SCHEME AND SYLLABI

FOR

THIRD TO EIGHTH SEMESTERS

OF

BACHELOR OF TECHNOLOGY

IN

PRINTING TECHNOLOGY

FROM 2009 ADMISSION ONWARDS

CALICUT UNIVERSITY (P.O), THENHIPALAM

PRINTING TECHNOLOGY

Combined 1st & 2nd Semester

Code	Subject	Hours/Week			Marks		Semester End duration-hours	credits
		L	T	P/D	internl	Sem End		
EN 101	Engineering Mathematics - I	2	1	-	30	70	3	4
EN 102	Engineering Mathematics - II	2	1	-	30	70	3	4
EN 103	Engineering Physics	2	1	-	30	70	3	3
EN 103(P)	Physics lab	-	-	1	50	50	3	1
EN 104	Engineering Chemistry	2	1	-	30	70	3	3
EN 104(P)	Chemistry lab	-	-	1	50	50	3	1
EN 105	Engineering Mechanics	2	1	-	30	70	3	4
EN 106	Basics of Civil & Mechanical Engg.	2	1	-	30	70	3	4
EN 107	Basics of Electrical & Electronics Engg.	2	1	-	30	70	3	4
EN 108	Engineering Graphics	0	-	3	30	70	3	3
EN 109(P)	Programming in C	1	-	1	50	50	3	3
EN 110A(P)	Mechanical workshop	-	-	2	50	50	3	2
EN 110B(P)	Electrical and Civil workshops	-	-	2	50	50	3	2
Total		15	5	10				38

3rd Semester

Code	Subject	Hours/Week			Marks		Semester End duration-hours	credits
		L	T	P/D	internl	Sem End		
EN09 301	Engineering Mathematics - III	3	1	-	30	70	3	4
EN09 302	Humanities and Communication Skills	2	1	-	30	70	3	3
PT09 303	Graphic reproduction and Colour separation	4	1	-	30	70	3	5
PT 09 304	Mechanics of Solids	3	1	-	30	70	3	4
PT 09 305	Electrical Machines and Measurements	3	1	-	30	70	3	4
PT 09 306	Thermal Engineering	3	1	-	30	70	3	4
PT 09 307(P)	*Machine Drawing*	-	-	3	50	50	3	2
PT 09 308(P)	*Basic Electrical and Electronics Engg. Lab*	-	-	3	50	50	3	2
Total		18	6	6				28

4th Semester

Code	Subject	Hours/Week			Marks		Semester End duration-hours	credits
		L	T	P/D	internal	Sem End		
EN09 401 A	Engineering Mathematics - IV	3	1	-	30	70	3	4
EN09 402	Environmental science	2	1	-	30	70	3	3
PT 09 403	Offset machinery- I	4	1	-	30	70	3	5
PT 09 404	Theory of Mechanism	3	1	-	30	70	3	4
PT 09 405	Electronic circuits	3	1	-	30	70	3	4
PT 09 406	Paper & Ink	3	1	-	30	70	3	4
PT 09 407(P)	*Printing Machines lab- I*	-	-	3	50	50	3	2
PT 09 408(P)	*Quality control lab*	-	-	3	50	50	3	2
Total		18	6	6				28

5th Semester

Code	Subject	Hours/Week			Marks		Semester End duration-hours	credits
		L	T	P/D	internal	Sem End		
PT09 501	Offset machinery - II	4	1	-	30	70	3	5
PT09 502	Digital printing	3	1	-	30	70	3	4
PT09 503	Engineering Economics & Principles of Management	3	1	-	30	70	3	4
PT09 504	Design &Planning for Media production	3	1	-	30	70	3	4
PT09 505	Microprocessor & Micro controllers	3	1	-	30	70	3	4
PT09 506	Printing measurements & control instruments	2	1	-	30	70	3	3
PT09 507(P)	*Printing Machine Lab-II*	-	-	3	50	50	3	2
PT09 508(P)	*DTP Lab*	-	-	3	50	50	3	2
Total		18	6	6				28

6th Semester

Code	Subject	Hours/Week			Marks		Semester End duration-hours	credits
		L	T	P/D	internal	Sem End		
PT09 601	Flexogaphy	4	1	-	30	70	3	5
PT09 602	Instrumentation & Control	3	1	-	30	70	3	4
PT09 603	Design of Machine Elements	3	1	-	30	70	3	4
PT09 604	Print finishing & converting	3	1	-	30	70	3	4
PT09 605	Screen printing & Gravure	2	1	-	30	70	3	3
PT09 Lxx	Elective -I	3	1	-	30	70	3	4
PT09 607(P)	*Print finishing Lab*	-	-	3	50	50	3	2
PT09 608(P)	*Screen printing & flexo lab*	-	-	3	50	50	3	2
Total		18	6	6				28

Electives – 1

PT09 L01 Digital pre-press

PT09 L02 Computer Graphics

PT09 L03 Mechanics of printing

PT 09 L04 Production and operation management

PT 09 L05 Management Information System

7th Semester

Code	Subject	Hours/Week			Marks		Semester End duration-hours	credits
		L	T	P/D	internl	Sem End		
PT09 701	Packaging Technology	4	1	-	30	70	3	5
PT09 702	Electrical Drives and Control	3	1	-	30	70	3	4
PT09 703	Tone and Color Analysis	2	1	-	30	70	3	3
PT09 704	Printing Machinery and Maintenance	2	1	-	30	70	3	3
PT09 Lxx	Elective -II	3	1	-	30	70	3	4
PT09 Lxx	Elective -III	3	1	-	30	70	3	4
PT09 707(P)	*Tone and Color Analysis Lab*	-	-	3	50	50	3	2
PT09 708(P)	*Packaging Technology Lab*	-	-	3	50	50	3	2
PT09 709(P)	*Project*	-	-	1	100	-	-	1
Total		17	6	7				28

8th Semester

Code	Subject	Hours/Week			Marks		Semester End duration-hours	credits
		L	T	P/D	internl	Sem End		
PT09 801	Print Management Costing & Estimating	4	1	-	30	70	3	5
PT09 802	Quality Control in Printing	2	1	-	30	70	3	3
PT09 Lxx	Elective -IV	3	1	-	30	70	3	4
PT09 Lxx	Elective - V	3	1	-	30	70	3	4
PT09 805(P)	Seminar	-	-	-	100	-	-	2
PT09 806(P)	Project	-	-	3	100	-	-	7
PT09 807(P)	Viva Voice	-	-	11	-	100	-	3
Total		12	4	14				28

Electives for 7th and 8th Semesters

1. PT09 L06 Operation Research
2. PT09 L07 Total Quality management (TQM)
3. PT09 L08 Book publishing
4. PT09 L09 Entrepreneurship Management
5. PT09 L10 Multimedia
6. PT09 L11 Enterprise Resource Planning.
7. PT09 L12 Publishing Science
8. PT09 L13 Continuous stationary &Security printing
9. PT09 L14 Industrial psychology
10. PT 09 L15 Advertising Management
11. PT 09 L16 Marketing Management
12. PT 09 L17 Image processing
13. PT 09 L18 Supply Chain Management
14. PT 09 L19 Scanners & systems

15. PT 09 L20 Human Resource Management
16. PT 09 L21 Print plant Layout and Facility Design.
17. PT 09 L22 E- Publishing
18. PT09 L23 News paper and Periodical Publishing
19. PT09 L24 Digital Photography
20. PT09 L25 Packaging Science

Global Electives

1. ME09 L22 Quality Engineering and management
2. ME09 L23 Industrial Safety Engineering.
3. ME09 L24 Energy Engineering and Management
4. EE09 L23 Process Control & Instrumentation
5. EE09 L24 Mechatronics
6. EE09 L25 Robotics & Automation
7. EC09 L24 Electronic Packaging.
8. CH09 L24 Industrial Pollution Control
9. AN09 L24 Project Management.
10. AN09 L25 Research Methodology.

3rd Semester

EN09 301: Engineering Mathematics III

(Common for all branches)

Teaching scheme **Credits:** 4

3 hours lecture 1 hour tutorial per week

Objective

This course provides a quick overview of the concepts and results in complex analysis that may be useful in engineering. Also it gives an introduction to linear algebra and Fourier transform which are wealths of ideas and results with wide area of application.

Module I: Functions of a Complex Variable (13 hours)

Functions of a Complex Variable – Limit – Continuity – Derivative of a Complex function – Analytic functions – Cauchy-Riemann Equations – Laplace equation – Harmonic Functions – Conformal Mapping – Examples: Z^n, sinz, cosz, sinhz, coshz, $(z+{}^1/_z)$– Mobius Transformation.

Module II: Functions of a Complex Variable (14 hours)

Definition of Line integral in the complex plane – Cauchy's integral theorem (Proof of existence of indefinite integral to be omitted) – Independence of path – Cauchy's integral formula – Derivatives of analytic functions (Proof not required) – Taylor series – Laurent series – Singularities and Zeros – Residues – Residue Integration method – Residues and Residue theorem – Evaluation of real integrals.

Module III: Linear Algebra (13 hours) - Proofs not required

Vector spaces – Definition, Examples – Subspaces – Linear Span – Linear Independence – Linear Dependence – Basis – Dimension – Ordered Basis – Coordinate Vectors – Transition Matrix – Orthogonal and Orthonormal Sets – Orthogonal and Orthonormal Basis – Gram-Schmidt orthogonolisation process – Inner product spaces –Examples.

Module IV: Fourier Transforms (14 hours)
Fourier Integral theorem (Proof not required) – Fourier Sine and Cosine integral representations – Fourier Transforms – Fourier Sine and Cosine Transforms – Properties of Fourier Transforms.

Text Books

Module I:
Erwin Kreysig, *Advanced Engineering Mathematics, 8e,* John Wiley and Sons, Inc.
Sections: 12.3, 12.4, 12.5, 12.6, 12.7, 12.9
Module II:
Erwin Kreysig, *Advanced Engineering Mathematics, 8e,* John Wiley and Sons, Inc.
Sections: 13.1, 13.2, 13.3, 13.4, 14.4, 15.1, 15.2, 15.3, 15.4
Module III:
Bernaed Kolman, David R Hill, *Introductory Linear Algebra, An Applied First Course,* Pearson Education.
Sections: 6.1, 6.2, 6.3, 6.4, 6.7, 6.8, Appendix.B.1
Module IV:
Wylie C.R and L.C. Barrett, *Advanced Engineering Mathematics*, McGraw Hill.
Sections: 9.1, 9.3, 9.5

Reference books

1. H S Kasana, *Complex Variables, Theory and Applications,* 2e, Prentice Hall of India.
2. John M Howie, *Complex Analysis*, Springer International Edition.
3. Shahnaz bathul, *Text book of Engineering Mathematics, Special functions and Complex Variables,* Prentice Hall of India.
4. Gerald Dennis Mahan, *Applied mathematics*, Springer International Edition.
5. David Towers, *Guide to Linear Algebra*, MacMillan Mathematical Guides.
6. Howard Anton, Chris Rorres, *Elementary Linear Algebra, Applications Version, 9e*, John Wiley and Sons.
7. Anthony Croft, Robert Davison, Martin Hargreaves, *Engineering Mathematics*, 3e, Pearson Education.
8. H Parthasarathy, *Engineering Mathematics, A Project & Problem based approach*, Ane Books India.
9. B V Ramana, *Higher Engineering Mathematics*, McGrawHill.
10. Sarveswara Rao Koneru, *Engineering Mathematics*, Universities Press.
11. J.K Sharma, *Business Mathematics, Theory and Applications*, Ane Books India

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: *Analytical/Problem solving questions* *4 x 5 marks=20 marks*

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: *Descriptive/Analytical/Problem solving questions* *4 x 10 marks=40 marks*

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

60% -	Tests (minimum 2)
30% -	Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% -	Regularity in the class

University Examination Pattern

PART A: *Short answer questions (one/two sentences)* *5 x 2 marks=10 marks*

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: *Analytical/Problem solving questions* *4 x 5 marks=20 marks*

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: *Descriptive/Analytical/Problem solving questions* *4 x 10 marks=40 marks*

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

Maximum Total Marks: 70

EN09 302: Humanities and Communication Skills

(Common for all branches)

Teaching scheme **Credits:** 3

2 hours lecture and 1 hour tutorial per week

Objectives

- *To identify the most critical issues that confr*
- *onted particular periods and locations in history*
- *To identify stages in the development of science and technology*
- *To understand the purpose and process of communication*
- *To produce documents reflecting different types of communication such as technical descriptions, proposals ,and reports*
- *To develop a positive attitude and self-confidence in the workplace and*
- *To develop appropriate social and business ethics.*
- *To develop appropriate social and business ethics.*

Module I (8 hours)

Humanities, Science and Technology: Importance of humanities to technology, education and society-Impact of science and technology on the development of modern civilization.
Contributions of ancient civilization: Chinese, Indian, Egyptian and Greek.
Cultural, Industrial, Transportation and Communication revolutions.
Advances in modern India: Achievements in information, communication and space technologies.

Module II (9 hours)

Concept of communication: The speaker/writer and the listener/reader, medium of communication, barriers to communication, accuracy, brevity, clarity and appropriateness

Reading comprehension: Reading at various speeds, different kinds of text for different purposes, reading between lines.
Listening comprehension: Comprehending material delivered at fast speed and spoken material, intelligent listening in interviews
Speaking: Achieving desired clarity and fluency, manipulating paralinguistic features of speaking, task oriented, interpersonal, informal and semi formal speaking, making a short classroom presentation.
Group discussion: Use of persuasive strategies, being polite and firm, handling questions and taking in criticisms on self, turn-taking strategies and effective intervention, use of body language.

Module III (10 hours)

Written Communication : Note making and taking, summarizing, notes and memos, developing notes into text, organization of ideas, cohesion and coherence, paragraph writing, ordering information in space and time, description and argument, comparison and contrast, narrating events chronologically. Writing a rough draft, editing, proof reading, final draft and styling text.
Technical report writing: Synopsis writing, formats for reports. Introductory report, Progress report, Incident report, Feasibility report, Marketing report, Field report and Laboratory test report
Project report: Reference work, General objective, specific objective, introduction, body, illustrations using graphs, tables, charts, diagrams and flow charts. Conclusion and references
Preparation of leaflets, brochure and C.V.

Module IV (9 hours)

Human relations and Professional ethics: Art of dealing with people, empathy and sympathy, hearing and listening. Tension and stress, Methods to handle stress
Responsibilities and rights of engineers- collegiality and loyalty – Respect for authority – Confidentiality – conflicts of interest – Professional rights, Rights of information, Social responsibility
Senses of ethics – variety of moral issues – Moral dilemma – Moral autonomy – Attributes of an ethical personality – right action – self interest

Reference Books

1. Meenakshi Raman and Sangeeta Sharma, *Technical Communication- Principles and Practice* Oxford University press, 2006
2. Jayashree Suresh and B S Raghavan, *Professional Ethics*, S Chand and Company Ltd, 2005
3. Subrayappa, *History of Science in India*, National Academy of Science, India
4. R C Bhatia, *Business Communication*, Ane Books Pvt. Ltd, 2009
5. Sunita Mishra and C Muralikrishna, *Communicatin Skils for Engineers*, Pearson Education, 2007.
6. Jovan van Emden and Lucinda Becker, *Effective Communication for Arts and Humanities Students*, Palgrave macmillam, 2009
7. W C Dampier, *History of Science*, Cambridge University Press
8. Vesilind, *Engineering, Ethics and the Environment*, Cambridge University Press
9. Larson E, *History of Inventions*, Thompson Press India Ltd.
10. Bernal J.D, *Science in History*, Penguin Books Ltd
11. Encyclopedia Britannica, *History of Science, History of Technology*

University Examination Pattern

PART A: Short answer questions (one/two sentences) 5 x 2 marks=10 marks

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: *Analytical/Problem solving questions* *4 x 5 marks=20 marks*

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: *Descriptive/Analytical/Problem solving questions* *4 x 10 marks=40 marks*

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

Maximum Total Marks: 70

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

PT04 303: Graphic Reproduction and Colour Separation

Credits: 5

Teaching scheme
4 Hours lecture and 1 Hr tutorial per week

Objectives:

- *To impart the basic concept of printing and printing industry*
- *To develop the concept of color reproduction and separation*

Module I (10 hours)
History and developments of printing – Printing methods- conventional and nonconventional methods - Introduction to printing Industry – size and scope of printing Industry, organizing printing service, preparation for career in printing. Printing industry in India – Printers measurement system. Alphabet design, Type face classification .Basic steps involved in planning a layout, factors to be considered while planning a layout Assembly & masking materials, positive & -ve film assembly, planning of multicolor work, punch & drill registration system, step & repeat work, imposition consideration for sheet fed & web fed press.

