dryden, “The Efficient Use of Energy” Butterworths, London, 1982
5. W.C. Turner, “Energy Management Hand book” Wiley, New York, 1982.
6. W.R. Murphy and G. Mc KAY “Energy Management” Butterworths, London 1987.

ME7077 ENTREPRENEURSHIP DEVELOPMENT L T P C
3 0 0 3

OBJECTIVES:

- The students will be provided with an understanding of the scope of an entrepreneur, key areas of development, financial assistance by the institutions, methods of taxation and tax benefits, etc.

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 – Financial Institutions – 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 Policy, Support. Institutional Support to Entrepreneurs: Need and Support – Taxation Benefits to Small Scale Industry: Need, Depreciation, Rehabilitation, Investment.

TOTAL : 45 PERIODS

OUTCOME:

- Upon completion of the course, the students will be able to gain knowledge and skills needed to run a business successfully.

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. Hisrich R D and Peters M P, "Entrepreneurship" 5th Edition Tata McGraw-Hill, 2002.
2. Mathew J Manimala," Entrepreneurship theory at cross roads: paradigms and praxis" Dream tech, 2nd edition 2006.
3. Rabindra N. Kanungo, "Entrepreneurship and innovation", Sage Publications, New Delhi, 1998.

ME 7078 INTRODUCTION TO OPERATIONS RESEARCH

L	T	P	C
3	0	0	3

OBJECTIVE:

- To introduce the concepts in optimization of resources for manufacturing and service based industries.

UNIT I LINEAR PROGRAMMING PROBLEMS 9

OR-Definition - Phases - models, LP problems formulation – Graphical solution, GLPP, Standard and Canonical forms of LPP- simplex methods- Big M, Two phase methods, Alternate optimal solutions, Duality in LP.

UNIT II TRANSPORTATION 9

Transportation problems- Basic feasible solution, Optimal solution By MODI method, Balanced and Unbalanced TP, Degeneracy, Production problems. Assignment problems – Hungarian method Traveling salesman problems - Sequencing models- Johnson algorithm, n job 2 machines, n job 3 machines and n job m machines.

UNIT III INVENTORY CONTROL 9

Types of inventory- Inventory cost - EOQ - Deterministic inventory problems – Purchase and Production models with and without shortages-EOQ with price breaks - Stochastic inventory problems - Multi product problems - Systems of inventory control (P and Q Systems)- Determination of buffer stock and re-order levels -Selective inventory control techniques (ABC, VED, SDE, etc.)

UNIT IV QUEUING THEORY 9

Queuing system - Characteristics - symbols - Poisson process and exponential distribution -Single server queuing models - Multiserver queuing models, Simulation Monte Carlo technique- Inventory & Queuing problems.

Attested

DIRECTOR
Centre For Academic Courses
Anna University, Chennai-600 025.

UNIT V PROJECT MANAGEMENT AND REPLACEMENT MODELS 9

Project management: Network logic – Ford-Fulkerson's rule - AON diagram - CPM and PERT techniques, Critical path and float calculations Replacement models -types of failures – Gradual failures-replacement of items: Efficiency deteriorates with time, sudden failures- individual and group replacement policies.

TOTAL:45 PERIODS

OUTCOME:

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

- Understand and apply the operations research techniques in industrial operations.

TEXT BOOKS:

1. Wayne.L.Winston, "Operations research applications and algorithms", 4th edition, 2007,Thomson learning.
2. Hamdy ATaha, "Operations research an introduction", 9th edition 2011, PHI/Pearson education.

REFERENCES:

1. G.Srinivasan, "Operations research principles and applications", 2nd edition EEE 2010, PHI.
2. R.Pannerselvam, "Operations research", 2nd edition 2009, PHI
3. Frederick. S. Hiller and Gerald.J.Lieberman, "Operations research concepts and cases", 8th edition (SIE) 2008,TMH.
4. Ravindran, Phillips and Solberg, "Operations research principles and practice", 2nd edition 2007, Wiley India.
5. J.K.Sharma, "Operations research theory and applications",5Th edition 2013, Macmillan India.
6. Prem kumar Gupta and D.S.Hira, "Problems in Operations research",2009 S.Chand.

ME 7079 LEAN SIX SIGMA

L	T	P	C
3	0	0	3

OBJECTIVE:

- To impart the knowledge of tools & techniques used in lean manufacturing and six sigma.

UNIT I EVOLUTION AND OVERVIEW OF LEAN MANUFACTURING 9

Evolution of Mass production, Traditional versus Mass production, Evolution of Toyota (Lean) Production System, Business Dynamics of Lean production, Principles of Lean production – Value, Value stream, Flow, Pull, Perfection.

UNIT II LEAN MANUFACTURING – TOOLS AND TECHNIQUES 9

3Ms – Muda, Mura, Muri, 7 Wastes in Manufacturing, Lean Tools to eliminate Muda - 5S, Standardised work, TPM, SMED, Jidoka – Poka Yoke, JIT, Heijunka, Kanban, One piece production.

UNIT III VALUE STREAM MAPPING 9

Need for Value Stream mapping; Steps involved in Value stream mapping – Choose value stream – PQ and PR analysis, Current State map, Lean Metrics, Future State Map, Kaizen plans; Lean implementation - Cultural change, Lean in the Supply chain.

UNIT IV SIX SIGMA – TOOLS AND TECHNIQUES 9

Cost of Quality – Conformance and Non-Conformance cost, 7 Basic Quality Control Tools, Seven Management tools, FMEA.

UNIT V SIX SIGMA METHODOLOGY 9

Need for Six Sigma, Six Sigma Team, DMAIC Methodology - Define, Measure, Analyse, Improve and Control; Lean Six Sigma.