Module II (14 hours)
Graphic Reproduction –Types of process camera-mechanical and optical principles –lens-focal length-image formation-lens aberrations-factors governing design and layout of studio-illumination, reflection and transmission –measurement and control of light sources-properties of photographic material-film processing- lith and rapid access film processing –replenishment –comparison of film bases and dimensional stability. Principle of densitometry–Characteristics curves-reciprocity failure – intermittency effect –assessment of different types original- line photography-half tone photography – theories of dot formation –toned reproduction curve –contact photography

Module III (18hours)

Color & color theory – Additive & subtractive -Terms to describe color, - color separation technique Direct & indirect method – GATF color triangles & color circle their use – modern color spaces -color matching – color original - color originals, selection and their characteristics – method of color measurement– color Gamut.Prepress color proofing- DDCP- inkjet-thermal wax – chromalin proofing- factors in proofing- substrate- color of ink- solid ink density- trapping tone reproduction- proofing methods- soft proof- digital proof- photomechanical proof- press proof- other proofing methods.

Module IV (30 hours)

Planographic plates: Introduction. Light sensitive coating-dichromate colloids, diazo compounds, photopolymers, diffusion and transfer methods, electrostatic. Sensitivity of coating to light. Dye-sensitized photo polymerization, dark reaction, post exposure, safe lights, reciprocity law. Action of light sources on coatings, stabilities of coatings. Plate materials-zinc, aluminum, brass, copper, steel, chromium. Action of oil and water on metal – contact angle. Ability to withstand cracking. Susceptibility to dot sharpening. The plate base- cross section of an aluminum plate, cross section of a plastic plate. Graining of plates – mechanical graining, electrochemical graining, Anodized aluminum, plate washes. Paper plates, paper aluminum laminates, plastic plates. Light sources for plate making-spectral data for various light sources, metal halide, mercury lamps, pulsed-xenon, laser. Treatment of non-image areas- densitizing gum, chemistry of gum Arabic, other natural & synthetic gum. General processing sequence for a negative working plate. General processing sequence for a positive working plate. Negative working plate- additive presensitized plates, subtractive diazo PS plates, photopolymer presensitized plates, aqueous developable plates, driographic plates, multimetal plates. Producing a multimetal plate. Types- bimetallic, trimetallic. Projection- speed negative plates. Positive working lithographic plates- presensitized plates, Baking of Positive plates – photo direct plates-. Screen less lithography, laser exposed plates, deep etch plates and their purposes. Waterless plate.

References:

1. Eric Chambers, reproduction photography for lithography, GATF.
2. J.W.Burden, Graphic, Reproduction photography, Focal Press, London
3. Hand book of Modern halftone photography, perfect graphic arts, USA
4. Jack Eggleston, Sensitometry for photographers, focal Press, London
5. Woddiff Thomas , J R.SPSE handbook of photographic science and engineering, John Wiley & Son
6. J.Michael ADAMS, David D Faux, Lloyd, J.Reiber, Printing Technology, 3E, Delma Publishing
7. PIRA, guide standardized lithographic colour printing
8. Mills southworth, colour separation technique, Graphical arts publishing
9. R.W.G. Hunt, reproduction of colour, Fountain Press
10. Principles of cold Reproduction applied to photomechanical reproduction, colour photography and the ink, paper and other related industries, John Wiley & Sons U.K.
11. Graphic Repro, Eaglehead Publishing Ltd. U.K.
12. Dr. R.K. Molla, Electronic colour separation, R.K. printing & Publishing company,USA.

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

PART A: *Short answer questions (one/two sentences)* *5 x 2 marks=10 marks*

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: *Analytical/Problem solving questions* *4 x 5 marks=20 marks*

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: *Descriptive/Analytical/Problem solving questions* *4 x 10 marks=40 marks*

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

Maximum Total Marks: 70

PT09 304 Mechanics of Solids

Credits: 4

Teaching scheme

3 Hours lecture and 1 Hr tutorial per week

Objectives:

- *To impart knowledge about the behaviour of materials under stress, which aids in the design of mechanical systems.*

Module I (13 hours)

1.Tension, compression & shear (8 hours)

Types of external loads – self weight –internal stresses-normal and shear stresses-strain-Hooke's law-Poisson's ratio-relationship between elastic constants-stress strain diagrams working stress- elongation of bars of constant and varying sections- statically indeterminate problems in tension and compression –assembly and thermal stresses-strain energy in tension –compression and shear

2.Analysis of stress and strain (5 hours)

Stress on inclined planes for axial and biaxial stress fields-principal stresses-Mohr's circle of stress-principal strains-strain rosette

Module II (15 hours)

3.Bending moment and shearing force (6 hours)

Different types of beams –shear force and bending moment diagrams for simply supported and cantilever beams-relationship connecting intensity of loading –shearing force and bending moment-shear force and bending moment diagrams for statically determinate plane frames.

4.Stresses in laterally loaded symmetrical beams (5 hours)

Theory of simple bending-limitations- bending stresses in beams of different cross sections-moment of resistance- beams of uniform strength- beams of two materials-principal stresses in bending-strain energy due to bending- shearing stresses in bending
5.Unsymmetrical bending (2 hours)
Shear flow –shear centre- determination of shear centre for simple sections

Module III (13 hours)
6.Deflection of beams (13 hours)
Differential equation of the elastic curve-Slope and deflection of beams by method of successive integration –Macaulay's method –moment area method –conjugate beam method –deflection due to shear.

Module IV (13 hours)
7.Theory of columns (5 hours)
Axial loading of short strut-long columns-Euler's formula –Rankine formula -Secant formula-eccentric loading-direct bending stresses
8.Torsion (5 hours)
Torsion of circular solid and hollow shafts –power transmission-strain energy in shear and torsion –close coiled and open coiled helical springs.
9.Thin and thick cylinders (3 hours)
Lame's equation –stresses in thick cylinders due to internal and external pressures –compound cylinders-shrink fit-wire wound pipes and cylinders

Reference books
1. Timeshenko & Young, Elements of Strength of Materials, Affilliated East West Press
2. Popov E.P, Mechanics of Materials, Prentice Hall India
3. Hearn E.J, Mechanics of Materials, Pergamon Press, Oxford University Press
4. Warnok F.V, Strength of Materials, Schaum's Outline Series, McGraw Hill
5. Wang C.K, Statically Indeterminate Structures, McGraw Hill

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	

PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 305 Electrical Machines & Measurements

Teaching scheme **Credit:** 4
3 Hours lecture and 1 Hr tutorial per week

Objectives:

- *Understanding the working principles of DC & AC motors.*
- *Understanding the basic working principles of electrical measuring instruments*

Module I: DC Machine (12 hours)
Types of DC machines-DC generators- open circuit and load characteristics of different types DC generators. DC motors-principles of operation-types-torque equations-characteristics-starters-losses and efficiency.

Module II: AC machines- Transformers (10 hours)
Principles of operation-emf equations-phasor diagram-equivalent circuit-OC and SC tests- basic principles of auto transformer and three phase transformer.

Module III: AC Machines- Rotating machines (17 hours)
Synchronous motor-Construction details-Principal of operation-starting method-losses and efficiency of synchronous motors-torque equations-V curve-invert V curve- Application. Induction motors-vector diagram and equivalent circuits- starting and speed control of squirrel cage wound rotor induction motors, no load test and blocked rotor test, torque equation, torque-speed characteristics, performance characteristics.

Module IV: Electrical measurements (15 hours)
Principles of indicating instruments-moving coil, moving iron and dynamometer type instruments-Extension of range of voltmeter and ammeter- measurement of 3 phase power by two wattmeter method-DC slidewire- potentional meter-wheat stone bridge –Kelvin's double bridge –schering bridge-Maxwell's bridge –principles of energy meter.

Text books
Hughes E.,*Electrical Technology*, ELBS
A K Theraja & B L Theraja, *Electrical Technology* ,

Reference books:

1. Cotton H., Electrical Technology, Pitman
2. Golding, Electrical measurements and measuring instruments, ELBS

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

Short answer questions (one/two sentences) *5 x 2 marks=10 marks*

PART A:

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: *Analytical/Problem solving questions* *4 x 5 marks=20 marks*

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: *Descriptive/Analytical/Problem solving questions* *4 x 10 marks=40 marks*

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

Maximum Total Marks: 70

PT09 306 Thermal engineering

Teaching scheme **Credit:** 4

3 Hours lecture and 1 Hr tutorial per week

Objectives:

To study the thermal behaviour of various systems, and to understand a basic engineering in detail

Module I (14 hours)

Thermodynamic systems –thermodynamic properties and processes-heat and work –equations of state –properties of ideal gases- properties pure substances –PVT, PT, TS, PV diagrams- Zeroth law of thermodynamics- First law of thermodynamics- application of first law to various thermodynamics processes in open and closed systems-internal energy and enthalpy- steady flow energy equations-introduction to second law-entropy-available energy and unavailable energy

Module II (13 hours)

Engineering application of thermodynamics-air cycles-principles of operations of IC engines- two strokes-four strokes- SI and CI engines- air cycle refrigeration-gas turbine cycles- open and closed cycle-regeneration and intercooling – vapour power cycle –mollier diagrams-Rankine cycle-vapour compression refrigeration cycle.

Module III (13 hours)

Conventional and non-conventional energy sources- thermal power plants –steam power plant layout- study of various systems- steam generators-high pressure boilers-steam power plant accessories-IC engines and gas turbine power plants- study of various systems and accessories-hydel plants-layout and classification- components and their functions.

Module IV (14 hours)

Steam turbine-impulse and reaction turbine – compounding- velocity diagrams-reheat factor –various efficiencies- turbine characteristic governing- operations and maintenance – reciprocating and rotary compressors

Text books

1. Prakash.R and Gupta, Engineering Thermodynamics, Nem Chand
2. Morse.F.T., Power plant engineering affiliated East West.

Reference books

1. Saad.M.A., Thermodynamics for Engineers, Prentice Hall of India
2. Spalding. D.B & Cole E.H, Engineering Thermodynamics, ELBS
3. Doolittle J.S. & Hale F.J., Thermodynamics for Engineers, John Wiley
4. Skrotsky B & Vopat, Power station Engineering, Tata McGraw Hill
5. Holman J.P., Heat transfer, McGraw Hill.

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)

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

10% - Regularity in the class

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 307(P) Machine Drawing

Credits: 2

Teaching scheme
3 Hours practical per week

Objectives: *This section helps the students to practice part drawings, production drawing, assembly drawing and line drawing of printing machines.*

1. Familiarization with screwed fastenings
2. Familiarization with Foundation bolts
3. Drawing Exercise of Welded joints
4. Drawing Exercise of Joints & couplings

5. Familiarization with Pulleys & Keys
6. Gears:- Terminology , Types
7. Bearings:- Journal
8. Lathe Parts: - Tail Stock, Tool Post, and Carriage.
9. Stop valves
10. Elements of Production Drawing.
11. Surface, Texture, Limit, Fix, Tolerance.
12. Drawings of Operation process charts in Presses.
13. Simple exercises using (Auto CAD)
14. Line Drawing exercise of following Printing machines
    a. Stitching machine.
    b. Cutting machine.
    c. Feed board with grippers.
    d. Roll Stand &Brake Assembly of web offset machine.

Internal Continuous Assessment mark *(Maximum mark 50)*
60%-Laboratory Practical and record
30%- Test
10%- Regularity in the class

Sem End Examination *(Maximum mark 50)*
70%-Procedure, conducting experiment, results, tabulation, and inference
20%- Viva voice
10%-Fair record

PT09 308 (P) Basic Electrical & Electronics Engg Lab

Teaching scheme **Credit:** 2
3 Hours practical per week

LIST OF EXPERIMENTS

1. Diode & Zener diode characteristics –dc and dynamic resistance
2. Clipping & Clamping circuits

3. Half wave rectifier & Full wave rectifiers with C, LC & CRC filters.
4. Zener diode regulator with emitter follower output-regulation curves
5. CB configuration & CE configuration- determination of h parameters
6. UJT characteristics & the relaxation oscillator
7. First and second order LPF/HPF/BPF with R and C for a given cutt-off frequency
8. Verification of Kirchhoff's Law in DC circuit.
9. Verification of super position theorem in DC circuit
10. 3Φ Power measurement using one wattmeter & two wattmeters
11. Load test on D.C shunt & series motor
12. Plot the following characteristics
    a) Output Vs efficiency
    b) Output Vs line current
    c) Output Vs Speed
    d) Speed Vs torque
    e) Line current Vs torque
13. Load test on 3Φ squirrel cage & slip ring induction motors
    a) Conduct the break test on both types of machines
    b) Obtain & plot the various performance characteristics
    c) Find the KVAR required improving the power factor to 0.95 at various loads & finding the relation.
14. No load & blocked rotor test on a 3Φ squirrel cage induction motors & slip ring induction motor.
    a) Conduct no load & blocked rotor tests on both type of machines
    b) Determine the equivalent circuit parameters & draw the equivalent circuit.
    c) Draw the circuit diagram & there from pre-determine the performance chara

Internal Continuous Assessment mark *(Maximum mark 50)*
60%-Laboratory Practical and record
30%- Test
10%- Regularity in the class

Sem End Examination *(Maximum mark 50)*
70%-Procedure, conducting experiment, results, tabulation, and inference
20%- Viva voice
10%-Fair record

FOURTH SEMESTER

EN09 401A: Engineering Mathematics IV

(Common for ME, CE, PE, CH, BT, PT, AM, and AN)

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Calicut University-2009

Objective

The use of probability models and statistical methods for analyzing data has become common practice in virtually all scientific disciplines. Two modules of this course attempt to provide a comprehensive introduction to those models and methods most likely to be encountered and used by students in their careers in engineering. A broad introduction to some important partial differential equations is also included to make the student get acquainted with the basics of PDE.

Module I: Probability Distributions (13 hours)

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

Module II: Theory of Inference (14 hours)

Population and Samples – Sampling Distribution – Sampling distribution of Mean (σ known) – Sampling distribution of Mean (σ unknown) – Sampling distribution of Variance – Interval Estimation – Confidence interval for Mean – Null Hypothesis and Tests of Hypotheses – Hypotheses concerning o
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Text Books

Module I:
Richard A Johnson, CB Gupta, *Miller and Freund's Probability and statistics for Engineers, 7e*, Pearson Education- Sections: 4.1, 4.2, 4.3, 4.4, 4.6, 4.8, 5.1, 5.2, 5.5, 5.7

Module II:
Richard A Johnson, CB Gupta, *Miller and Freund's Probability and statistics for Engineers, 7e*, Pearson Education- Sections: 6.1, 6.2, 6.3, 6.4, 7.2, 7.4, 7.5, 7.8, 8.1, 8.2, 8.3, 9.5

Module III:
Erwin Kreysig, *Advanced Engineering Mathematics, 8e*, John Wiley and Sons, Inc.-
Sections: 4.1, 4.3, 4.4, 4.5

Module IV:
N Bali, M Goyal, C Watkins, *Advanced Engineering Mathematics, A Computer Approach, 7e*, Infinity Science Press, Fire Wall Media- Sections: 16.1, 16.2, 16.3, 16.4, 16.5, 16.6, 16.7, 16.8, 16.9
Erwin Kreysig, *Advanced Engineering Mathematics, 8e*, John Wiley and Sons, Inc.
Sections: 11.2, 11.3, 11.4, 9.8 Ex.3, 11.5

Reference books

18. William Hines, Douglas Montgomery, avid Goldman, Connie Borror, *Probability and Statistics in Engineering*, 4e, John Wiley and Sons, Inc.
19. Sheldon M Ross, *Introduction to Probability and Statistics for Engineers and Scientists*, 3e, Elsevier, Academic Press.
20. Anthony Croft, Robert Davison, Martin Hargreaves, *Engineering Mathematics*, 3e, Pearson Education.
21. H Parthasarathy, *Engineering Mathematics, A Project & Problem based approach*, Ane Books India.
22. B V Ramana, *Higher Engineering Mathematics*, McGrawHill.
23. Sarveswara Rao Koneru, *Engineering Mathematics*, Universities Press.
24. J K Sharma, *Business Mathematics, Theory and Applications*, Ane Books India.
25. John bird, *Higher Engineering Mathematics*, Elsevier, Newnes.
26. M Chandra Mohan, Vargheese Philip, *Engineering Mathematics-Vol. I, II, III & IV.*, Sanguine Technical Publishers.
27. Wylie C.R and L.C. Barret, *Advanced Engineering Mathematics*, McGraw Hill.
28. V R Lakshmy Gorty, *Advanced Engineering Mathematics-Vol. I, II.*, Ane Books India.
29. Sastry S.S., *Advanced Engineering Mathematics-Vol. I and II.*, Prentice Hall of India.

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

University Examination Pattern

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

EN09 402: Environmental Science

(Common for all branches)

Teaching scheme **Credits:** 3
2 hours lecture and 1 hour tutorial per week

Objectives

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

Module I (8 hours)

The Multidisciplinary nature of environmental science, Definition-scope and importance-need for public awareness. Natural resources, Renewable and non-renewable resources:
Natural resources and associated problems-forest resources: Use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their defects 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 over grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging,salinity,case studies.-Energy resources: Growing energy needs, renewable and non-renewable energy resources, use of alternate energy resources, Land resources: Land as a resource, land degradation, man induced land slides, soil erosion and desertification.

Module II (8 hours)

Ecosystems-Concept of an ecosystem-structure and function of an ecosystem – producers, consumers, decomposers-energy flow in the ecosystem-Ecological succession- Food chains, food webs and Ecological pyramids-Introduction, types, characteristics features, structure and function of the following ecosystem-Forest ecosystem- Grassland ecosystem –Desert ecosystem-Aquatic ecosystem(ponds, streams, lakes, rivers, oceans , estuaries)

Biodiversity and its consideration

Introduction- Definition: genetic , species and ecosystem diversity-Biogeographical; classification of India –value of biodiversity: consumptive use, productive use, social ethical , aesthetic and option values Biodiversity at Global, national , and local level-India at mega –diversity nation- Hot spot of biodiversity-Threats to biodiversity: habitat loss, poaching of wild life, man , wild life conflicts – Endangered and endemic species of India-Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

Module III (10 hours)

Environmental pollution

Definition-Causes, effects and control measures of Air pollution-m Water pollution –soil pollution-Marine pollution-Noise pollution-Thermal pollution-Nuclear hazards-Solid waste management: Causes, effects and control measures of urban and industrial wastes-Role of an individual in prevention of pollution-pollution case studies-Disaster management: floods, earth quake, cyclone and landslides-Environmental impact assessment

Module IV (10 hours)

Environment and sustainable development-Sustainable use of natural resources-Conversion of renewable energy resources into other forms-case studies-Problems related to energy and Energy auditing-Water conservation, rain water harvesting, water shed management-case studies-Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust-Waste land

Text Books

1. Clark,R.S.Marine pollution,Clanderson Press Oxford.
2. Mhaskar A. K. Matter Hazrdous, Techno-science Publications.
3. Miller T. G. Jr., Environmental Science, Wadsworth Publishing Co.
4. Townsend C., Harper J, Michael Begon, Essential of Ecology, Blackwell Science
5. Trivedi R. K., Goel P. K., Introduction to Air Pollution, Techno-Science Publications.

Reference Books.

1. Raghavan Nambiar,K Text book of Environmental Studies,Nalpat Publishers Kochi
2. Bharucha Erach, Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, Email: mapin@icenet.net
3. Cunningham, W.P., Cooper, T.H., Gorhani, E & Hepworth, M.T. 2001Environmental encyclopedia Jaico publ. House Mumbai 1196p
4. Down to Earth, Centre for Science and Environment
5. Hawkins, R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay
6. Mckinney, M.L. & School, R.M. 1996. Environmental Science system & Solutions, Web enhanced edition, 639p.
7. Odum, E.P. 1971. Fundamentals of Ecology. W.B.Saunders Co. USA, 574p
8. Rao, M.N. & Datta, A.K 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd., 345p
9. Survey of the Environment, The Hindu Magazine

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as Report of field work, literature survey, seminar etc.
10% - Regularity in the class

Note: Field work can be Visit to a local area to document environmental assets-

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 403 Offset Machinery-I

Teaching scheme **Credit:** 5

4 Hours lecture and 1 Hr tutorial per week

Objectives: *This paper deals about the working operation of a sheet fed offset machine and helps to understand about a basic idea of lithographic process.*

Module I (18 hours)

Offset process-principle, advantages, and limitations. Various press configurations. Sheet control unit. In feed unit-pile table, pile height, air blast nozzles, forwarding pick up sucker, rear pickup suckers, separator brushes & fingers. Types of feed board sheet control devices-conveyor assemblies, conveyor tape, hold down rods. Sheet separation system-friction, pneumatic. Forwarding system-successing sheet feeder. Front lay type of movements. Side lay-push type lays, pull type lays, Side lay settings. Sheet detectors-mechanical types, electromechanical types, pneumatic types. No sheet detectors-early or fast detectors, twisted sheet detectors. Double sheet detectors. Grippers –spring gripper, pin type gripper, sorung pad gripper, compression spring, tension spring. Plate insertion system-tumbler gripper, rotary gripper, swing arm gripper. Sheet transfer section-chain transfer, single drum transfer, three drum transfer. Delivery unit-skeleton wheels. Transfer drum. Sheet decurler. Sheet guiding device blow downs. Air cushion transfer drum. Slow down mechanisms. Antiset-off spray equipments. Joggers. Extended deep pile delivery. Double delivery. Puff system. Metered powder supply. Electrostatic system. Introduction. Theory of ink-film flow. Ink film thickness. Dwell time. Ductor shock. Ink duct. Ink fountain. Ink feed roller. Oscillating roller. Reciprocating rollers. Drive rollers. Intermediate & plate inking rollers. Drum type inking system. Roller setting-Setting form roller to oscillator, setting form roller to plate, setting the duct roller. Roller covering. Roller maintenance-roller removal, replacement, roller storage, roller hardness. System cleanliness. Ink agitators. Ink consumption counters. Air curtain.

Module II (18 hours)

Dampening system. Introduction. Fountain roller. Dampening feed roller. Dampening solution composition, Iso propanol alcohol-storage of alcohol, substitute of alcohol. PH of dampening solution. Conductivity of dampening system. Damper setting, construction of plate dampening roller. Brush system for metering. Flat system for meeting, air knife system for metering. Conventional dampening system- metering dampening on conventional dampening system. Continues flow damp systems, roland –matic plate feed continuous flow damp system, miller-meter plate feed continuous flow damp system, miller-meter plate feed continuous flow dampening system. Inker feed- Dahlgren inker feed system-Heidelberg alkdow, Epic delta. Critical metering nip, reverse slip nip. Roller covers- molleton fabric cover, stockinette cover, paper damper cover, synthetic damper cover. Damper cleaning machine.

Module III (18 hours)

Introduction. Cylinder gears-spur gear, helical gear, bevel gear. Cylindrical design. Plate cylinder-cylinder driving cylinder body, cylinder gap, plate clamping, plate punching, bearer contact cylinder. Bearer contact cylinder, bearer gap cylinder. Plate mounting. Preparing plate in cylinder – measuring height of a mounted plate. Determining packing requirement. Types of blanket. Blanket squaring Blanket punching. Under blankets. Shore durometer. Mounting the blanket. Recovering from blanket

smash. Use of slightly damaged blanket. Care of blanket, blanket cleaning device. Impression cylinder. Transfer cylinder. Delivery cylinder.

Module IV (18 hours)

Pre make ready, make ready, inspection of press sheets, control of press function during press run maintaining the inking system, maintaining the dampening system, operating the feeder, operating the delivery, Colour sequence in two colour and multicolour operations. Printability and urn ability. Wet – on-wet printing. Wet –on Dry printing. Perfecting presses. Direct imaging presses, Schematic drawings of modern presses. Quality control during the press run-Densitometry, colour control bars, press room lighting and standard viewing conditions, electronics in press room, remote control consoles, plate scanner, scanning densitometers, closed loop systems. Printing unit problems. Inking unit problems. Paper problems. Blanket troubles. Proof press-requirements and advantages, progressive proof. Waterless printing. Advantages and disadvantages, printing technique. Types of wireless plates. Method of making waterless plates.

Reference:

1. Manual for Lithographic Press Operation- A S Porter
2. Lithographic Technology –Edwin A Dennis, Olusegan Odesina
3. Introduction to Printing Technology-Hugh M Speirs
4. Sheetfed Press Opertaion-GATF
5. Offset Technology-C S. Mishra.
6. Modern Lithography

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 404 Theory of Mechanism

Teaching scheme **Credit:** 4

3 Hours lecture and 1 Hr tutorial per week

Objectives: *Provide the necessary foundation and establish the theory, analysis, design, and practice of mechanism and kinematics & dynamics of machine.*

Module I (14 hours)

Mechanism and machine. Kinematic pair. Chain and inversions. Constrained and unconstrained motion. Four bar mechanism. Single and double slider crank mechanism with inversions, quick return mechanism. Toggle mechanism, oldham's couping, Hooke's joint. Types of cams. Types of followers. Cam profiles. Graphical methods for simple harmonic motion. Uniform velocity and cycloidal motion. Radical and oscillating follower. Calculation of maximum velocity and acceleration of follower.

Module II (14 hours)

Gear classifications. Law of gearing. Spur gear definitions. Involute tooth profile and involuntometry. Determination of length of path of contact. Arc of contact. Contact ratio. Interference in involute gear. Minimum number of teeth on pinion to avoid interference. Parallel and crossed helical gear. Simple compound reverted. Epicyclic gear train. Solution by tabular column method only. Torque transmitted by epicylic gear train. Bevel epicylic gear train. Differential gear drive of an automobile.

Module III (13 hours)

Static and dynamic balancing. Balancing of revolving masses in single plane and different planes (Graphical method).Action of belt on pulleys. Open and crossed belt drives. Velocity ratio. Slip belt thickness. Length of belts. Ratio of friction tensions. Maximum power transmitted by belt.

Module IV (13 hours)

Definitions. Types of vibration. Natural vibration. Un-damped and damped (Viscous damping only).Logarithmic decrement. Forced damped vibrations. Vibration isolation and transmissibility.

Reference:

1. Ballany P.L.- Theory of machines
2. S.S. Rattan.- Theory of machines
3. Hamilton H. Mabie and Oevirk.- Mechanisms and dynamics of machines
4. Jagadishlal.- Theory of machines
5. Dr. J.S. Rao & Dukkipati.- Theory of machines and mechanisms
6. V.P. Singh.- Theory of machines.

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 405 Electronic Circuits

Teaching scheme **Credit:** 4

3 Hours lecture and 1 Hr tutorial per week

Objectives: *This is a paper deals about BJT, FET, MOSFET and its different configuration circuits like amplifiers, oscillators, power amplifiers etc.*

Module I (13 Hours)

Transistor as an amplifier- small signal low frequency , high frequencymodels of BJT – h parameters equivalent circuits of CC ,CB, CE configurations – analysis – hybrid pi model- JFET- construction characteristics-MOSFETS- types-enhancement &depletion type –transfer & Drain characteristics.

Module II (13 Hours)

Biasing- need of biasing-different types – load line –bias stabilization –stability factor-thermal runway- JFET biasing- self bias- fixed bias –biasing of mosfet- feed back biasing and fixed biasing for enhancement &depletion mode MOSFET- small signal equivalent circuit model- analysis of CS &CD configuration.

Module III (14 hours)

Feedback-Effect of feedback on amplifier performance –voltage shunt-voltage series-Current series and Current Shunt feedback configurations-Positive feedback and Oscillators –Analysis of RC phase shift, Wein bridge, Copitts, Hartley and Crystal oscillators- Stabilization

Module IV (14 hours)

Power amplifiers-Class A, AB, D & S power amplifiers –Harmonic distortation-Efficiency –Wide band amplifiers-Broad banding techniques-Low frequency and high frequency compensation-CAS code amplifier –Broad banding using inductive loads.

Reference book

1. Millman & Halkias, Integrated Electronics, McGraw Hill
2. Sedra A.S & Smith K.C, Microelectronic Circuits, Oxford University Press
3. Boylesand & Nashelsky L, Electronics Devices & Circuit Theory' ,Prentice Hall of India
4. Hay W.H.,Electonic Analysis & Design ,Jaico Pub.
5. Borgrat T.F.,Electronic Devices & Circuits', McGraw Hill
6. Horenstein M. N., Microelectronic Circuits & Devices', Prentice Hall of India
7. Schilling D.L & Belove C, Electronic Circuits, McGraw Hill
8. Baker R.J, Li H.W & Boyce D.E, CMOS-Circuit Design, Layout & Simulation, Prentice of India

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 406 Paper & Ink

Teaching scheme **Credit:** 4
3 Hours lecture and 1 Hr tutorial per week

Objectives: *This paper gives a basic knowledge about the characteristics and importance of printing Paper and Printing ink.*

Module I (13 hours)
Raw materials and processing-sources and kinds of cellulose fibres, thermo mechanical, mechanical and chemical pulping, bleaching, beating, refining, non-fibres additives,paper making machines-different sections, finishing operations, coating, board making-furnish, manufacture and finishing.main classes of paper and board sizes, paper requirements for different printing process, paper handling. Paper properties runnability and printability-structural: formation, 2 sidedness, grain direction- physical: GSM, caliper,bulk, porosity, smoothness, dimensional stability, curves, moisture content and rh-optical: glosses, brightness, colour, opacity-chemical:pH, ash content, tensile, burse, tear internal bonding, fold endurance, stiffness, pick resistance.

Module II (14 hours)_
Recycled paper-Introduction recycling process, fibre preparation- screening, centrifugal cleaning, flotation, washing, deinking plant functions, continuous drum pulper, pre-screening and cleaning, primary flotation, cleaning, fine screening, thickening, disperging, brightness control, post flotation, light weight cleaning, washing, thickening and storage. Deinking chemistry. Bleachers-Hydrogen peroxide, oxygen and ozone bleaching, reductive bleaching agents, chelatining agents, sodium silicate, catalyse enzymes, agglomerating chemicals, surfactants. Biodegradation of surfactants, dispersants and the principles of washing, deinking, displectors.

Module III (14 hours)
Printing inks-raw materials-colorants: pigment classifications, preparations and properties-Inorganic: white and coloured, carbon black, metallic, ultramine and fluorescent-Organic: Diarylide yellow, hansa yellow, rodamine, lithol, rubine toner, phalocyanine blue and green and alkali blue, benzidine orange, toluidine red and lake red C-Dyestuffs: classification, preparation and properties and uses, acid, basics, solvents and disperse dyes. Oils: classification, preparation and properties and uses of drying semi –drying
And non-drying oils-resins: natural: rosin and its derivatives,gum Arabic, synthetic resins: epoxy resins, acrylic resins and varnishes. Solvents: aliphatic and aromatic hydro carbon, alcohol, esters, glycols & keytones. Addictives- properties and applications Driers, vaxes, antioxigens, plasticizers, wetting agents, deforming agents and anti skinning agents.

Module IV (13 hours)
Paste inks: single roll mill, roll mill,triple roll mill, twin horizondal mixer, zarm stirrer- liquid inks: ball mill, bead mill, and attritor. Flow chart for ink manufacturing, weighting, mixing, grinding, testing and packing. Viscocity, tack, colour, gloss, rub resisitance, length, dry characteristics, and finess of grind. Special inks and drying mechanism: heat sets, quick sets, gloss,magnetic and water based inks, Radiation curable inks-IR, UV & EB, Raw materials to constitute the inks and the equipments used for drying. Different types of ink drying mechanism. Ink problems-related to major printing processes-causes and remedies.

References:

1. R.H. Leach, The Printing Ink Manual, fifthe edition, Chapman & Hall, London
2. Robert F Reed, What the Printer should know about inks, GATF
3. Clifwool, A Manual for Flexographic inks, Fishbum Printing ink co. Ltd
4. Fonald E Tood, Printing inks, Pira International, United Kingdom
5. Printing Materials Science and Technology- Bob Thomson, PIRA
6. Advances in Printing Sciences and Technology, Vol. 24-J.Anthony Bristow.
7. Handbook of printing and production-Michael Bernard, John Peacock.
8. Introduction in Printing Technology-Heigh. M. Speir.
9. W.H. Bureau, “What the printer should know about the paper”, GATF
10. J.P. Casey, Pulp and paper chemistry and chemical technology.
11. R.J. McGill, “ measurement and control in paper making”, Adam Hilger Ltd.
12. D.Venkateswaralu, Paer for printing and packaging. SS Graphics

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 407(P) Printing Machines Lab I

Teaching scheme **Credit:** 2

3 Hours practical per week

Objectives*:* *To develop a practical knowledge in sheet fed offset machine.*

1. Familiarization of printing equipments and conventional methods of printing.
2. Preparation of imposition schemes for various jobs.
3. Film assembly for single color and multi color printing
4. Preparing plate for single and multi color printing
5. Setting the feeder board, lays, and delivery of sheet fed offset machine.
6. Taking single color print from sheet fed offset machine
7. Taking multi color print from sheet fed offset machine

Internal Continuous Assessment mark *(Maximum mark 50)*

60%-Laboratory Practical and record

30%- Test

10%- Regularity in the class

Sem End Examination *(Maximum mark 50)*

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

20%- Viva voice

10%-Fair record

PT09 408(P) Quality Control Lab

Teaching scheme **Credit:** 2

3 Hours Practical per week

Objectives: *To know the characteristics of printing materials and its quality testing*.