TOTAL:45 PERIODS

OUTCOME:

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

- Apply the various tools, techniques and methodology of lean manufacturing and six sigma concepts to the potential quality gaps in manufacturing / production industries.

TEXT BOOKS:

1. Pascal Dennis, "Lean production Simplified: A plain language guide to the world's most powerful Production system", Productivity Press 2007
2. Issa Bass and Barbara Lawton, "Lean Six Sigma using Sigma XL and Minitab", Tata McGraw Hill 2010.

REFERENCES:

1. Yasuhiro Monden, Toyota Production System: "An Integrated approach to Just-in-Time", CRC Press 2012
2. Taiichi Ohno, Toyota "Production System: Beyond Large-Scale Production", Productivity Press 1988
3. Mike Rother and Rother Shook, "Learning to See: Value-Stream Mapping to Create Value and Eliminate" Muda, The Lean Enterprise Institute 2003
4. James Womack, Daniel T. Jones, and Daniel Roos, "The Machine that changed the world", Free Press 1990
5. James Womack and Daniel T. Jones, "Lean Thinking: Banish waste and create wealth in your organization", Free Press 2003.
6. Donna C. S. Summers, "Six sigma: Basic tools and techniques", Pearson / Prentice Hall 2007.

ME7080 MARKETING MANAGEMENT

L	T	P	C
3	0	0	3

OBJECTIVE:

- To expose the students to newer concepts of marketing principles like strategic marketing concepts, segmentation, pricing, advertisement and strategic formulation.

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 Grids.

Attested

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UNIT V ADVERTISING, SALES PROMOTION & 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:45 PERIODS

OUTCOME:

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

- Understand the philosophies of marketing and should able to formulate market planning, strategies and could promote sales in effective manner**.**

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

ME7083 SUSTAINABLE AND GREEN MANUFACTURING L T P C
3 0 0 3

OBJECTIVES:

- To inculcate the knowledge of sustainability in manufacturing.
- To learn the basis involved in Green manufacturing, recycling and life cycle assessment.

UNIT I INTRODUCTION TO SUSTAINABLE MANUFACTURING 9

Sustainable Manufacturing - Concept of Triple bottom line, Environmental, Economic and Social Dimensions of Sustainability, Sustainable Product Development – Various Phases.

UNIT II EVALUATING SUSTAINABILITY 9

Sustainability performance evaluators- Frameworks and techniques - environmental management systems - life cycle assessment - strategic and environmental impact assessments - carbon and water foot-printing.

UNIT III MANUFACTURING STRATEGY FOR SUSTAINABILITY 9

Concepts of Competitive Strategy and Manufacturing Strategies and development of a strategic improvement programme - Manufacturing strategy in business success Strategy formation and formulation - Structured strategy formulation - Sustainable manufacturing system design options - Approaches to strategy formulation - Realization of new strategies/system designs.

UNIT IV GREEN MANUFACTURING 9

Green manufacturing- Definition, motivation and barriers to green manufacturing- Environmental impact of manufacturing- Waste generation- Energy consumption- Strategies for green manufacturing – Green manufacturing by design – Life cycle assessment.

UNIT V RECYCLING **9**

Reclamation and recycling of waste- Recycling as Universal resource policy- Innovation towards environmental sustainability – systematic framework for conscious design- International green manufacturing standards and compliance.

TOTAL:45 PERIODS

OUTCOME:

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

- Formulate strategy for sustainable manufacturing, implement green manufacturing, follow environmental norms in manufacturing and perform lifecycle assessment.

TEXT BOOKS:

1. Davim, J.P., "Sustainable Manufacturing", John Wiley & Sons, 2010.
2. Dornfield David, "Green Manufacturing", Springer, 2012.

REFERENCES:

1. Seliger, G ,"Sustainable Manufacturing: Shaping Global Value Creation", Springer, 2012.
2. Jovane, F., Ęmper, W.E. and Williams, D. J., "The ManuFuture Road: Towards Competitive and Sustainable High-Adding-Value Manufacturing", Springer, 2009.
3. Kutz, M.," Environmentally Conscious Mechanical Design", John Wiley & Sons, 2007.
4. G. Atkinson, S. Dietz, E. Neumayer, —Handbook of Sustainable Manufacturing‖. Edward Elgar Publishing Limited, 2007
5. Christian N. Madu "Handbook of environmentally conscious manufacturing" London : Kluwer Academic Publishers, 2001.
6. Joseph Sarkis "Greener manufacturing and operations: from design to delivery and back" Greenleaf Pub., 2001
7. Davim.J.Pauls, "Green Manufacturing Processes and Systems", Springer, 2013

MF7075 INDUSTRIAL ROBOTICS **L T P C**
3 0 0 3

OBJECTIVES:

- To understand the functions of the basic components of a Robot.
- To study the use of various types of End of Effectors and Sensors.
- To impart knowledge in Robot Kinematics and Programming.
- To learn Robot safety issues and economics.

UNIT I FUNDAMENTALS OF ROBOT **9**

Robot - Definition - Laws of Robot- Robot Anatomy - Co ordinate Systems, Work Envelope, Types and Classification-Specifications - Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load - Robot Parts and their Functions - Need for Robots-Different Applications - Material Handling, Processing and Assembly.

UNIT II ROBOT DRIVE SYSTEMS AND END EFFECTORS **9**

Pneumatic Drives - Hydraulic Drives - Mechanical Drives - Electrical Drives - Stepper Motors, Servo Motors - Salient Features, Applications and Comparison of all these drives. End Effectors - Grippers - Mechanical Grippers, Pneumatic and Hydraulic - Grippers, Magnetic Grippers, Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations.