List of Experiments:

1. Introduction to pH meter
2. Introduction to conductivity meter
3. Paper Testing methods
   a.GSM test b.Curl test
4. Fountain solution
   a.pH b.Conductivity
5. Paper pH
6. pH of coating material
7. Moisture content of paper
8. Moisture penetration of paper
9. Ink testing
   a. Drying time b.Flow property c. Length
10. Acid value of resin

Internal Continuous Assessment mark *(Maximum mark 50)*
60%-Laboratory Practical and record
30%- Test
10%- Regularity in the class
Sem End Examination *(Maximum mark 50)*
70%-Procedure, conducting experiment, results, tabulation, and inference
20%- Viva voice
10%-Fair record

FIFTH SEMESTER

PT09 501 Offset Machinery-II

Teaching scheme **Credit:** 5
3 Hours lecture and 1 Hr tutorial per week
Objectives: *This paper helps to give knowledge about the working and operation of a web offset printing*

Module I (14 hours)
Introduction, Overview. General terminology-web offset, direct lithography,folder,sheeter,gusset wrinkle, rewinder, gear side, operator side, printing couple, printing unit,perfecting,nonperfecting,inline,horizontal presses, vertical presses-I-C presses. Blanket to Blanket presses-Introduction, plate cylinder, Blanket cylinder, cylinder pressure &timing, Arithmetic oh packing. Packaging gauge, bench micrometer. Inking system –Introduction, functions of Inking system, construction of Inking system, roller setting methods, washup machines.

Module II (18 hours)
Dampening systems-Introduction, pH and conductivity, fountain solution ingredients, parts of dampen system, conventional dampening system, dampening roller coverings, water stop for regulating water

flow. Types of dampening systems –levy flap dampening systems, continuous flow dampening systems, brush dampening using flick blades, Clare brush dampening systems, gross brush dampening systems. Alcohol in fountain solution. Continuous flow dampening systems- inker feed systems; Dahlgreen dampening systems-Miehle-matic-roland-matic-Harris duotrol-Epic litho/dampener plate feed systems. Combination continuous –flow systems. Critical metering nip.Reverse slips nip-Smith dampening systems. Spray-bar dampening systems.

Module III (15 hours)

Single- roll stand, multiple roll stand, dancer roller, Lug air shaft, continuous roll feeding devices-Flying Pasters-splicing sequence on flying paster. Zero speed splicer-splicing sequence on a zero speed paster. Preparing a splice. Splice template, infeed operation.Dryers-introduction, function, setting of quick set ink, setting of heat set ink. Types of dryers, removal of solvent-lader air from web, putting a controlled ripple in the web. Chill rolls-Introduction, function, types of roll system. The evolution of chill roll design, chill roll plumbing, Average web temperature
after chilling, side-to-side temperature variation after chilling.Folders-Introduction,folding principles, parts of folder, combination folder, ribbon folder, double-former folder, the mechanics oh folding process of jaw fold, chopper fold mechanisms. Operation of collect cylinder, press folders, doubleformer prefolder, flow folders, insert folders.

Module IV (25 hours)

Inline finishing-Introduction, gluers, paster wheels, demonstrable pattern gluers, segmented gluers, envelope pattern gluers, backbone gluers.Patternperforating and numbering units-sheeters,variable rotary cutters, auxillary equipments- Remote control console ,plate scanners, scanning densitometer, close- loop system, web preconditioners, sheet cleaners ,ink agitators, water coded ink oscillators, fountain solution recirculation systems, fountain solution mixers ,refrigerating fountain solution ,automatic blanket washers, side lay sensors, web break defectors, liquid applicator systems, roller applicator systems, antistatic devices,Imprinters,Perfectors,cut off controls, stroboscope, synchroscope, counters – Dentex laser counter, stobb counter.Web control factors, measuring tension, setting tensions a the press, paper behaviour a press. Image control- registration, register marks backup, colour register, relative print width, relative print lengths, and controlling fan out. Web control-side lay, box tilt, cut off, no slip cut off, web to web and ribbon to ribbon. Make ready-make readyinfeed, makeready printing units, makeready dryer and chill rolls make ready folder, running makeready.Press room safety.

Reference:

1. Web offset press operating-David B.Crouse
2. Offset M/C II-C.S.Mishra
3. Manual for Lithography press operator- A.S .Porter.

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*

	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 502 Digital Printing

Teaching scheme **Credit:** 4

4 Hours lecture and 1 Hr tutorial per week

Objectives: *To develop awareness about various digital work flows and technologies in printing and also helps to create an idea about inkjet printing techniques*.

Module I (20 hours)

Electrophotography, Ionography, Thermography, Electrography, Photography, X-graphy, Hybrid printing systems, CTF,-types, workflow, film materials. CTP- Designs, Plate substrates, workflow, imaging systems CTP for flexographic printing, Computer to cylinder for Gravure printing, Computer to Screen for Screen Printing.

Module II (14hours)

Computer to Press/Direct imaging: Direct imaging with removal of master for each job, Re-imagable Master, Concepts of Re- imagable Master with material application/Ablation- re imagable printing plate systems without material application. Chemical material systems for generating re-imagable surface.

Module III (10 hours)

Inkjet printing: Introduction and development of the inkjet process over years. Types of Inkjet Technology, Thermal bubble jet, Piezzo electric and dye sublimation Inside an Inkjet printer-Parts of a typical Inkjet Printer, Print head assembly, Print Head, Ink Cartridges, Ink Cartridge combinations, Separate black and color cartridges, color and black in a single cartridge for each ink color. The cartridges with print head itself. Print head stepper motor, Belt, Stabilizer bar, Paper feed assembly, Paper tray / feeder-rollers – paper feed stepper motor, Power supply control circuitry interface port(s)-The parallel port, USB port. Serial port (SCSI) port. Comparison of inkjet with other types of printers both non-impact and conventional. Application of Inkjet printing in various fields. Scope and development of Inkjet in various industries and ongoing trends.

Module IV (10 Hours)

Click OK to Print, Computer to Ink jet Printer- The process and requirements RAM, Buffer series of steps from command to printing, substrate used for inkjet printing- papers types and quality, compatibility of ink and paper, properties of inkjet paper, Other substrates.Long format digital ink jet printing. Areas of application and materials that can be used as substrates. The technology and advantages, Nozzle head, Ink supply, transport mechanism, Software, UV Ink, safety features.

Text book:
H Kippan , *Hand book of Print Media*- Heidelberg.

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

EN09 503: Engineering Economics and Principles of Management

(Common to ME and AM)

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *Impart fundamental economic principles that can assist engineers to make more efficient and economical decisions*
- To provide knowledge on principles of management, decision making techniques, *accounting principles and basic management streams*

Module I (14 Hrs)

Economic reasoning, Circular Flow in an economy, Law of supply and demand, Economic efficiency. Element of costs, Marginal cost, Marginal Revenue, Sunk cost, Private and Social cost, Opportunity cost. Functions of Money and commercial Banking. Inflation and deflation: concepts and regulatory measures. Economic Policy Reforms in India since 1991: Industrial policy, Foreign Trade policy, Monetary and fiscal policy, Impact on industry

Module II (13 Hrs)

Value Analysis –Function, aims, procedure.–Time value of money, Single payment compound amount factor, Single payment present worth factor, Equal payment series sinking fund factor, Equal payment series payment Present worth factor- equal payment series capital recovery factor-Uniform gradient series annual equivalent factor. Methods of project analysis (pay back, ARR, NPV, IRR and Benefit -Cost ratio) Break-even analysis-, Process planning

Module III (13 hours)

Principles of management – Evolution of management theory and functions of management Organizational structure – Principle and types

Decision making – Strategic, tactical & operational decisions, decision making under certainty, risk & uncertainty and multistage decisions & decision tree

Human resource management – Basic concepts of job analysis, job evaluation, merit rating, wages, incentives, recruitment, training and industrial relations

Module IV (14 hours)

Financial management – Time value of money and comparison of alternative methods

Costing – Elements & components of cost, allocation of overheads, preparation of cost sheet, break even analysis

Basics of accounting – Principles of accounting, basic concepts of journal, ledger, trade, profit &loss account and balance sheet

Marketing management – Basic concepts of marketing environment, marketing mix, advertising and sales promotion
Project management – Phases, organisation, planning, estimating, planning using PERT & CPM

Text books

1. Panneer Selvam, R, Engineering economics, Prentice Hall of India, New Delhi, 2002.
2. Wheeler R(Ed) Engineering economic analysis, Oxford University Press, 2004.
3. O. P. Khanna, *Industrial Engineering and Management*, Dhanpat Rai and Sons, Delhi, 2003.

References

1. F. Mazda, *Engineering management*, Addison Wesley, Longman Ltd., 1998
2. Lucy C Morse and Daniel L Babcock, *Managing engineering and technology*, Pearson Prentice Hall
3. P. Kotler, *Marketing Management: Analysis, Planning, Implementation and Control*, Prentice Hall, New Jersey, 2001
4. Venkata Ratnam C.S & Srivastva B.K, *Personnel Management and Human Resources*, Tata McGraw Hill.
5. Prasanna Chandra, *Financial Management: Theory and Practice*, Tata McGraw Hill.
6. Bhattacharya A.K., *Principles and Practice of Cost Accounting*, Wheeler Publishing
7. Weist and Levy, *A Management guide to PERT and CPM*, Prantice Hall of India
8. Koontz H, O'Donnel C & Weihrich H, *Essentials of Management*, McGraw Hill.
9. Ramaswamy V.S & Namakumari S, *Marketing Management : Planning, Implementation and Control*, MacMillan

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*

	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 504 Design & Planning for Media Production

Teaching scheme **Credit:** 4

3 Hours lecture and 1 Hr tutorial per week

Objectives: *To develop the concept of design in print media and gives knowledge about the planning methods in media production.*

Module I (12 hours)

Importance of a good design. Impact of a design on various taget audience. Relationship between design of a communication and sale of a product. Graphic designer and his role. Elements of design. Principles in designing. Characteristics of vision. Human interpretation of movement, colour pattern. Psychological influences of consistency. Language as a communication tool-terminologies-meaning of metaphor, simile, synecdoche, allegory etc., examples denotation, connotation.

Module II (14 hours)

Visual ingredients of graphic design, point, line, graphic space, texture, color, scale, balance and contrast. Use of computers in designing. Introduction to some designing softwares. Suitability for a particular job, design, printing technique and paper surface. Legibility and readability, monograms and trademarks.The relationship between type, illustration and Photography. Types of images. Photography as a design element preparation, selection and assessment of originals, photographs, sketches, paintings. Factors to be considered in photography.

Module III (15 hours)

Relationship of a design studio with production and sales departments of a press. Control and checking of art work at all stages, employment of free-lance artists, designers and photographers. The advertising agency, its structure and its services. Methods of preparing a design in various stages. Design for books, magazines, newspapers, catalogues, cartons and commercial stationary. Materials and tools used in preparing layouts and art work. Copy preparation. Casting-off and marking-up.Identifying requirements of the proposed print job and obtaining a clear brief. Explanation of a good brief. Writing a good brief. Relationship between designer, customer and printer. Analysis of production problems. Understanding estimating procedures. Technical influences of choice of process and materials available.

Module IV (13 hours)

Selection and co-ordination of production processes within the economic terms of the brief consideration of composition methods. Limitations of binding, finishing and ancillary processes as

they affect design. Selection and specification of ink, paper and other materials in relation to design specifications and to the production process decided. Designing of a website. Factors to be considered. Importance of a site map. Conter creation. Co-ordination of work between various departments. Selection of color. Hosting maintenance of website. Production of advertising commercials, corporate and industrial films. Job flow and co-ordination between various agencies. Meaning of a scratch, story board and final presentation. Production for radio jingles-factors to be considered. Work flow and final execution.

References

1. Sohick (Cd)- Fundamentals of Copy & Layout- A.C. Book (Ac)
2. Craig- Production for the Graphic Designer
3. Muray (Ray)- How to brief designs & buy print
4. A.S. Porter - Lithographic Press Work
5. Rooney J. & Steadmazn P.- Principle of CAD
6. David A.Akar & John G. Myers.- Advertisement management
7. Arthur Robinson, Randall Sale & J.K. Morrison- Elements of Cartography.
8. Jal Baker.- Analysis of Electronic Circuit
9. Leon O Chus & Pen Min Lin C.A.- Copy Preparation

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*

	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 505 Microprocessors and Micro Controllers

Teaching scheme **Credit:** 4

3 Hours lecture and 1 Hr tutorial per week

Objectives: *Understanding the architecture and programming of 8085 microprocessors.*
Understanding the architecture, programming and interfacing of basic microcontrollers.

Module I (16 Hours)

Microprocessor as a programmable device. Architecture and operations – MP initiated operations & 8085 Bus organisation, Internal data operations and 8085 registers.8085 programming model.– 8085 instruction set. Write assemble & execute a program – adding two hexa decimal number.Data transfer operations – Addressing models, Data transfer form register to output port, Data transfer to control output devices.Timing diagram- instruction cycle-machine cycle-T-states- 8085timing diagram for simple instruction execution timings.Arithmetic operations, Addition and increment, Subtraction. Subtraction of two unsigned numbers. Logic operations – Logic AND, Data masking with Logic AND, OR, exclusive – OR and NOT, Setting & resetting specific bits, OR ing data from two input ports. Branch operations – Unconditional jump to set up a continuous loop, Conditional jumps, Testing of the carry flag. Writing assembly language programs – Getting started, Micro processor controlled manufacturing processing. Debugging a programming.

Module II (12 hours)

Programming techniques –. Additional data transfer & 16 bit arithmetic Instructions – 16 bit data transfer to register pairs, Data transfer from memory to MD, Data transfer from MP to memory, Block transfer of data bytes. Stack .Subroutine – Traffic signal controller, Subroutine documentation and parameter passing. Restart, conditional call & return instructions – Restart instructions, Conditional call & return instructions.

Module III (13 hours)

8085 Interrupt – RST instructions, An implementation of the 8085 interrupt, Multiple interrupts & priorities. 8085 vectored interrupts – Trap, RST 7.5, 6.5 & 5.5, Interrupt driven clock. Additional I/O concepts & processes – Programmable interrupt controller – 8259A, Director memory access. Basic interfacing concepts – Peripheral I/O instructions, I/O execution, Device selection and data transfer, Absolute v/s partial decoding, Input interfacing, Interfacing I/O's using decoders. Memory mapped I/O – Execution of memory related data transfer instructions, Safety control system using memory mapped I/O techniques.

Module IV (13 hours)

Introduction. Comparing micro processors & micro controllers. 8051 Micro controller hardware. External Memory– Correcting external memory. Timing, Timer modes of operation, Counting. Serial data Input/Output – Serial data interrupts, Data transmission, Data reception, Serial data transmission modes. Key boards – Human factors, Key switch factors, Key configurations, Program for key boards, Scanning program for small key boards, Program for a large matrix keyboard. Displays – Seven segment numberic display, Intelligent LCD display. Pulse measurement – Measuring frequency, Pulse

width measurement. D/A and A/D conversions – D/A conversions, A/D conversions. Multiple interrupts – Hardware circuits for multiple interrupts.

Reference

1. Ramesh S. Gaonker, Microprocessor Architecture, Programming and Applications with the 8085, 4th edition

2. Kenneth J. Ayala, The 8051 Microcontroller – Architecture Programming & Applications

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 506 Printing measurements and Control Instruments

Teaching scheme **Credit:** 3

3 Hours lecture and 1 Hr tutorial per week

Objectives: *Concepts about measurements are essential for an engineer to measure and evaluate a system.The paper provides relevant concepts and equipments used for selecting measuring instruments*

Module I (8 hours)

Limits, Fits and tolerances – reason for systems of limits – definitions and terminology – shaft based and hole based systems – types of fits – Tolerances – specifications – compound tolerancing – tolerance grades – Taylor's principles – limit gages.Linear and angular measurements – comparators – tool makers microscope – autocollimator – profile projector.

Module II (8 hours)

Geometric features – basic definition of straightness, flatness, parallelism, roundness, circularity, squareness etc. – principles and equipments for measurement – principles of interferometry Surface roughness – Definitions – General considerations – Tally surf – Profilometer – roughness indicators – symbols in geometric features.Gears – measurements and inspections of spur gears – tooth thickness, pitch, base pitch etc. – gauging of gears. Screws – Terminology – measurement and inspection of threads – major, minor, effective diameters, pitch. – gauging of screws.

Module III (10 hours)

Paper tester – Introduction. Optical Property Testers – Brightness meters, colorimeters, glossmeters, opacimeters, spectro colorimeters, spectro photometers. Printability property testers – Absorbency testers, densitometers, Dynamic property testers, expansimeters, coefficient-of-friction testers, Hydrostatic testers, linting testers, moisture meters, picking testers, relative humidity testers. End use property testers – Abrasion testers, adhesion testers, adhesive testers, basic weight testers, book strength testers, bursting strengths testers, compression testers, crush resistance testers, folding endurance testers, micrometers, puncture testers, roll coating testers, stiffness testers, tearing strength testers, tensile strength testers, wet strength testers, wick resistance testers. Multiple property testers. Ink testers – Introduction. Working property testers – colorimeters & spectrophoto meters, dispersion testers, drying time testers, drying time tester, film applicators, Ink film thickness gauges, film thickness gauge accessories, fineness-of-grind testers, Mixing scales, tack testers, tack tester accessories, viscometers, rotational viscometers, viscometer accessories, viscosity control instruments, viscosity cups, viscosity tubes, weight-per-gallon cups. End-use-property testers – Abrasion testers, exposure resistance testers, rub testers, shear/scratch testers. Process control instruments – Introduction. Photographic process control instruments – Calibration standards, Color control instruments, Densitometers. Densitometers – Densitometric terms & definitions, relationship between density & exposure, Densitometer types – visual densitometer, photoelectric densitometer, transmission, reflection & combination densitometer, practical used densitometer – calculating evenless of illumination-determining filter factor – exposure calculation

Module IV (10hours)

Densitometer accessories – dot area meters, exposure control meters, film inspection system, Light integrators. Stripping process control instruments – layout gauges, screen angle gauges, screen tint specification instrument. Plate making process control instruments – Dot gain meters, light integrators, optical depth gauge. Press process control instruments – blanket gauges, durometers, fountain solution control instruments, gravure proofing instruments, ink control instruments. MICR-quality control instruments – Packing gauges, scanning densitometers, speed recording instruments, web tension control instruments. General instruments – carton crease gauge, contact coaters, hand coaters, rotary coaters, illuminators, transparency, lighting inspection, magnifiers, stereo microscopes, pH meters, pH meters, buffer sets, printability testers, printability tester accessories, sheet splitters, sound level meters, specimen cutters, surface profile measurement instruments, tack testers, pressure sensitive materials, thermometers, viewing booths, Stroboscope, Synchroscope. Robots in Testing.

Text Book:

Gupta I.C , *A Textbook of Engineering Metrology*

Reference book

R K Jain *Industrial Metrology*, Khanna Publishers.
Jennifar Hohmans- Instruments for graphic Arts
Erwin Jaffe- Half tone photography

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 507(P): Printing Machines Lab- II

Teaching scheme **Credit:** 2
3 Hours Practical per week

Objectives: *To develop a practical knowledge in web offset machine.*

List of Experiments:

1. Preparation of impositions for web offset printing.
2. Film assembly & Platemaking.
3. Cocking the plate.
4. Study of pre-make ready & makeready operations of web offset machine.
5. To obtain single color print from web offset machine.
6. To obtain multi color print from web offset machine.

Internal Continuous Assessment mark *(Maximum mark 50)*
60%-Laboratory Practical and record

30%- Test
10%- Regularity in the class

Sem End Examination *(Maximum mark 50)*
70%-Procedure, conducting experiment, results, tabulation, and inference
20%- Viva voice
10%-Fair record

PT09 508(P): DTP Lab- II

Teaching scheme **Credit:** 2
3 Hours lecture and 1 Hr tutorial per week

Objectives: *To Develop a concept in designing and designing softwares.*

List of experiments:
1. Familiarising with key board.
2. M.S. Word-Justification works, column work, single column, double column, fonts & type style changing, copy & cut & paste command, word art.
3. Page Maker- Designing of visiting cards, page make up of pamphlets, page make up of advertisements, folders, journals, book work. Picture and text manipulation, Table work setting, tabular work setting.
4. Photo shop-Introduction, Picture editing, scanning the picture, converting image formats, resizing the images.
5. Corel draw- working principles, designing and practicing.
6. Comparing various outputs-Dot matrix, Inkjet printer, Laser printer, Digital printer.

Internal Continuous Assessment mark *(Maximum mark 50)*
60%-Laboratory Practical and record
30%- Test
10%- Regularity in the class
Sem End Examination *(Maximum mark 50)*
70%-Procedure, conducting experiment, results, tabulation, and inference
20%- Viva voice
10%-Fair record

SIXTH SEMESTER

PT09 601: Flexography

Teaching scheme **Credit:** 5
4 Hours lecture and 1 Hr tutorial per week

Objectives: *To impart an idea about flexo printing methods and its applications in the current scenario.*

Module I (18 hours)
Definition, flexographic printing, flexographic market, flexographic products, growth potential, Advantages of flexography, Press development. Mechanical principles of flexography – Fountain roll, Anilox roll, plate cylinder, impression cylinder. Basic elements of flexography – Print plate, cylinder,

integral, demountable, sleeves, magnetic. Gears. Mounting & proofing devices, flexographic printing press – unwind and in feed section, printing section, drying section, out feed and rewind section. Sheet fed flexo presses. Inks, variations on flexopresses

Module II (20 hours)
Introduction. Plates for process printing – Molded rubber plates – basics of rubber plate making, rubber printing plate components, rubber plate molding. Photo polymer plates – Basics of photopolymer plates. Types of Photopolymers – Plate making from liquid photo polymer, plate making from sheet photo polymer. Negatives, engravings and hard durometer. Photo polymer masters – preparation of metal and image exposure, powder less etching of metal, finishing, qualities of a good metal engraving, basic types of engravings, types of metal originals other originals. Molded printing plate manufacture – molding press, thickness control bearers, bench micrometers, rubber plate finishing. Auxiliary equipment needed to produce printing plate. Making the thermosetting mold or matrix – Composition of matrix, shrinkage and its control, matrix floor, determining thickness control bearers, preheat function, position molding, Pressure and caring requirements, matrix mold make-ready, procedure for molding a matrix. Rubber plate molding. Types of molded printing plate, care and handling of printing plates.

Module III (20 hours)
Flexo press types – Stack press, Central impression cylinder press, Inline press, Tension in flexographic m/c, Tension gear, tension levels and pattern for zones, Web tension contact systems. Unwind equipments – general, single-position unwind – flying-splice unwind, unwind tension systems, infeed unit, cooling drum a out feed unit. Rewind equipments – surface winders, center winders, rewind tension systems. Web guides. Printing stations – two roll, anilox roll, reverse angle doctor blade system, Deck control, Continuous inking, side and circumferential register control, Dryers. Mechanical components – CI drum, plate cylinders. Anilox roll – construction, cell structure, anilox roll wear, selecting the right anilox roll, chrome plating. Fountain rolls – formulating rubber for rolls, Flexo roller covering, Care of covered rolls, Properties of rubber regarding and polishing. Cooling rolls – Balancing flexo rolls, deflection of rolls. Unwind equipment. Repeat lengths increments – Direct drive quadrant geared press.

Module IV (14 hours)
Introduction. Checking the equipment. Operator care of equipment. Understanding the mounting instructions. Mounting and proofing a complete line job – Mounting procedure, proofing the first set of plates, proofing for printability, methods of prepress makeready, additional offline time savers, wrapping mounted cylinders. Miscellaneous procedures – removing plates from the cylinder, mounting metal-backed plates, reusing sticky back, plate staggering, use of release agents. Tools for the operator. Basic requirements for process colour printing. Press room practices. Environment and safety concerns. Flexo graphic substrates. Narrow web presses – Narrow web press components, Future narrow web flexography. Wide web presses. Corrugated presses. Pre printed linear presses. Future of Ink distribution system. Tomorrows flexographic plates. News print for water-base flexography. Markets for today and tomorrow.

References
Flexography principles and practices – Foundation of flexographic technical association.

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 602 Instrumentation & Control

Teaching scheme **Credit:** 4

3 Hours lecture and 1 Hr tutorial per week

Objectives:

- *To impart the basic concept and operating principle of various electrical and mechanical sensors used for measuring the mechanical and physical parameters in industrial process*
- *An introduction to control system and its analysis.*

Module I(10 hours)

Measurement terminology – calibration, accuracy, precision, sensitivity, errors in measurement. Basic mechanical detector – Transducer elements, Elastic transducers. Electrical resistance. Capacitance,

inductances. Differential transformers, CRO recording techniques. Pressure measurement – Bourdon gauge, diaphragms, mechanical & electrical resistance type secondary transducers, McLeod gage, bulk modules gauge.

Module II (14 hours)
Flat grid, Foil grid, Rectangular rosefte type electrical resistance strain gages, theory of operation, gage materials, gage factor, mounting techniques, moisture proofing, comparison between Ballast circuit & Wheatstone Bridge circuit, temperature compensation, calibration, strain measurement on static & rotary shaft.
Module III (14 hours)
Proper orientation of gages for measurement of axial & bending strains, block diagram of strain indicator, strain measurement CRO, paper & styles oscillograph, light beam oscillograph.Proving ring. Proving ring strain gage load cell. Hydraulic load cell, pneumatic load cell. Measurement of torque: cradled dynamometer, band brake, water brake, Torque meter. Temperature Measurement: Bimetallic Thermometer, constant volume thermometer. Vapour pressure thermometer, laws of thermocouples, thermocouple materials, optical pyrometer. Vibration: Vibration detectors, practical vibrometer, practical accelerometers.
Module III (16 hours)
Introduction, servomechanism, historical development – multivariable control systems, engineering examples of control systems. Mathematical models of physical systems. Examples of electrical, mechanical, thermal, liquid level, pneumatic systems. Transfer functions. Derivation of transfer functions for the above systems and D.C. motor with load, block diagrams.Signal time response of first order system, time response of second order systems, steady state errors and error constants. Concepts of stability, relative stability. Routh's stability criteria and Nyquist stability criteria.

Reference:

1. Wealey Publishing Company, Buck & Beck, With Mechanical Measurement. Addison
2. A.K. Sawhney, Dhanpat Rai & Sons.- Mechanical Measurements Instrumentation
3. I.J. Nagarth / M. Gopal.- Control Systems Engineering
4. Sirohi, Radhakrishna.- Mechanical Measurement
5. B.C. Nakra, K.K. Chaudhry.- Instrumentation Measurement & Analysis
6. Harrison & Bollinger.- Automatic Control Systems
7. Benjamin C. Kuo. - Automatic Control Systems

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Semester Examination

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*

	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 603: Design of Machine Elements

Teaching scheme **Credit:** 4

3 Hours lecture and 1 Hr tutorial per week

Objectives: *This paper aims at imparting knowledge about the factors that should be considered while designing a component so as to enable the design for manufacturing*.

Module 1 (13 hours)

Machine design – introduction – basic procedure – basic requirements of machine elements – Design of machine elements – traditional methods – standard in design – selection of preferred sizes – aesthetic and ergonomic consideration – mechanical properties – different types of steels – non ferrous materials – selection of materials. Design against static load – design against fluctuating load, Design of threaded joints, shafts, keys and couplings

Module II (15 hours)

Design of belt drives – chain drives – rolling contact bearings – spur gears – helical gears, worm gear

Module III (12 hours)

Hydrodynamic theory- sommerfeld number-dimensionless parameters-optimum journal bearings-design problem in journal bearings – newer bearing materials-types of antifriction bearings-static and dynamic and capacity- cubic mean load, variable load-selection of antifrictional bearings

Module IV (14 hours)

Design of shafts - forces on shafts due to gears, belts, and chains- estimation of shaft size based on strength and critical speed- selection of material. Design of springs- stresses and deflection in round wire helical springs- accounting for variable stresses- concentric springs- design of helical and leaf springs.

Reference:

1. Faires v m, Design of machine elements, the macmillan co, London.
2. Dobrovalasky, Machine Elements, MIR Publications.
3. Shigley, Mechanical Engineering design, McGraw Hill.
4. Design Data hand book , DAV printers, Coimbatore.

Text Books

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Semester Examination

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 604: Print Finishing and Converting

Teaching scheme **Credit:** 4
3Hours lecture and 1 Hr tutorial per week

Objectives: *To impart the knowledge about post press operation and converting process in printing industry.*

Module I (11 hours)
Buying Paper, Paper grades, Factors affecting buying of paper, Paper trade, An outline of the procedure for paper and board buying and an appreciation of the value of paper. Paper and board issue including covers for book and flat work. Binding Materials: Covering materials of all types, preparation and treatment in covering. Miscellaneous materials such as thread cords, tapes, mull, eyelets etc. Purchase, selection, care and use of all types of materials. Methods of dealing with fungi and insect pests.

Module II (15 hours)

Introduction, Principles of adhesives, operating parameters for adhesives – operative, wet tack, compression, solidification. Types of adhesives – Drying adhesives – solvent based adhesives, water based adhesives, pressure sensitive adhesives. Hot melt adhesives – pressure sensitive hot melts, applying hot melts. Curing adhesives – cure by mixing two or more components, cure when heated, exposure to moisture. Radiation curing, Ultra curing, Pressure sensitive adhesive. Styremic block copolymers – ultraviolet curing SBC's comparison of this stages involved in bond formation. Adhesive classes and Properties – Acrylics, animal glues, casein, starch, dextrin, pregelatinized starch, ethylene acetate copolymer, hot melts, polyamide hot melts, polyester hot melts, resin hot melts, natural rubber – latex adhesives, polyurethanes, polyvinyl acetate, poly vinyl alcohol, polyvinyliidene chloride, SBS and SIS block copolymers, styrene-bufadiene rubber, vinyle acetate copolymers, vinyl acetate – ethylene copolymers for liquid applications. Theories of adhesion – mechanical adhesion, chemical adhesion, theories of chemical adhesion – chemical reaction theory, absorption theory, electrostatic theory, diffusion theory, contact angle and wettability, surface modification.

Module III (14 hours)

General principles of the single knife guillotines. Semiautomatic and automatic programming systems, principles and applications. Three-knife pile trimmers, features and operations of semi automatic and continuous machines. Mechanism, operation and maintenance of guillotines and three-knife trimmers; causes and prevention inaccurate cutting. Production capacities. Basic principles of folding by buckle or combination machines. Setting and operating features, use of
predators, creasers and slifters; methods of delivery. Suitability of folding method and machine to job requirements and paper stock. Mechanism, operation and adjustment, of folding machines; causes and prevention of inaccurate folding; maintenance of machine feeders; production capacities.

Module IV (14 hours)

Principles of machine gathering types of machines available. Coupling of other units for in-line production. Insetting and wire stitching by semiautomatic and automatic means. Wire stitching, thread stitching, adhesive binding, sewing. General principles, materials used, styles, varieties and purposes of each method. Spiral wire binding, plastic comb binding, loose-leaf binders; thong and ring binders. Principles and operation of perforating, punching, drilling, round cornering, indexing, creasing, gluing, eyeletting, ruling and numbering. Varnishing, gumming and film lamination machines. Machines used for gathering, collating, insetting and attaching plates. Maintenance of these equipment for trouble free running; production capacities

Reference

1. A.G. Martin.- Finishing Process in Print Industry
2. U.S. Govt. Printing- Theory and Practice of Book Binding
3. Aurther W. Johnsori.-The Thames and Hudson Manual of Book Binding
4. Michael Barnard. -Introduction to Print Buying Printing, Bob Thompson, Materials Science and Technology

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 605 Screen Printing & Gravure

Teaching scheme **Credit:** 3

2 Hours lecture and 1 Hr tutorial per week

Objectives: *This paper helps to develop a basic concept about screen printing process and gravure industry*

Module I (9 hours)

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

Module II (10 hours)

Manual Printing Process, Semi automatic Screen Printing m/c. Automatic Screen Printing m/c. Screen Printing machines – Flat bet hinged frame, Flat bed vertical lift, Cylinder-bed presses, Container printing m/c, Rotary Screen Printing m/c, Carousel m/c. Special Machine configurations. Basic registration techniques. Method of halftone preparation for screen printing.

Drying methods – Evaporation, Oxidation, Penetration, Polymerization. Drying Equipments – Drying racks, wicket dryers, Jet dryers, Infrared dryers, Ultraviolet dryers. Flocking process.Introduction, Paper and Paper board, Wood, Textiles, Plastics, Metals, Ceramics and glass. Specialized Areas – Printed circuit boards of screen printing.

Module III (10 hours)

History of gravure, Gravure products and markets – Publication gravure – gravure packaging and converting – product gravure. Gravure Screens. Gravure cylinder preparation – Diffusion etch – Direct Transfer-Electromechanical process – Laser cutting. Electronic engraving systems today. Chemical engraving methods and equipments – cell configurations – advantages and disadvantages. Cylinder correction methods – Re-etching electro mechanical engravings, Colour balance etches, spot plating.