UNIT III SENSORS AND MACHINE VISION 9

Requirements of a sensor, Principles and Applications of various types of sensors - contact sensors - touch sensors, position & displacement sensors - potentiometers, encoders, LVDT, pneumatic sensors, force & torque sensors, wrist sensors, joint sensors, tactile array sensors, slip sensors for robot grippers, Proximity & Range sensors, optical sensors, Electro-optical imaging sensors. Machine vision - Camera, Frame Grabber, Sensing and Digitizing Image Data-Signal Conversion, Image Storage, Lighting Techniques, Image Processing and Analysis-Data Reduction, Segmentation, Feature Extraction, Object Recognition.

UNIT IV ROBOT KINEMATICS 9

Forward Kinematics and Inverse Kinematics, Forward Kinematics and Reverse Kinematics of manipulators with Two, Three Degrees of Freedom (in 2 & 3 Dimension), Co-ordinate reference frame, Velocity and Forces - Manipulator Dynamics, Trajectory Generator, Manipulator Mechanism Design - Derivations and problems.

UNIT V ROBOT PROGRAMMING AND ROBOT ECONOMICS 9

Lead through Programming, Robot programming Languages-VAL Programming-Motion Commands, Sensor Commands, End Effectors commands and simple Programs. RGV, AGV: Implementation of Robots in Industries - Various Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

TOTAL: 45 PERIODS

OUTCOMES:

- Upon completion of this course, the students can able to apply the basic engineering knowledge for the design of robotics.

TEXT BOOKS:

1. Klafter R.D., Chmielewski T.A and Negin M., “Robotic Engineering - An Integrated Approach”, Prentice Hall, 2010.
2. Groover M.P., “Industrial Robotics(SIE): Technology, Programming and Applications”, McGraw Hill, 2012.

REFERENCES:

1. Craig J.J., “Introduction to Robotics Mechanics and Control”, Pearson Education, 2008.
2. Deb S.R., “Robotics Technology and Flexible Automation” Tata Mc Graw Hill Book Co., 2010.
3. Koren Y., “Robotics for Engineers’, Mc Graw Hill Book Co., 1992.
4. Fu.K.S.,Gonzalz R.C. and Lee C.S.G., “Robotics Control, Sensing, Vision and Intelligence”, McGraw Hill Book Co., 1987.

MF7076 NANOTECHNOLOGY L T P C
3 0 0 3

OBJECTIVES:

At the end of this course the students are expected to understand the general issues relating to nanotechnology and nanofabrication.

- Methods for production of Nanomaterials.
- Characteristic techniques of Nanomaterials.

UNIT I INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY 9

History, background scope and interdisciplinary nature of nanoscience and nanotechnology, scientific revolutions. Definition of Nanometer, Nanomaterials, and Nanotechnology. Concepts of nanotechnology - size dependent phenomena, surface to volume ratio, atomic structure, molecules and phases, energy at the nanoscale molecular and atomic size.

UNIT II SYNTHESIS NANOMATERIALS AND PROCESSING OF NANOMATERIALS BY PHYSICAL METHODS 9

Introduction: Importance of Synthesis and Processing techniques, nanofabrication, Bottom-Up versus Top Down; Top-down approach with examples. Stability and dispersion of Nanoparticles, Surface modification of inorganic nanoparticles by organic functional groups Physical Methods: Ball milling synthesis, Arc discharge, RF-plasma, Plasma arch technique, Inert gas condensation, electric explosion of wires, Ion sputtering method, Laser pyrolysis, Molecular beam epitaxy and electrodeposition. Electro spinning, Physical vapor Deposition (PVD) - Chemcial vapour Deposition (CVD) - Atomic layer Deposition (ALD) - Self Assembly - LB (Langmuir-Blodgett) technique.

UNIT III PROCESSING OF NANOMATERIALS BY CHEMICAL METHODS 9

Chemical precipitation methods - co-precipitation, arrested precipitation, sol - gel method, chemical reduction, photochemical synthesis, electrochemical synthesis, Microemulsions or reverse micelles, Sonochemical synthesis, Hydrothermal, solvothermal, supercritical fluid process, solution combustion process,4 spray pyrolysis method, flame spray pyrolysis, gas phase synthesis, gas condensation process, chemical vapor condensation. Fundamental aspects of VLS (Vapor-Liquid-Solid) and SLS (SolutionLiquid-Solid) processes - VLS growth of Nanowires - Control of the size of the nanowires - Precursors and catalysts - SLS growth - Stress induced recrystallization.

UNIT IV LITHOGRAPHY 9

Nanomanipulation and Nano lithography - Soft Lithography - Electron beam lithography, SEM based nanolithography, AFM based nanolithography, Ion beam lithography - Oxidation and metallization - Mask and its application - Deep UV lithography, X-ray based Lithography, Dip pen lithography. Self-assembly of Nanoparticles and Nanowires.

UNIT V CHARACTERISATION OF NANOMATERIALS 9

Scanning Probe Microscopy (SPM) – Scanning tunneling microscope, Transmission electron microscope, Scanning transmission electron microscope, Atomic force microscope, Scanning force microscopy, Electrostatic force microscopy , Dynamic force microscopy, Magnetic force microscopy, Scanning thermal microscopy, Peizo force microscopy, scanning capacitance microscopy, Nano indentation - Issues in characterization of nanomaterials.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of this course

- The student will be able to produce nanomaterials using various techniques.
- Use this knowledge to characterize nanomaterials.
- Use this knowledge to fabricate nano-scaled products.