Well formation – variables, basic types. Cylinder construction and preparation – Cylinder design, types. Balancing the cylinder. Copper plating and polishing, Re use of cylinders. Doctor blade – Doctor blade assembly – Blade angles. Blade distance from Nip, Blade edge, Blade mounting. Doctor Blade wear – Fatigue, Corrosion, Abrasive, Adhesive wear, Doctor blade materials, Doctor blade holder configurations, Blade setting procedures, Preparing blade for use, Doctor blade problems. Gravure Impression Roller – function, Roller covering, Roller pressure, Cylinder diameter, Roller design & configuration. Balance – static & dynamic. Roller setting. New developments. Storage of impression rollers, Impression roller problems. Impression mechanisms – mechanical, hydraulic, pneumatic.

Module IV (7 hours)

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

Reference:

1. Babette Magee- Screen Printing Preview
2. John Stephens.- Screen Printing
3. GAA.- Gravure process and technology
4. Adams, Faux, Rieber. - Printing Technology

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*

	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 L01: Digital pre-Press

Teaching scheme **Credit:** 4

3Hours lecture and 1 Hr tutorial per week

Objectives: *This paper provides about the digital pre-press workstations in a printing industry*.

Module I (10 hours)

Structure of Digital Printed Product – Technological capabilities and work flows – Digital description of the Printed Page - Text - Images – Graphics – Layout - The digital page used as a basis from the digital description of the page to its printing. Digital Screening Process – RT Screening, Super cells, irrational screening, output options. Quality requirement – Input and Out put resolution Transferable tonal range – Dot shape tonal value influence in printing dot gain print characteristics curve . color management profile – image dependent effects & corrections.

Module II (14 hours)

Digital Photography: Origin, Image scanning with digital camera, Demands on the resolution special features – tone value quantization, focal length of lenses, aspect ratio, link up to a computer. Digital photography and color management. Digitalizing originals- scanner design & models- scanner technology – Digitalizing & redegitizing scanner operation and image processing sheet assembly and imposition – page make up & sheet assembly, full sheet output, full sheet production in the work flow, imposition through sheet work, imposition sheet & imposition layout, types of imposition programs, demand on imposition programs, imposition work flow

Module III (12 hours)

Rates Image process or (RIP) – structure & function, interpreter interaction, color data, Rip integration/ execution, workflow storage media- classification network- concepts & components, topologies, Data transfer, Ethernet, high speed networks, data formats.

Module IV (18 hours)

Color management – definition, image reproduction process – production of color profiles, structures of colours profiles, connection of colours profiles, rendering intent, colour management and standardization colour management concepts .Digital proof – proofing process Quality Control Press and pre press proofing –digital colour proofing and its limitations –usage of colour charts- 3M match print colour control elements – FORGA standards

Text books:

H. Kippan, Hand book of print media, Heidlberg.
The manual of photography Photography and digital imaging.

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

P ART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09L02: Computer Graphics

Teaching scheme **Credit:** 4
3Hours lecture and 1 Hr tutorial per week

Objectives*:* *Develop theoretical knowledge about computer graphics and its principles*

Module I (10 hours)

Introduction,The origin of computer graphics,working of interactive-graphics display,New display devices,General purpose graphics software,The user interface,display of solid objects,A line drawing displays-Display devices and controllers,Display devices,The CRT-electron guns,Deflection system,phosphors,Beam penetration CRT,shadow mask CRT.Inherent-memory,devices-Direct view stoarage tube,plasma panel,laser-scan display,the storage tube display,The refresh line-drawing display.Two dimentional transformations,transformation principles,concatenation,matrics representation-matrics formulation of transformations, concatenation of matrics transformations efficiency.The chipping and windowing-a line chipping algorithm,midpoint sub divisions,clipping other graphic entites,polygon clipping,viewing transformations,the windowing transformations.

Module II (15 hours)
Three dimensional graphics-realism in three dimensional graphics-molecular modeling,CAD, animation,simulation,Techniques for achieving realism-parallel projections,perspective projections,intensity curves,stereo scopic views,Kinetic depth effects,hidden-line elimination,shading with hidden surfaces removed,3D images.Modelling three dimensional scenes-cordinate system,modeling objects,cube representation,representing topology & geometry,structured three dimensional models,constructing models,Modelling & realism

Module III (15 hours)

Illumination models-ambient light,diffuse reflection,atmospheric attenuation,specular reflection,improving the point light source model,multiple light sources.Shading models for polygons-constent shading,interpolated shading,polygon mesh shading,gouraud shading,phong shading,problems with interpolated shading.Surface detail-surface detail polygons texture mapping,bump mapping,other approaches,shadow-scan-line generation of shadow,a two pass object-precision shadow algorithm, shadow volumes,a two-pass-z buffer shadow algorithm,global illumination shadow algorithms. Transparency- non refractive transperancy,refractive transparency,inter object reflectins,Physically based illumination models-improving the surface model, the microfacet distribution function, the geometrical attenuation factor,the fresnet term.Extended light sources,spectral sampling,improving the camera model,globel illumination algorithms,recursive ray tracing-efficiency considerations for recursive ray tracing-a better illumination model,Area sampling variations,distributed ray tracing,ray tracingfrom the light source.Radosity methods-radosity equations,computing form factors,substructuring,progressive refinement.computing more accurate form factors,specular reflection,combining radosity and ray tracing.

Module IV (14 hours)

Rendering pipelines-local illumination pipelines,global illumination pipelines,designing flexible renders,progressive refinement.Summery, Animation-conventional animation,computer assistance animation,interpolation,simple animation effects,animation languages-Linear-list notation-full eplicit control,procedural control,constraint based system,tracking live action,actors,kinematics and dynamics,physically based animation.Basic rules of animation.problems peculiar to animation summary.

Reference:

1. Computer graphics principles and practice 2nd Ed.-Van Dam,Foley,Fiener Hughes.
2. Principles of interactive computer graphics, 2nd Ed.,William N Newman,Robert S Sproull.
3. Computer graphics-Heam&Backer.
4. Precedural elements of computer graphics-David F .Rogers.

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	

PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 L03: Mechanics of Printing

Teaching scheme **Credit:** 4

3Hours lecture and 1 Hr tutorial per week

Objectives: *To know the mechanical aspects of printing***.**

Module I (10 hours)

Typical lithographic press design-Printing cylinders,Inking system-Dampening system-Three important phenomena-wetting-Ink contact angle-wet by ink,wet by fountain,Surface tension-young's equation-emulsification-NIP action-Theory behind the lithographic press,cylinder design-required printing pressures-for gravure,offset lithography

Module II (16 hours)

Rollers and rolling action-roller design properties-Mechanical construction,dead shaft roller design,live shaft roller design-ink receptive roller material-water receptive roller material,complaint rollers-rigid material-surface specification of rigid rollers and compliant rollers,Relation connecting surface speed (V) width of stripe(S).

Module III (15 hours)

Inking system design-inking rollers-Macphec's design requirements-over shot orientation-under shot,Types of metering elements-continuous blade-segmented blade,discrete elements-discrete elements with cover-ductor mechanism-dynamic behavior of inking system-long term and short term behavior,Relationship between print density and ink feed rate,heat generation in inking system- heat generation due to film slitting(Qfs)-due to vibration action (Qva) due to slippage due to cyclic straining(Qcs)

Module IV (13 hours)

Web presses – categarisation of web press- heat set –non heat set- web guides- web tension-role of capstan roller-capstan equation for controlling web tension –wrap angle- relation ship between velocity and tension of web.

Text book:

JohnMacphee, GATF Press, Fundamentals of lithography printing, Volume I Mechanics of printing.

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 L04 Production & Operation Management

Teaching scheme **Credit:** 4
3Hours lecture and 1 Hr tutorial per week

Objectives:

- *To impart the concepts, model and behaviour of production and operation management*
- *It emphasizes the analysis and quantitative techniques and overall role of operations management in organization*

Module I (16 hours)
Definition, Types of production systems: Job production,Batch Production,Continuous production, Functions, Production – consumption cycle.Organization of RRC. Section conventional organisation structure – variations, central and decentralized PPC in case of multiplant establishment.Product development and design – Effect of company policy and competition on design Product analysis – Marketing Aspect functional aspect – operational aspect-durability and dependability aspect-atheistic aspect.Economic analysis – profit and competiveness standardization – simplification – preferred numbers – break-even analysis, profit volume charts for single product and multiproducts – production aspects.

Module II (14 hours)
Factors affecting plant location, types of layouts, use of load travel chart calculations in layout planning. Process analysis – use of flow process charts, activity charts, (man-machine charts), Production master program, route sheet (process sheet), job cards Calculations for requirements of equipmenymanpower. Sales forecasting: use of forecasts, types of forecasts, forecasting techniques –

qualitative methods – quantitative methods – time series methods – trend line, calculation of seasonal indices – moving average – weighted moving average – exponentially weighted' moving average (exponential smoothing) – correlation technique. Forecast control – MAD,MSE, tracking signal.

Module III (12 hours)

Inventory control**:** Classification of inventories – ABC analysis ordering cost, carrying cost, setup cost. Economic order quantity determination: 1) Instantaneous Delivery, 2) Delivery over a period of time 3) Instantaneous delivery with shortage permitted, 4) Delivery over a period of time with shortage permitted. Effect of quantity discount on order size; reorderpoint, leadtme, safetytock, graphical representation, M.R.R. (material Requirements Planning)- M.R.R. Concepts, Inputs and Outputs, M.R.R. Logic problems.

Module IV (12 hours)

Aggregate Planning:Trial and error method,use of transportation algorithm; master production schedule. Job Shop Scheduling: Index method of loading (Ref: Sheets, Weatermann and Wimmert). Scheduling methodology – Gantt charts; shortest processing time (SPT) rule. Critical Ratio Rule; sequencing of 'n' jobs through: machines (Johnson's rule) 'n' jobs through 3 machines, 2 jobs through 'm' machines.

Reference books:

1.Production/ Operation Management – Anantha.K

2.Production and Operation Management Concepts, models and behaviour (3rd edition) – Everett E. Adam.Jr.,Ronald J. Ebert

3. Modern production/ Operations Management (8th edition) – Elwood S .Buffa, Rakesh K. Sarin.

4. Elements of production Planninng and control – Samuel Eilo.

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	

	Maximum Total Marks: 70

PT09 L05: Management Information System

Teaching scheme **Credit:** 4
3Hours lecture and 1 Hr tutorial per week

Objectives: *This course will introduce the methods and the influence of the information systems in management milieu and use MIS as an effective tool in management and decision making*.

Module I (13 hours)
Evolution of MIS concepts - concept of information - definition of information - information in the mathematical theory of communication - mathematical definition of information - entropy - redundancy - data reduction - classification and compression - organisational summarising and filtering inference - age and quality of information concepts to information system design - system concepts - definition of a system - characteristics of a system - types of systems - deterministic and probabilistic - closed and open systems - law of requisite variety - filtering - system concepts applied to MIS - integrated system vs total system - human being as Information processor and its implication for MIS design - basic model of manual information processing system - comparison with computer systems - limits on human processing

Module II (13 hours)
Structure of MIS - basic structural concepts - operational elements - synthesis of MIS structure - conceptual and physical extent of integration and the extent of man/machine interaction - methedology of system design - feasibility study data gathering techniques documentation - forms design - codification and classification

Module III (14hours)
MIS support for planning and control - planning and control process - strategic planning - tactical planning - operation controls - their requirements and relevant support from MIS - MIS support for marketing function - marketing function - product introduction, pricing - enlarging the market and channel strategies - their requirements and relevant support from MIS design - MIS support for personnel function - personnel administration - database consideration - personnel status reporting system - personnel action data system - relevant support from MIS - MIS support for finance function - financial status and status change - payment control - credit control and material control - support from MIS - MIS support for production function - production planning and control - quality control - waste and rejection

Module IV (14 hours)
Development of MIS - approaches to the development of MIS, bottom up and top down approach - determining information requirements - decision analysis approach - data analysis approach - evolution of the decision and data analysis alternative - techniques and technology for MIS development - process - driven/forms driven methods - evolution of system analysis and design technique - information system audit - review of documentation procedure - evaluating the utilisation and output quality - audit for system security - future trends in MIS - sociological considerations

Text book

1. Davis G.B. & Olson M.H., Management Information Systems - Conceptual Foundation Structure And Development.

Reference books

1. Ross & Murdick G.R., Information Systems for Modern Management, Prentice Hall
2. Ross J.E., Information Systems, Prentice Hall
3. Lucas H.C. Jr., Analysis, Design and Implementation of Information Systems
4. Saiders D.H., Computers Today, Tata McGraw Hill
5. Martin J.L., Information Management, The Dynamics of MIS, Tata McGraw Hill

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 607(P) Print Finishing Lab

Teaching scheme **Credit:** 2

3Hours practical per week

Objectives: *To develop a basic knowledge in the post press operation of printing*

List of experiments

I Study of various controls, operations and mechanisms of the following machines: 1. Folding Machine. 2. Guillotine Machine. 3. Cutter and Greaser. 4. Varnishing Machine. 5. Laminating Machine. 6. Sewing and Stitching Machine.
Miscellaneous Machine.

II. **Preparation of the following types of bindings**: 1. Half Bound Account Books 2. Full Bound Books. 3. Perfect Binding. 4. Loose-Leaf Binding. Knowing the tools, equipments and machines in department, knowing and handling the materials.

III. **Preparation of**: a) Saddle/side stitched Booklets. b) Saddlegiat sewing of Booklets, magazines. c) Receipt Book of 25 receipt in triplicate. d) Quarter Bound Note Book – flush sewing. e) Quarter Bound A/c books sewing on tapes. Binding of Half Bound A/c Book – constructive aspects through durability will be obtained. Binding of full bound, case bound, Publishers. Book emphasis will be given on decoration – Print finishing operation – Gold blocking, embossing, edge decoration, etc.

IV. **Preparation of:**

a) Court case file, b) Tag binder, c) Portfolio, d) Loose leaf book, e) Cheque book, Perfect Bind binding, g) Preparing of old books.

Internal Continuous Assessment mark *(Maximum mark 50)*
60%-Laboratory Practical and record
30%- Test
10%- Regularity in the class

Sem End Examination *(Maximum mark 50)*
70%-Procedure, conducting experiment, results, tabulation, and inference
20%- Viva voice
10%-Fair record

PT09 608(P) Screen Printing & Flexo Lab

Teaching scheme **Credit:** 2
3Hours practical per week

Screen Printing:
1. Study of various types of Screen Materials.
2. Make ready for Screen Printing – Printing of Letterheads and Visiting Cards.

Flexo Laboratory:
1. Mounting of Stereos and Polymer Plates.
2. Setting the machine for a Two colour Printing.
3. Printing on Paper and Plastics.
4. Preparation of Screen Line and Column.

Internal Continuous Assessment mark *(Maximum mark 50)*
60%-Laboratory Practical and record
30%- Test
10%- Regularity in the class

Sem End Examination *(Maximum mark 50)*
70%-Procedure, conducting experiment, results, tabulation, and inference
20%- Viva voice
10%-Fair record

SEVENTH SEMESTER

PT09 701: Packaging Technology

Teaching scheme **Credit:** 5

4Hours lecture and 1 Hr tutorial per week

Objectives: *This paper deals about the importance of packaging and the technology used for creating good package according to the product.*

Module I (20 hours)

Introduction, Function of a package, Factors influencing design of a package, Computer, Aided, Package Design, Packaging Cycle, Product Package Relationship, Product of curve, Elements of Package Design, Classification of Packaging – Flexible package type, Rigid package types. Hazards on package – Mechanical, Climatic, Biological and other hazards. Markings on package – Handling marks, routing marks, information marks. Tests on Package – Mechanical test – Drop test, Vibration test, Compression test, Inclined impact test, Rolling test, Drum test, Climatic test – Rain test, Sand and dust test., Salt spray test, Fungus resistance test, Shelf life, Rancidity, Corrosion - Shelf life, Rancidity, Corrosion – Types, cause, Classification of corrosion prevention methods. Desiccants. Cushioning Materials – Functions, properties, Classifications – space fillers, resilient cushioning materials, properties. Classifications – space fillers, resilent cushioning materials, non resilent cushioning materials. Expanded polystryrene – process of manufacturing, advantages, applications.

Module II (20 hours)

Wood-classification, effect of moisture on wood, preservation of wood, advantages. Board-types, paper-types Glass- properties, advantages, types, basic approaches to designing a bottle, production process of glass, tests on glass-annealing test, thermal shock test, pressure test, impact test, density test. Plastics-BOPP.HDPE, LDPE, LLDPE, PVC, PP, PET, Polyolefins, Celluosics, Polymides, Nylon-6 – advantages, functions & applications. Tests on plastics, process of making plastic sheets. Classifications of plastics. Metals – functions, uses, cross section of in plat, tin plate, black plate. Aluminium foils – Manufacturing of foil, properties, applications, method of laminating foil to film or paper.