TEXT BOOKS:

1. Guozhong Cao, “Nanostructures and Nanomaterials, synthesis, properties and applications”, Imperial College Press, 2004.
2. M.S. Ramachandra Rao, Shubra Singh, Nanoscience and Nanotechnology: fundamentals to Frontiers, Wiley 2013.
3. Charles P. Poole Jr. and Franks. J. Qwens, "Introduction to Nanotechnology" Wiley publications.

REFERENCES:

1. Nanomaterials – A. K. Bandyopadhyay, New Age International Publishers, 2nd Edition,2010.
2. T. Pradeep , “NANO The Essential , understanding Nanoscience and Nanotechnology”. Tata McGrawHill Publishing Company Limited, 2007.
3. C.A. Mirkin and C.M. Niemeyer, Nanobiotechnology- II, More Concepts and Applications, WILEY-VCH, Verlag Gmb H&Co, 2007.
4. David G. Bucknall. Nanolithography and patterning techniques in microelectronics, CRC

Press.
5. Hari Singh Nalwa - Encyclopedia of Nanotechnology.
6. Processing & properties of structural Naonmaterials by Leon L. Shaw (editor).
7. Chemistry of Nanomaterials : Synthesis, properties and applications by CNR Rao et.al.
8. Nanochemistry: A chemical approach to Nanomaterials Roayal Society of Chemistry, Ozin and Arsenault, Cambridge UK 2005.
9. Nanoparticles: From Theory to Applications, G.Schmidt, Wiley Weinheim 2004.

MF7077 TOTAL PRODUCTIVE MAINTENANCE L T P C
3 0 0 3

OBJECTIVE:

- To teach the students basic concepts of Total Productive Maintenance. Expose the students to the objectives, maintenance models, group activities, logistics, condition monitoring and implementation of Total Productive Maintenance.

UNIT I MAINTENANCE CONCEPTS 9

Introduction - Objectives and functions – Productivity, Quality, Reliability and Maintainability (PQRM) - Terotechnology - Reliability Centered Maintenance - Predictive Maintenance - Condition Based Maintenance - maintainability prediction - availability and system effectiveness- maintenance costs - maintenance organization.

UNIT II MAINTENANCE MODELS 9

Minimal repair - As Good As New policy - maintenance types - balancing PM and breakdown maintenance - PM schedules: deviations on both sides of target values - PM schedules: functional characteristics - replacement models.

UNIT III TOTAL PRODUCTIVE MAINTENANCE 9

Zero breakdowns - Zero Defects and TPM - maximizing equipment effectiveness – Autonomous maintenance program - five pillars of TPM - TPM small group activities - TPM organization - Management Decision - Educational campaign - Creation of Organizations - Establishment of basic policies and goals - Formation of master plan - TPM implementation.

UNIT IV MAINTENANCE LOGISTICS 9

Human factors in maintenance - maintenance manuals - maintenance staffing methods - queuing applications - simulation - spare parts management - maintenance planning and scheduling.

UNIT V ONLINE MONITORING 9

Condition monitoring - Infrared Thermography, Oil Analysis, acoustic emissions testing, Motor Current Analysis, Vibration Measurement and Analysis, Wear Debris Monitoring, Visual checks - corrosion control - Maintenance Management Information System - Expert system applications.

TOTAL: 45 PERIODS

OUTCOMES:

- Implementation the concept of total productive maintenance to the industries.
- Effectively use the total productive maintenance for online monitoring of processes.

TEXT BOOKS :

1. Nakajima S., “Introduction to TPM”, Productivity Press, Chennai, 1992.
2. Srivastava S.K., “Maintenance Engineering (Pri.Practices & Management)”, S. Chand Group, 2011.

REFERENCES :

1. Wireman T., “Total Productive Maintenance”, Industrial Press Inc., New york, 2004.
2. Goto F., “Equipment planning for TPM Maintenance Prevention Design”, Productivity Press, 1992.
3. Shirose K., “Total Productive Maintenance for Workshop Leaders”, Productivity Press, 1992.
4. Shirose K., “TPM for Operators”, Productivity Press, 1996.
5. Suzuki T., “New Directions for TPM”, Productivity Press, 1993.
6. Kelly A., “Maintenance planning and control”, Butterworths, London, 1991.

PT7001 3D PRINTING L T P C
3 0 0 3

OBJECTIVES:

- To impart knowledge on principles of 3D printing techniques
- To understand 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 – Colorjet.

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:

- Comprehend 3D printing workflow
- Compare the different types of 3D Printing techniques
- Select appropriate method for designing and modeling applications

TEXT BOOKS:

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

REFERENCES:

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

PT7002 ADVERTISING TECHNIQUES L T P C
3 0 0 3

OBJECTIVES:

- To understand the concepts of Advertising and the role of the media
- To learn about advertising production and business in detail

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 Radio, 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, variable data advertising, planning and execution of campaign, evaluation of the campaign.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Analyze the importance of advertising.
- Analyze the functioning of an advertising agency
- To use the advertising production knowledge to create advertisements
- Develop media planning and campaigning solutions.

TEXT BOOKS:

1. Sudhir Dawra, "Advertising and Sales Management", Mohit Publications, 2014
2. Nick Couldry, Media, Society, World: Social Theory and Digital Media Practice, Wadsworth Publishing, 2015.

REFERENCES:

1. Wells, Burnett and Moriarty, Advertising; Principles & Practice, Prentice Hall Inc., 2002.
2. Maurice I.Mandell, Advertising, Prentice Hall Inc., 1999
3. David A.Aaker, Rajeev Batra, John G.Myers, Advertising Management, Prentice Hall Inc., 1999.
4. Leon G.Schiffman and Leslie Lajar Konar, Consumer Behaviour, Prentice Hall Inc., 1996.
5. Loudon, Della Bitta, Consumer Behaviour concepts and Application, McGraw Hill, 1996.

PT7003 BOOK PUBLISHING L T P C
3 0 0 3

OBJECTIVE:

- To impart knowledge on areas of publishing, editorial process, production management, distribution methods and legal aspects involved in book publishing.

UNIT I PUBLISHING ORGANISATION 8

Areas of publishing – General publishing, Educational publishing, Professional publishing, Reference publishing, Publishing textbooks 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 10

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 will be able to:

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

PT7004 COLOUR MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

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

- Understand the variables in colour reproduction workflow.
- Learn the fundamentals of colour management system.
- Resolve issues in colour workflows

UNIT I COLOUR MANAGEMENT 9

Need for color management, Device characteristics, Cosed and Open loop color control, International color consortium – standards, profiles, profile types; Color Management - Components, steps, workflow; Color measurement devices - types, calibration, accuracy; Viewing conditions.

UNIT II PRESS STANDARDISATION 9

Variables in printing process, Test forms, Press standardization, Optimization - gravure, flexo, offset, Screen, Digital; ISO standards, GraCOL.

UNIT III CREATION OF PROFILES 9

Profile structure, Lookup table construction, Test targets, Profiling softwares, Calibration and characterization of scanner, digital camera, monitor, Press and Proofer; Profile quality evaluation; Profile editing.

UNIT IV CONVERSION 9

CMM - function, static, dynamic; Gamut boundaries, Gamut mapping – influencing factors, algorithms, Rendering Intent; Color Appearance Models

UNIT V WORKFLOW 9

Color management features - Operating System, Graphic software applications, PDF, RIP; Intermediate color spaces; Color Management workflows – RGB workflow, CMYK workflow, embedded workflow, assumed workflow, Internet workflow, Remote proofing, Hardcopy proofing; Color servers, Device link profiles;

TOTAL: 45 PERIODS

OUTCOMES:

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

- Construct profiles for display, input and output devices.
- Apply appropriate color management settings in pre-press.
- Reproduce and match colour across various devices and software applications
- Analyze advanced concepts in colour management

TEXT BOOKS:

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

REFERENCES:

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

PT7005 DIGITAL DATA HANDLING L T P C
3 0 0 3

OBJECTIVES:

- To impart knowledge on the workflow of digital prepress production and its suitable file formats.
- To provide exposure to the basic concepts of networking, database management and security issues.

UNIT I WORKFLOW OF DIGITALIZED PRE-PRESS 9

Conventional Pre-press workflow Vs Digitalized Pre-press workflow; Image acquisition; Software used – Processing: Text, Images, Graphics, File preparation, Normalization, Page layout preparation, Preflighting, Imposition, Optimization, preRIP, postRIP, OPI, Trapping, Postscript, PDF; CIP4 – JDF, JMF.

UNIT II NETWORKING 9

Data transmission fundamentals, Communication media, Data interfaces; Concepts and principles of computer networks, PAN, LAN, WAN, MAN, Cloud; Network topologies; Network protocols – FTP, TCP/IP; Network node components – Hubs, Bridges, Routers, Gateways, Switches; Internet – principles, Client/Server model.

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, Wavelet, Fractal image encoding; Image quality evaluation.

UNIT IV DATABASE MANAGEMENT 9

Database - Types, Database management, Database languages, Query processing, Data storage, Backup & Recovery, Distributed databases, Cloud databases, Data warehousing, Data mining; Security issues, Access control; Digital Asset Management.

UNIT V SECURITY ASPECTS 9

Security in operating systems, Principles of network security, Security standards, Cryptography, 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:

- Identify individual steps involved in digital prepress production workflow
- Choose suitable file format for images based on publishing mode
- Apply knowledge of networking, security and database management in digital data handling

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. Mani Subramanian, Network Management: Principles & Practice, Pearson Education India, 2010
2. SanjivPurba, Handbook of Data Management, Viva Books Private Ltd., 1999
3. Douglas E. Comer, Computer Networks and Internets, 2nd Edition, Pearson Education, 2009
4. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2011
5. Charles P. Pfleeger, Shari Lawrence Pfleeger, Security in Computing, Fourth Edition, Pearson Hall, 2006

PT7006 DIGITAL MEDIA MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

- To understand the basic concepts of managing digital content.
- To learn the various content protection techniques of digital media.

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:

- Comprehend the principles of digital media dissemination and distribution process.
- Apply the concepts of Content Management System and intellectual property rights for digital content.
- 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
2. William R. Davie, Jim Upshaw, Principles of Electronic Media, Pearson/Allyn and Bacon, 2006.
3. Wenjun Zeng, Heather Yu, Ching-Yung Lin, Multimedia Security Technologies for Digital Rights management, Academic Press, 2006.
4. Bill Rosenblatt, Bill Trippe and Stephen Mooney, Digital Rights Management - Business and Technology, Wiley, 2002.

PT7007 DIGITAL PRINTING L T P C
3 0 0 3

OBJECTIVES:

- To understand the components of digital workflow
- To impart knowledge on digital printing techniques

UNIT I DIGITAL DATA HANDLING 9

File formats – EPS, JPEG, GIF, TIFF, PNG, PDF, Comparison of file formats, Overview of Compression techniques - Lossy& lossless compression; Image quality evaluation; Content Management Systems - DBMS, Data Warehousing, Cloud based systems; Computer networks - Principle, types, components, security.

UNIT II DIGITAL PRINTING WORKFLOW 9

Digital Printing - Principle, Features, Applications; Data Preparation - Layout components & compatibility, Trapping; Postscript, PDF - standards, features; Workflow - Data Preflight, PDF/X Creation and Output, Colour Management, Proofing, Digital Screening, Ripping, CIP4, JDF;

UNIT III COMPUTER TO PRESS/DIRECT IMAGING 9

Direct imaging - principle, features, applications; Once Imageable Masters - Principle, types, Press configurations; Re-imagable Masters - Principle, types, Press configurations;.