Module III (20 hours)

Dies – unit die jigged die. Carton style. Folding cartons – Production steps, types. Corrugated containers – classifications, components in a corrugated board, flutes, stages in preparation in corrugated boards. Plastic corrugated boards – features & advantages.Gas packaging – MAP & CAP, Vaccum packaging, shrink packaging, stretch wrapping blister packaging, skin packaging, strip packaging, Aerosal packaging – Aerosol valve assembly cross section of Aerosol container, working principle. Vaccum metalization. Injection Blow Moulding, Extrussion blow moulding, Extrusion. Injection Molding, Compression molding, transper molding, thermo forming. Vaccum forming – Drape forming, Snap back forming, Plug Assist forming. Pressure forming. Matched mould forming. Thermo form/fill/seal- Horizontal machine, Vertical machine.

Module IV (12 hours)

Futuristic trends in packaging. Advancements in food packaging. Environmental implications of packaging – recycling, Pyrolysis. Legal aspects in packaging. Designing –Cans, metal tubes, Plastic tubes. Closures-screw caps, Snap-on caps. Adhesive tapes – Fabric tapes, Paper tapes, Film tapes, Foil tapes, Foam tapes, Two faced tapes. Labels – Basic elements of correct labeling, Purpose types.

Reference.

1. Frank Paine.- Packaging design and performance.
2. John Briston.-Advance in Plastic Packaging Technology.
3. Packaging design an introduction - Laszlo Roth.
4. Packaging Technology – Volume I - IIP

5. Packaging Technology – Volume II - IIP
6..Packaging Technology – Volume III – IIP

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 702 Electrical Drives and Controls

Teaching scheme **Credit:** 4
3Hours lecture and 1 Hr tutorial per week

Objectives: Understand the fundamentals of various power electrical components.
Understanding the basic principle and operation of drives.

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Module I (13 hours)
Silicon Controlled Rectifier-structure- V-I Characteristics- turn-on Characteristics-gate – gate triggering circuits-turn on characteristics- turn-off characteristics-methods of turning off- series and parallel connection of SCRs.Structure and characteristics of GTO thyristors, power diodes, power transistors, power MOSFET and IGBT-working of TRIAC

Module-II (13 hours)

Basic principle of Electric Drives – Block diagram – Parts of Electrical Drives – Dynamics of electric drive – torque equation -speed torque conventions – loads with rotational and translational motion – components of load torques – nature and classification of load torques – load equalization – control of electrical drives – closed loop speed control – current limit control – closed loop torque control – speed sensing current sensing – phase locked loop control.

Module III (14 hours)

Dc motor drives – basic equations – constant torque and constant power control – fully controlled and half controlled converter fed DC drives – continuous and discontinuous operation – two quadrant operation – three phase controlled rectifier fed dc drives – dual converter fed control – chopper fed DC drives – closed loop control scheme for control below and above base speed .

Module IV (14 hours)

Three phase induction motor drives – AC Voltage controlled drives – variable frequency control -V/f control- VSI fed induction motor drive – operation with field weakening – CSI controlled induction motor drives – slip power recovery scheme – rotor frequency control – single phase induction motor drives – PWM Drives Synchronous motor drives – methods of speed control- VSI and CSI fed drives – variable frequency control – self controlled synchronous motor drives – brushless dc motor drives.

Text book:

1. H. Rashid: Power electronics, 3rd edition Pearsons Educations
2. Ashfaq Ahmed: Power Electronics for Technology, Pearson Education
3. Dubey G K : Fundamentals of Electrical drives
4. R. Krishnan : Electric Motor Drives- Modeling Analysis & Control

Reference:

1. Vedam Subramaniam: Thyristor control of Elecric drives
2. Sen P C Thyrister DC Drives
3. Singh MD & Khandhandani K B : Power Electronics, McGraw Hill
4. Dubey G K Thyristorised Power controllers.
5. Bimbhra : Power Electronics
6. Ned Mohan et-al: Power Electronics, John Willey
7. P.C Sen Power Electronics, McGraw Hill

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*

	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 703: Tone and Color Analysis

Teaching scheme **Credit:** 3

2Hours lecture and 1 Hr tutorial per week

Objectives: *This paper deals about the concept of tone and the role of color management in printing.*

Module I (10 hours)

CIE- Spectral reflectance- CIE color standard – standard observer- tristimulus values Munsell- Munsell Hue circle- CIELAB, CIELUV, metamerism, Memory color- color management- Introduction- WYSWYG- functions of color management- color management module-Color engine- functions of CMM-Principle of color management- models of color management, RGB, HSB,ICC- Colorimeter and spectrophotometer- color calibration.

Module II (10 hours)

Introduction, development of electronic publishing, basic elements of scanners, principles of electronic scanning – basic of electronic scanning- pixels-binary resolution- AM, FM Screening- digital halftones- basic scanner types-pantone-focal tone- trumatch- special/spot color- application of special color- digital images- sampled images-bitmap- raster- vector graphics. Scanning-automated scanning software, copy dot scanning and rescreening. Image capture elements- photomultiplier tubes, charged coupled device. Scanner adjustments, Scanner workflow, scanner resolution, scanner choice, preparing originals for scanning, types of scanners, working and their advantages. Tone adjustments- White, black point adjustments, gradation, color adjustments, automatic scanners adjustments, color separation.

Module III (10 hours)

Types of originals- transparencies- the ideal transparencies- color correction – need for color correction- Masking- Integral color masking – color printing using standard inks- digital color separation- ink color sequence- brief intro to manual retouching- masking for color correction- types of masking- positive masking- negative masking- double overlay masking- integral color masking – dye retouching-chemical correction or reduction – positive dot etching- intensification- unsharp masking- grey balance and tone reproduction.

Module IV (6 hours)

Densitometry- type of densities- specular – diffuse- double diffuse density- color printing- factors in color printing- -printed color density- n trapping- tone value- additivity and proportionality failure- UCR- GCR- color control strips and punch register system- duo ones- dot area measurement- Murray Davis equation and Yule nelson correction.

Reference books:

1. Principles of color reproduction- J.A.C. Yale

2. Color – Robin B. McAllister

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 704: Printing Machinery and Maintenance

Teaching scheme **Credit:** 3

3Hours lecture and 1 Hr tutorial per week

Objectives:

Machinery maintenance has a major role in printing industry. This paper provides a basic knowledge about machinery maintenance and its control.

Module I (8 hours)

Maintenance management- Objective of maintenance management- Maintenance functions- Types of maintenance activities – maintenance planning, scheduling and control, maintenance records – contract maintenance- Training of maintenance staff- Human factor in maintenance. Modern trends- Application of computers in maintenance.

Module II (10 hours)

Equipment needed for erection – selection of location and environmental conditions- erection procedure for various prepress. printing and finishing equipments and machinery- loading and transport of raw materials and printed products with respect to layout design- commissioning- various test forms.

Module III (10 hours)

Reconditioning-Principles of reconditioning-repair methods of various parts- roller copperising and rerubberising- ebonite covering- dampening and inking systems- paper transport systems- cylinder bearing supports- eccentrics.

Lubrication and lubricants- Purpose of lubrications- types of lubricants- lubricating instructions for machine operators- replacement of lubricants- lubrication chart- annual lubrications. Replacement schedule- paint marks for lubricating points on the machines- regeneration of used oils.

Module IV (8 hours)

Maintenance of electrical systems- AC motors and DC motors- electro magnetic friction couplings. Electromagnets- magnetic starters and contractors- limit switches- knife switches- micro switches- starting and regulating rheostat- electric panels- electrical apparatus and electric wiring on the machines

Reference:

1.H.P. Garg, Industrial maintenance, S.Chand &Company ltd.
2.Jerry Wireman, Computerised maintenance management systems, Industrial press Inc.,
3.Lewis and Tow, Readings in maintenance management, Cohners Books.
4.A.S Porter, A manual of Lithographic press operation, Lithographic trading services.
5.Lithographers manual, Graphical arts Technology Foundation, USA.
6. Herschel L.Apfelberg, Maintaining printing equipment, GATF
7. Barbara, L.Albinini and others, Solving web offset press problems, GATF
8. Pamela Groff and others, Lithographic Press operators Handbook

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*

	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 Lxx

PT09 Lxx

PT09 707(P) Tone and Color Analysis Lab

Teaching scheme **Credit:** 2

3Hours lecture and 1 Hr tutorial per week

Objectives: *To impart a basic knowledge about color and its measuring instruments.*

List of Experiments:

1. Familiarizing with half tone & continuous tone copy.
2. Familiarizing with color management softwares.
3. Color measurements by using
    i. Spectrophotometer.
    ii. Colorimeter.
    iii. Densitometer.
4. Calibration of devices-Scanner, Printer, Monitor.
5. Dot area measurement by using dot area meter.
6. Dot area measurement by using Murray Davis Equation.
7. Dot area measurement by using Nauebauger equation.
8. Familiarizing of quality control aids
    i. Color control charts
    ii. Fogra Charts.
    iii. GATF Charts.

Internal Continuous Assessment mark *(Maximum mark 50)*

60%-Laboratory Practical and record

30%- Test

10%- Regularity in the class

Sem End Examination *(Maximum mark 50)*

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

20%- Viva voice

10%-Fair record

PT09 708(P) Packaging Technology Lab

Teaching scheme **Credit:** 2
3Hours lecture and 1 Hr tutorial per week
Objectives*:* *To Know about designing and preparation of package designs*.

List of Experiments:
1. Preparation of layout - Parallel tuck-in, Reverse tuck- in, Auto-lock bottom
2. Designing and Preparation of various flexible packages
3. Designing and Preparation of various rigid packages
4. Study and operation of various packaging machines.
5. Study of manufacturing of various types of corrugated boards.
6. Cutting, creasing, and building up corrugated boards.
7. Designing and preparation of various designs of paper bags.
8. Test conducted on Cartons, Corrugated packages, wooden packages.
9. Drop test, Vibration test, inclined impact test, compression test, rolling test, Drum test.

Internal Continuous Assessment mark *(Maximum mark 50)*
60%-Laboratory Practical and record
30%- Test
10%- Regularity in the class
Sem End Examination *(Maximum mark 50)*
70%-Procedure, conducting experiment, results, tabulation, and inference
20%- Viva voice
10%-Fair record

PT09 709(P): PROJECT

Teaching Scheme **Credit:** 1
1 hour practical per week
Objectives

- *To judge the capacity of the students in converting the theoretical knowledge into practical systems/investigative analysis.*

Project work is for duration of two semesters and is expected to be completed in the eighth semester. Each student group consisting of not more than five members is expected to design and develop a complete system or make an investigative analysis of a technical problem in the relevant area. ***The project may be implemented using software, hardware, or a combination of both.*** The project work may be undertaken in ***PRESS, PRE- PRESS & POST- PRESS*** and must have relevance

in ***printing Technology.*** Project evaluation committee consisting of the guide and three/four faculty members specialised in ***Printing Technology*** *will* perform the screening and evaluation of the projects.

Each project group should submit project synopsis within three weeks from start of seventh semester. Project evaluation committee shall study the feasibility of each project work before giving consent. Literature survey is to be completed in the seventh semester.

Students should execute the project work using the facilities of the institute. However, external projects can be taken up in reputed industries, if that work solves a technical problem of the external firm. Prior sanction should be obtained from the head of department before taking up external project work and there must be an internal guide for such projects.

Each student has to submit an interim report of the project at the end of the 7th semester. Members of the group will present the project details and progress of the project before the committee at the end of the 7th semester.

50% of the marks is to be awarded by the guide and 50% by the evaluation committee.

Internal Continuous Assessment	
20% - Technical relevance of the project	:
40% - Literature survey and data collection	
20% - Progress of the project and presentation	:
10% - Report	
10% - Regularity in the class	

EIGHTH SEMESTER

PT09 801 Print Management Costing and Estimating

Teaching scheme **Credit:** 5

4Hours lecture and 1 Hr tutorial per week

Objectives: *To impart the knowledge about the functions of costing and estimating process in printing industries.*

Module I (17 hours)

Printing management, Management principles, Management functions, Organizational criteria, Skills requirements, Types of business, Printing company management structures, Management team responsibilities, Business plan, Management styles, Management decisions, Communications, Print marketing and sales – marketing sales.

Module II (20 hours)
HRM for printing, employment policy, evaluation of skills requirements for printing occupations, recruitment, job evaluation, staff appraisal, motivation training, human resources factors that limit productivity, staff flexibility. Manning and training requirements, States of industry, Analysis and development of human resources strategy. Management personal skills and development, job satisfaction through involvement. Single & double entry book keeping system. Objectives of bookkeeping. Meaning of journal, ledger, debit, credit, asset, liability & capital. Differences between journal and ledger. Formats of journal & ledger. Types of accounts. Journalising rules, problems. Trial balance meaning & format. Format of balance sheet & income statement, contents to be explained. Ratio Analysis – Liquidity ratios, leverage ratios, turnover ratios, profitability ratios. Problems.

Module III (20 hours)
Cost accountancy & its subjects, relationship of cost & financial accounting, cost accounting & management accounting, costing as a basis for estimating, the purpose of cost accounting, advantages of cost accounting, installation of costing systems, costing system for printing industry & related problem.The concept of cost, Analysis of cost, elements of cost, The costs which are to be ascertaines. Procedure of linking costs with cost, centers & cost units, Methods of cost finding. Overhead – classification. Allocation & apportionment, Over head absorption rates & problem.

Module IV (15 hours)
Purpose and functions of estimating from printer point of view & customers point of view. Difference between costing & estimating. Qualifications of an estimator, working environment, estimators tools, estimating paper – selection of paper, allowance for waste, allowance for trimming, weight of loose sheets, weight of a reel of paper. Estimating ink – Ink consumption formula, Ink allowance for spoilage, Estimating binding materials – Board requirement, estimating covering materials, estimating sewing thread, estimating stitching wire, estimating adhesives. Terms and conditions – approved by AIFMD.

Reference:
1. B.S. Raman, Principles of Accounting
2. Prasanna Chandra. - Fundamentals of Financial Management

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*

	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 802 Quality Control in Printing

Teaching scheme **Credit:** 3
2Hours lecture and 1 Hr tutorial per week

Objective: *This paper gives knowledge about the quality control aids and importance of testing in printing.*

Module I (8 hours)
Introduction-Definition of quality, Quality control, its meaning and purpose. Setting up a quality control programme and establishing necessary procedures, economic consideration. Management responsibility. Quality systems and ISO 9000. Materials control-Establishing clear specifications and standardization of materials to be purchased. Inspection and testing of incoming materials as part of quality control, importance of proper handling and maintenance of records of performance of materials, Sampling.

Module II (10 hours)
Requirement of quality control devices, Functions, Classifications – Diagnostic quality control devices, Process control devices, Standardization control devices.
Types of process control devices- Half tone test wedge , Copy line step wedge, Transparent step wedge, proof control wedge, Contact indicator, Applied image density patches, Brunner control strips, Exposure test target, Film process control strips, Reflection gray scale, Transmission gray scale, Paper gray scale, Color test strips- RIT, print control strips- Brunner, Color control bars- GATF, Color control strips- GRETAG, Dot gain scale, Slur gauge, Dot gain scale for middle tone, Production control bars, Image control mark system, News dot, Six color control bar, Rapid access control strips, Sensitivity guide, Plate control wedge.

Module III (12 hours)
Types of standardization control devices – AGFA GEVALUX wedge, Copy color CCX calculator, Dot size comparator, Reflection density guide, Color reproduction guide, Light indicator, Gray balance chart, Half tone gray wedge, Mechanical ghosting form, Camera focusing template, Contact screen cutting template, Gray balance & Tone reproduction selector, Contact element, Sensitivity guide.Types of diagnostic control devices- Applied image metric general test chart. Applied image metric large area test chart, Applied image setter, Star target, Test plate negative set, Strip for plate making, Ladder target, News paper test form kit, Register test grid, Screen angle guide, Alphanumeric resolution test objects, Process ink gamut kit, Screen pattern analyzer and rescreening key.

Module IV (6 hours)

Quality control instrumentation-Paper and board testing instruments, Ink testing instruments, process control instruments, devices and aids used in camera, darkroom, stripping department, plate room and press room. Press sheet control devices for color printing. Minimum instrumentation necessary to produce a product consistent with the appropriate quality level.

References:

1)Miles Southworth and Donna Southworth. Quality and Productivity in the Graphic Arts. Graphic Arts Publishing Company(1980)
2)Douglas C. Montgomery, Introduction to Statistical Quality Control, John Wiley(1985)
3)Brian Rothery, ISO 9000, Productivity and Quality Publishing Private Ltd
4)Kelvin Tritton, Colour Control for Lithography, PIRA International.
5)Mortimer, A Colour Reproduction in Printing Industry PIRA International.
6)Phil Green Quality Control for Print Buyers, Blue Print
7)J.P Casey (Ed) Pulp and Paper Chemistry and Chemical Technology, Vol II Wiley interscience
8)Ronald E. Todd, Printing Inks – Formulation Principles, Manufacture and Quality Control Testing Procedures. PIRA International.
9)H.L Apfelberg and M.J. Apfleberg, Implementing Quality Management in Graphic Arts, GATF.