UNIT IV DIGITAL PRINT TECHNOLOGIES 9

Inkjet presses - Principle, types, press configuration, ink types, ink properties; Electrophotographic - Principle, Imaging Systems, Inking Unit, Fixing and Cleaning, Toner types, toner properties; Thermography - Direct Thermography, Thermal Sublimation Printing Systems, Thermal Transfer Printing Systems;

UNIT V APPLICATION AND ADVANCES 9

Proofing, VDP (variable data printing), POD (print on demand), Inline post press and finishing operations, Size factor considerations, Costing of digital print jobs, Wastages, Toner recycling, Substrate variety and limitations, Quality Standards, Setup of a digital print house, Case study

TOTAL: 45 PERIODS

OUTCOMES:

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

- Select suitable digital printing technique and finishing process for print jobs
- Analyze different types of digital presses
- Able to develop standardized PDF documents

TEXT BOOKS:

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

REFERENCE:

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

PT7008	DISPLAY AND SIGNAGE PRINTING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the types of print products for display and signage industry.
- To learn about the substrates and printing technologies 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, Passes, Colors; 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;

TOTAL: 45 PERIODS

OUTCOMES:

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

- Identify the requirements of printed products for signage industry
- Select suitable substrate, printing technology and conversion process.
- Analyze the various applications of display and signage in day-to-day use

TEXT BOOKS:

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

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

PT7009 MASS COMMUNICATION L T P C

3 0 0 3

OBJECTIVES:

- To understand the concepts of verbal and non-verbal communication
- To understand the concepts of broadcast and print journalism

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, etc. 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:

- Develop content for different media
- Analyze the functionary of Radio and Television Media
- Use the various tools and techniques for audio visual communication

TEXT BOOKS

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

REFERENCES:

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

PT7010 NEWSPAPER AND PERIODICAL PUBLISHING L T P C
3 0 0 3

OBJECTIVES:

- To provide a detailed knowledge on the operations of newspaper and magazine companies.
- To impart knowledge on editorial process, production workflows and the 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 will be able to:

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

TEXT BOOKS

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

REFERENCES

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

PT7011 PHYSICS FOR PRINTING TECHNOLOGY L T P C
3 0 0 3

OBJECTIVE:

- The objective of this course is to introduce the essential principles of physics for printing technology applications.

UNIT I SURFACE TENSION 9

Surface tension - angle of contact - pressure difference across a liquid surface - excess pressure inside a liquid drop - shape of a liquid surface in a capillary tube - determination of surface tension by capillary tube method - bubble pressure method - Jaeger's method - effect of temperature - examples of surface tension - dynamic surface tension - surfactants - tensiometer.

UNIT II VISCOSITY 9

Viscosity and coefficient of viscosity - streamline and turbulent flow - Reynold's number - Poiseuille's equation - Stoke's law and terminal velocity - experimental determination of n - Basic viscoelasticity - effect of temperature - measurement - viscoelastic flow - Newtonian and non-Newtonian fluids. Basic physical principles of ink-jet printer - ink droplet - ink gun (principles).

UNIT III MAGNETIC/OPTICAL DATA STORAGE TECHNIQUES 9

Introduction - magnetic material parameters - magnetic disk memories - optical data storage - phase change recording - magneto-optical data storage - Hi-tech involved in system development - capacity of CD in normal use - advantages of CD - holographic storage - construction of a hologram - reconstruction of a hologram - photorefractive storage.

UNIT IV OPTOELECTRONICS AND DISPLAY DEVICES 9

Analog and digital modulation - electro optic modulators - magneto optic devices - optical switching and logic devices. Photoluminescence, cathode luminescence, electroluminescence, injection luminescence - plasma displays - organic LEDs - liquid crystals and LCD construction and working - photo detectors - junction photodiode - barcode generation - barcode reader.

UNIT V OPTICAL IMAGE PROCESSING 9

Introduction to Fourier optics - Fourier transforming properties of lenses - analog optical information processing - Abbe-Porter experiment - optical filters - optical spatial light modulators - conversion of incoherent image into coherent image basics of digital image processing.

TOTAL : 45 PERIODS

OUTCOME:

- The students will have knowledge on the basics of physics related to properties of surface tension, viscosity, optical image processing etc. and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications.

REFERENCES:

1. Mathur, D.S. “Properties of Matter”, S. Chand & Co. Ltd., (2007).
2. Gaur, R.K. and Gupta, S.L. “Engineering Physics”, Dhanpat Rai Publications (2013).
3. Halliday, D., Resnick, R. and Walker, J. “ Fundamentals of Physics”, Wiley India Pvt. Ltd. (2008).
4. Bhattacharya, B., “Semiconductor Optoelectronic Devices, Prentice Hall of India (1995).
5. Goodman, J.W. “Introduction to Fourier optics”, Viva Books Pvt. Ltd. (2007).

PT7012 PRINTED ELECTRONICS L T P C
3 0 0 3

OBJECTIVES:

- To understand the basics of printed electronics and its applications
- To learn about the materials and printing techniques used in electronic products manufacturing

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:

- Analyze the suitability of printing processes for various electronic products
- Identify the materials and the techniques involved in printed electronics
- Comprehend the 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.

PT7013 PRINTING MACHINE DESIGN L T P C
3 0 0 3

OBJECTIVES:

- To gain knowledge on the principles and procedure for designing Mechanical power Transmission components.
- To understand the standard procedure available for Designing Transmission of Mechanical elements
  - To learn to use standard data and catalogues

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)

OUTCOME:

- Upon completion of this course, the student can successfully design machine elements and transmission components used in printing machinery.

TEXT BOOK:

1. Bhandari V, Design of Machine Elements, 3rd Edition, Tata McGraw-Hill Book Co, 2010.

REFERENCES:

1. Joseph Shigley, Charles Mischke, Richard Budynas and Keith Nisbett, Mechanical Engineering Design, 8th Edition, Tata McGraw-Hill, 2008.
2. Sundararajamoorthy T. V, Shanmugam .N, Machine Design, Anuradha Publications, Chennai, 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. C.S.Sharma, Kamlesh Purohit, Design of Machine Elements, Prentice Hall of India, Pvt. Ltd., 2003.
6. Bernard Hamrock,Steven Schmid,Bo Jacobson, Fundamentals of Machine Elements, 2 nd Edition, Tata McGraw-Hill Book Co., 2006.
7. Robert C. Juvinall and Kurt M. Marshek, Fundamentals of Machine Design,4th Edition,Wiley, 2005
8. Alfred Hall, Halowenko, A and Laughlin, H., Machine Design, Tata McGraw-Hill Book Co.(Schaum's Outline), 2010
9. Orthwein W, Machine Component Design, Jaico Publishing Co, 2003.
10. Ansel Ugural, Mechanical Design – An Integral Approach, 1st Edition, Tata McGraw-Hill Book Co, 2003.
11. Merhyle F. Spotts, Terry E. Shoup and Lee E. Hornberger, Design of Machine Elements 8th Edition, Printice Hall, 2003.

PT7014 PRINTING MACHINERY MAINTENANCE L T P C
3 0 0 3

OBJECTIVE:

- To provide an overview of the printing machinery maintenance and maintenance management..

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 allied equipment maintenance. Electrical components maintenance: Motors, Electric brakes. Mechanical components maintenance: types of gears, cams, levers, Bearings, Clutches, Drives, printing and converting 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:

- Analyze the basic concepts of maintenance management
- Identify the stages of machine erection and testing
- Create a maintenance schedule based on criticality and economics
- Evaluate equipment effectiveness

TEXT BOOKS:

1. Venkataraman.K, Maintenance Engineering and Management, Prentice-Hall of India, Private Limited., 2007.
2. P.Goplakrishnan, A.K.Banerji, Maintenance and Spare Parts Management, Prentice- Hall of India, 2013

REFERENCES:

1. H.P.Garg, Industrial Maintenance, S.Chand & Company Ltd., 1990.
2. Kenneth E.Rizzo, Total Production Management, Second Edn., GATF Press, 2008
3. N.D.Vohra, Quantitative Techniques in Management, Tata McGraw – Hill Publishing Co. Ltd, 2006
4. Herschell L. Apfelberg, Maintaining Printing Equipment, GATF Press,1984
5. Keith Mobley, Lindley Higgins, Darrin Wikoff, Maintenance Engineering Handbook, McGraw – Hill,2008

PT7015 QUALITY CONTROL IN PRINTING L T P C
3 0 0 3

OBJECTIVES:

- To impart knowledge about principles of quality
- To understand statistical process control tools and quality standards
- To implement quality control in various stages of printing

UNIT I FUNDAMENTALS OF QUALITY 9

Fundamental concepts of Quality, Quality Cost, Specification of Quality, Quality inspection, Quality Challenges in printing; Types of Standards such as ISO/PSO, TAPPI, CGATS, CIE, ICC, Media Standard, DIN, ASTM, ANSI.

UNIT II STATISTICAL PROCESS CONTROL 9

Introduction to Statistical Process Control, Statistical Quality Control; 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 softwares like Minitab, SPSS, SAS

UNIT III MATERIALS QUALITY CONTROL 9

Quality Control procedures and practices used in receiving and for inventory management in print house. Substrate testing-surface properties, physical properties and optical properties, Ink testing – Rheology, particle size, press performance testing, dried print performance testing, surface energy of inks, Importance of proper handling and maintenance of records of performance of materials.

UNIT IV PREPRESS QUALITY CONTROL 9

Need for establishing clearly meaningful job specifications and acceptable tolerance limits. 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 V PRESS QUALITY CONTROL 9

Process variability and measures of variability, Process inspection and control procedures for every production department, developing of quality monitoring checklists for all processes, checklists of definable and measurable attributes of products, waste and spoilage reduction, Press Characterization (finger printing) and standardization, Various test forms used for standardization;

TOTAL: 45 PERIODS

OUTCOMES:

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

- Implement ISO standards
- Evaluate quality of incoming materials and outgoing products
- Identify instruments required for implementing quality
- Analyze the statistical data and establish process and wastage control

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. Douglas C.Montgomery, Introduction to Statistical Quality Control, John Wiley, 1985
2. Brian Rothery, ISO 9000, Productivity & Quality, Publishing Private Ltd., 1992
3. Kelvin Tritton, Colour Control for Lithography, PIRA International, 1992
4. Mortimer,A., Colour Reproduction in Printing Industry, PIRA International, 1991.

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DIRECTOR
Centre For Academic Courses
Anna University, Chennai-600 025.

5. Ken Holmes, Implementing ISO 9000, 2nd edition, PIRA International, 1995
6. Phil Green, (1992), Quality Control for Print Buyers, Blue Print.
7. Ronald E.Todd, Printing Inks – Formulation Principles, Manufacture and Quality Control Testing Procedures, PIRA International, 994
8. Apfelberg, H.L., Apfelberg, M.J., Implementing Quality Management in Graphic Arts, GATF, 1995
9. Derek Porter, Print Management (second edition), Pira International Ltd., 1998

PT7016 SECURITY PRINTING L T P C
3 0 0 3

OBJECTIVES:

- To understand the various features, materials and methods involved in Security Printing.
- To know the appropriate Printing Techniques for different security 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 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 TECHNOLOGY 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 etc.

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. Different types of machines used for producing various security products. Recent trends and developments in security printing.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Analyze the security features in printed products
- Develop security techniques as per the requirement
- Incorporate standards and specifications in security printing

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. Martin Monestics, The Art of Paper Currency, Quarlet Books Ltd.,1983.

PT7017 SPECIALITY PRINTING L T P C
3 0 0 3

OBJECTIVES:

- To understand the advanced reproduction techniques in printing.
- To appreciate the impact of printing in product security.
- To learn the selection of print production technique suitable for substrate, shape and securing operations.

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:

- Design innovative print products using specialty printing techniques.
- Enhance value addition to existing print design
- Analyze new avenues for speciality 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.

PT7018 VISUAL COMMUNICATION L T P C
3 0 0 3

OBJECTIVES:

- To understand the Importance of Visual Communication and its application.
- To analyze the various vehicles of Visual communication

UNIT I INTRODUCTION 9

Visual arts history from cave drawings to video painting, identifying and analyzing hidden languages in various media and cultures.

UNITII PRINCIPLES OF VISUAL COMMUNICATION 9

Psychology of human vision, How the eye and brain process image, Visual grammar, Color form, Depth and movement, Visual theories, Perception, Semiotics, Visual story creation.

UNIT III VISUAL ANALYSIS 9

Visual persuasion and propaganda, visual image analysis, stereotypes and the media, Ethics of visual story telling.

UNIT IV PRINCIPLES OF DESIGN 9

Balance, Emphasis, Simplicity, Repetition, Rhythm, Proportion, Unity, Variety, The application of design principles in creating visual images, Case studies.

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 publicrelations .Analysisofavisualevent–film,TV,photoexhibit,advertisements,etc.Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

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

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

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GE7072	FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT	L	T	P	C
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OBJECTIVES:

- To understand the global trends and development methodologies of various types of products and services
- To conceptualize, prototype and develop product management plan for a new product based on the type of the new product and development methodology integrating the hardware, software, controls, electronics and mechanical systems
- To understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification
- To understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics
- To develop documentation, test specifications and coordinate with various teams to validate and sustain up to the EoL (End of Life) support activities for engineering customer

UNIT I FUNDAMENTALS OF PRODUCT DEVELOPMENT 9

Global Trends Analysis and Product decision - Social Trends - Technical Trends- Economical Trends - Environmental Trends - Political/Policy Trends **- Introduction to Product Development Methodologies and Management -** Overview of Products and Services - Types of Product Development - Overview of Product Development methodologies **-** Product Life Cycle – Product Development Planning and Management.

UNIT II REQUIREMENTS AND SYSTEM DESIGN 9

Requirement Engineering - Types of Requirements - Requirement Engineering - traceability Matrix and Analysis - Requirement Management - **System Design & Modeling -** Introduction to System Modeling - System Optimization - System Specification - Sub-System Design - Interface Design.

UNIT III DESIGN AND TESTING 9

Conceptualization - Industrial Design and User Interface Design - Introduction to Concept generation Techniques – **Challenges in Integration of Engineering Disciplines** - Concept Screening & Evaluation - **Detailed Design -** Component Design and Verification – **Mechanical, Electronics and Software Subsystems** - High Level Design/Low Level Design of S/W Program **-** Types of Prototypes, S/W Testing- Hardware Schematic, Component design, Layout and Hardware Testing – **Prototyping -** Introduction to Rapid Prototyping and Rapid Manufacturing - **System Integration, Testing, Certification and Documentation**

UNIT IV SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT 9

Introduction to Product verification processes and stages - Introduction to Product Validation processes and stages - Product Testing Standards and Certification - Product Documentation - **Sustenance -**Maintenance and Repair – Enhancements - **Product EoL -** Obsolescence Management – Configuration Management - EoL Disposal

UNIT V BUSINESS DYNAMICS – ENGINEERING SERVICES INDUSTRY 9

The Industry - Engineering Services Industry - Product Development in Industry versus Academia –**The IPD Essentials -** Introduction to Vertical Specific Product Development processes -Manufacturing/Purchase and Assembly of Systems - Integration of Mechanical, Embedded and Software Systems – Product Development Trade-offs - Intellectual Property Rights and Confidentiality – Security and Configuration Management.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Define, formulate and analyze a problem
- Solve specific problems independently or as part of a team
- Gain knowledge of the Innovation & Product Development process in the Business Context
- Work independently as well as in teams
- Manage a project from start to finish

TEXTBOOKS:

1. Book specially prepared by NASSCOM as per the MoU.
2. Karl T Ulrich and Stephen D Eppinger, "Product Design and Development", Tata McGraw Hill, Fifth Edition, 2011.
3. John W Newstorm and Keith Davis, "Organizational Behavior", Tata McGraw Hill, Eleventh Edition, 2005.

REFERENCES:

1. Hiriyappa B, “Corporate Strategy – Managing the Business”, Author House, 2013.
2. Peter F Drucker, “People and Performance”, Butterworth – Heinemann [Elsevier], Oxford, 2004.
3. Vinod Kumar Garg and Venkita Krishnan N K, “Enterprise Resource Planning – Concepts”, Second Edition, Prentice Hall, 2003.
4. Mark S Sanders and Ernest J McCormick, "Human Factors in Engineering and Design", McGraw Hill Education, Seventh Edition, 2013