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 Lxx

PT09 Lxx

PT09 805(P) Seminar

Teaching scheme **Credit:** 2

3Hours per week

Objective: *To assess the ability of the student to study and present a seminar on a topic of current relevance in printing technology or allied fields.*

It enables the students to gain knowledge in any of the technically relevant current topics and acquire the confidence in presenting the topic. The student will undertake a detailed study on the chosen topic under the supervision of a faculty member, by referring papers published in reputed journals and conferences. Each student has to submit a seminar report, based on these papers; the report must not be reproduction of any original paper. A committee consisting of three/four faculty members will evaluate the seminar.

Internal Continuous Assessment

20% - Relevance of the topic and literature survey
50% - Presentation and discussion
20% - Report
10% - Regularity in the class and Participation in the seminar

PT09 806(P) PROJECT

Teaching scheme **Total Credits:** 7

11 hours practical per week Credits for interim evaluation: 2

Credits for final evaluation: 5

This project work is the continuation of the project initiated in seventh semester. The performance of the students in the project work shall be assessed on a continuous basis by the project evaluation committee through progress seminars and demonstrations conducted during the semester. Each project group should maintain a log book of activities of the project. It should have entries related to the work done, problems faced, solution evolved etc.

There shall be at least an Interim Evaluation and a final evaluation of the project in the 8th semester. Each project group has to submit an interim report in the prescribed format for the interim evaluation.

Each project group should complete the project work in the 8th semester. Each student is expected to prepare a report in the prescribed format, based on the project work. Members of the group will present the relevance, design, implementation, and results of the project before the project evaluation committee comprising of the guide, and three/four faculty members specialised in Printing or allied fields.

50% of the marks is to be awarded by the guide and 50% by the evaluation committee.

Internal Continuous Assessment
40% - Design and development/Simulation and analysis
30% - Presentation & demonstration of results
20% - Report
10% - Regularity in the class

PT09 807(P): Viva-Voce

Objective **Credits : 3**

- *To examine the knowledge acquired by the student during the B.Tech. course, through an oral examination*

The students shall prepare for the oral examination based on the theory and laboratory subjects studied in the B.Tech. Course, seminar, and project. There is only university examination for viva-voce. University will appoint two external examiners and an internal examiner for viva-voce. These examiners shall be senior faculty members having minimum five years teaching experience at engineering degree level. For final viva-voce, candidates should produce certified reports of mini project, seminar, and project (two interim reports and main report). If he/she has undergone industrial training/industrial visit/educational tour or presented a paper in any conference, the certified report/technical paper shall also be brought for the viva-voce.

Allotment of marks for viva-voce shall be as given below.

Assessment in Viva-voce
40% - Subjects 30% - Project 20% - Seminar 10% - Industrial training/industrial visit/educational tour or Paper presented at National-level.

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ELECTIVES

PT04 L06: Operations Research

Teaching scheme **Credit:** 4

3Hours lecture and 1 Hr tutorial per week

Objective:

- This gives a new approach to the systematic and scientific study of the operations of the system.
- It provides a good intellectual support in making decisions and coordination of the policies of different components.

Module I (13 hours)

History and development of O.R. - linear programming - formulation of L.P.P - graphical solutions - simplex method - two-phase method - dual and its solutions - sensitivity analysis

Module II (13 hours)
Transportation and assignment problems - formulation and solution - test for optimality - cases of degeneracy Net work techniques - networks: PERT / CPM. Computation of critical path - float - crashing and resource leveling - minimal spanning tree problems - shortest route problem - maximal flow problem

Module III (14 hours)
Queuing theory - types of queues - poisson arrival exponential service - single server queues - multiple server queues - introduction to simulation techniques - Monte Carlo simulation (no problems) - theory of games - decision making under certainty - uncertainty and risk - maxi-mini and mini-max principles - saddle points - solution of simple problems

Module IV (14 hours)
Dynamic programming - concept of stages - principles of optimality - application in deterministic and simple probabilistic situations - integer programming - method of integer programming - formulations - cutting plane algorithms branch & bound algorithms

Reference books
1. Sharma S.D., *Operations Research*, Kedarnath Ramnath
2. Taha H.A., *Operations Research*, Prentice Hall of India

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	

	Maximum Total Marks: 70

PT04 L07: Total Quality Management in G.A.1

Teaching scheme **Credit:** 4

3Hours lecture and 1 Hr tutorial per week

Objective*: Deals about total quality management process in graphic arts industry.*

Module I (15 hours)

Embrace the tenets of tqm, definition of quality and related terms, basic elements of tqm, characteristics, advantages, holistic features, application of quality concept, quality principles, tqmmodels-kaizen, european quality awards, malcom baldridge award, deming prize, indian quality awards, motorola 6 sigma concepts, zero defect quality, quality by design. quality gurus and their contribution-deming, crosby, taguchi, ishikkava, juran. bench marking processes & practice, re-engineering. statistical process control (spc), purpose of spc,spc tools-process maps, ishikawa diagrams, check sheets, pareto analysis, histograms, run charts, contact charts, correlation diagrams, monitoring variables- xbar/r-chart, monitoring print attributer-p-chart, counting defects-c-chart. manufacturing categories-project oriented process, job shop oriented process, assembly oriented process, continuous oriented process.

Module II (15 hours)

conventional wisdom. cost of quality and categories. relationship between the cost element & strategies for cost reduction. implementing a quality cost measurement system. data collection and analysis. reasons for collecting data. data collection principles. measurement of critical print variables. 100% inspection. statistical sampling. acceptance sampling by attributes. acceptance sampling by mil-std-iose. attributes v/s variables. disadvantages of monitoring attributes. the plan-do-check-act cycle. Problem solving tool kit. Case study of customer satisfaction (printing industry).

Module III (12 hours)

Introduction, example to illustrate the PCS, distribution displaying skew ness, distributions that are multi model or random, distributions displaying kurtosis, comparing natural o/p of the process to man-made specification imposed up on it. process capability indices, making predictions based upon the findings, comparison of design of experiments to statistical process control, fundamentals of doe (design of experiments), one variable at a time (ovat) v/s doe, steps in designing the experiment, analysis of experiment, evolutionary operation (evop) and response surfaces.

Module IV (12 hours)

Historical development, benefit of quality improvement teams, developing a quality team effort, soliciting quality-oriented projects, issues to avoid, identify and prioritize quality projects. action team development & training, team member reports and action on team projectsintroduction. basic assumption concerning employees and work habit changes. perceived threats, facilitating change. fine tenets of continual process improvement, supplier process. internal & external suppliers and mechanism, operation and adjustment, of folding machines; causes and prevention of inaccurate folding; maintenance of machine feeders; production capacities.

Reference Books:

1. TQM and ISO 14000 – Dr. K.C. Arora.
2. Applying ISO 9000 QMS – International Trade centre
3. Test Images for printing – Pamela J. Groff.

4. Implementing Quality management in graphic arts- Herschel L.Apfelberg.

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A: *Short answer questions (one/two sentences)* *5 x 2 marks=10 marks*
All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: *Analytical/Problem solving questions* *4 x 5 marks=20 marks*
Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: *Descriptive/Analytical/Problem solving questions* *4 x 10 marks=40 marks*
Two questions from each module with choice to answer one question.

	Maximum Total Marks: 70

PT 04 L08: Book Publishing

Teaching scheme **Credit:** 4
3Hours lecture and 1 Hr tutorial per week
Objective: *To impart knowledge of publishing process and book publishing organization.*

Module I (13 hours)

Publishing organization. Areas of publishing - general publishing, educational publishing, professional publishing and reference publishing. Publishing house - the role of commissioning editor, the desk editor, the designer, the production manager, the sales/marketing manager, the publishing manager. Editorial process and development. Copy editing, Page makeup, Proofs; the book editor - multipurpose functions,

Discussion with author, Editing educational material, decision making role; editorial technique - style sheet, reference aids; the author and his manuscript - unsolicited manuscripts, author-publisher, professional guides and societies, the literary agent, author publisher relationship, writing textbooks for children.

Module II (12hours)

Education and estimating in book publishing. Pre-production planning, Manuscript, layout and design, imposition, composition, Anatomy of a book; Printing techniques; Production Process; technical aspects of production; Quality control - Proofing stage; financial aspects; first copy cost, manufacturing cost, overheads; Economics of publishing - net book, non-net book, variations in price, published price of a book.

Module III (15 hours)

Promotion channels, distribution outlets and sales techniques. 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 bookshop - Booksellers associations, laws and ethics; University, college and Professional Publishing council, Book marketing council, Book development council.

Module IV (14 hours)

Book binding, print finishing and legal aspects. Man made binding, Perfect binding, mechanical binding, loose leaf binding, securing operation, automatic & semiautomatic binding machines; computerised binding, finishing operation; laminating, varnishing, gold foiling, die stamping, rounding, cornering, punching, drilling etc; copy right, types of agreement between author and publishers, agreement for sale of Translation rights, illustration and artwork agreement, packaging rights agreement; the outright sale of the copy right profit sharing agreement; the royalty system, commission agrements.

References

1. D. Raghavan, An introduction to Book Publishing, Institute of Book Publishing, New Delhi, 1988.
2. John P. Dessauer, Book Publishing, R.R. Bowker Company, New York & London, 1981.
3. Roy Paul Nelson, Publication Design, Wm. C. Brown Company Publishers, Dubugue, Lowa, 1983.
4. Charles Clark, Publishing agreement, George Allen & Unwin, London, 1984.
5. Book Production Practice, Second Edition, Publishers Association, British Printing Industries Federation, 1984.
6. Clive Bradley, Publishing: A vital National and International Asset, Secretary and Chief Secretary, The Publishers Association, 1982.

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	

PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 L09 Entrepreneurship Management

Teaching scheme **Credit:** 4

3Hours lecture and 1 Hr tutorial per week

Module I (20 hours)

Entrepreneurial perspectives - understanding of entrepreneurship process - entrepreneurial decision process - entrepreneurship and economic development - characteristics of entrepreneur - entrepreneurial competencies - managerial functions for enterprise

Module II (10 hours)

Process of business opportunity identification and evaluation - industrial policy - environment - market survey and market assessment - project report preparation - study of feasibility and viability of a project - assessment of risk in the industry

Module III (12 hours)

Process and strategies for starting a venture - stages of small business growth - entrepreneurship in international environment - entrepreneurship - achievement motivation - time management creativity and innovation structure of the enterprise - planning, implementation and growth

Module IV (12hours)

Technology acquisition for small units - formalities to be completed for setting up a small scale unit - forms of organizations for small scale units - financing of project and working capital - venture capital and other equity assistance available - break even analysis and economic ratios technology transfer and business incubation

Reference books

1. Harold Koontz & Heinz Weihrich, *Essentials of Management*, McGraw Hill International
2. Hirich R.D. & Peters Irwin M.P., *Entrepreneurship*, McGraw Hill
3. Rao T.V., Deshpande M.V., Prayag Metha & Manohar S Nadakarni, *Developing Entrepreneurship A Hand Book*, Learning Systems
4. Donald Kurado & Hodgelts R.M., *Entrepreneurship A Contemporary Approach*, The Dryden Press
5. Dr Patel V.G., *Seven Business Crisis*, Tata McGraw Hill
6. Timmons J.A., *New Venture Creation-Entrepreneurship for 21st Century,* McGraw Hill International
7. Patel J.B., Noid S.S., *A Manual on Business Opportunity Identification, Selections*, EDII
8. Rao C.R., *Finance for Small Scale Industries*
9. Pandey G.W., *A Complete Guide to Successful Entrepreneurship*, Vikas Publishing

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 L10 Multimedia

Teaching scheme **Credit:** 4
3Hours lecture and 1 Hr tutorial per week

Objective: *To the part of media mix. To impart an idea of technology in creativity***.**

Module I (12ours)
Introduction- Basic theory, sound , sound of physics , human hearing mechanism, recording technology- microphone, amplifier, equalizer, sampling MIDI, file formats (image & sound file formats) digital audio, GIF , Bit map, image capturing & editing**.**

Module II (14 hours)
Software supports-Basic tools painting & drawing tools, image editing tools, OCR softwares, sound editing, animation, video and digital movies. Digital video and editing Basic compression techniques , lossy and lossy compression , digital video formats – quick time , JPEG,MPEG , editing software-Adobe premier, Digitizers video formats.

Module III (14 hours)
Authorizing tools- card based tools , icon based tools , time based tools, object oriented tools.
Macromedia authoreware,- Macromedia director with lingo creating a presentation using sound text , images, video, interactive icon , calculating icon , navigation, frame work icon, decision icon**.**

Module IV (14 hours)
Introduction to web development , History , Introduction to web development tools, Web designing , Web designing tools, Web designing techniques, Introduction to HTML, XHTML, XML etc , The use of Cas Cading Stylesheets(CSS) in web development , Scripting,client side scripting, Serverside scripting, ECMA (ECMA Scripting), Web development techniques, Web development as an industry, End users (browswers used, web standards, accessibility etc), Introduction to W3C (World Wide Web Consortium), Future of Web development

Text books:
1. Corel Draw 8 Tata McGraw Hill
2. Adobe Photoshop 5 – class room in a book- Techmedia

Reference:
1. Adobe premiere 5- Classroom in a book- Tech media
2. Inside Macromedia Director 6 with Lingo- Tech media
3. Authorware an introduction to multimedia- Simon Hooper.

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*

	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 L11 Enterprise Resource Planning

Teaching scheme **Credit:** 4

3Hours lecture and 1 Hr tutorial per week

Objective: This enables to plan and develop enterprise resource planning systems successfully.

Module I (15 hours)

Introduction. Evolution of ERP. Reasons for the growth of the ERP market. The advantage of ERP. Why do many ERP implementations fail? Why are ERP packages being used now? Enterprise – an Overview. Introduction. Integrated Management Information. Business modeling. Integrated data model.Introduction. Business process reengineering. Management information systems. Decision support system. Executive information system. Data warehousing. Data mining. On-line processing. Supply chain management.

Module II (15 hours)

Introduction. ERP CAD/CAM. Materials requirement planning. Bill of material. Closed loop MRP. Manufacturing resource planning. Distribution requirements planning. JIT and Kanban. Product data management. Data requirement. Benefits of PDM. Make to order and Make to stock. Assemble to Order. Engineer to order. Configure to order. ERP Modules. Introduction. Finance. Plant Maintenance. Quality Management. Material Management. Benefits of ERP. Reduction of lead time. On-time shipment. Reduction in Cycle Time. Improved resource utilization. Better customer satisfaction. Improved supplied performance. Increased flexibility. Reduced quality costs. Improved information accuracy and decision making capability.

Module III (12hours)

Introduction. SAP AG. Baan company. ERP Implementation Lifecyle. Introduction. Pre-evaluation screening. Package evaluation. Project planning Phase. Gap analysis. Reengineering. Configuration. Implementation. Vendors, Consultants and Users. Introduction. In house implementation – Pros and Cons. Vendors. Consultants. End-users.

Module IV (12hours)

Introduction. New markets-New channels. Faster implementation methodologies. Business Models and BAPIs. Convergence on Windows NT. Application platforms. New business segments. More features. Web enabling. Market snapshot. Case Studies- An Overview. Mercedes-Benz. Kee Hin Industries. Bull Electronics Angers Plant Manufacturers. Twentieth Century companies. Inc. Ameritch. Essr Steel. Jindal Iron and steel company Ltd. Godrej Soaps and Associated companies. Indian renewable Energy development agency.

Reference

1. Alexis Leon- Enterprise Resource Planning
2. Daniel E. O'Leary- Enterprise Resource Planning System
3. Vinod Kumar Garg.- Enterprise Resource Planning Concepts & Practice

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT04 L12: Publishing Science

Teaching scheme **Credit:** 4
3Hours lecture and 1 Hr tutorial per week
Objective*: Deals about the concept of reporting& publishing of a publishing industry.*

Module I (13ours)
Concept and definition of News. News values- factors affecting selection of News. Elements of News, structure of News story- inverted pyramid, truth, objectivity and fairness chronological and narrative style. Kinds of Leads-the body, language of News.
Module II (13 hours)
Duties and responsibilities of reporter-Role of stringer, special correspondent, bureau chief and foreign correspondent. News gathering methods. Sources of News- News agencies, press release, press conference, press briefings and press tours. News beat meetings and speeches.
Module III (13 hours)

Reporting sports, art, culture, crime and disasters. Human interest stories covering elections, civic affairs, government, legislature. Kinds of reporting-Investigative, interpretative advocacy, editorial or comment. Specialised reporting, science. Environment and financial reporting. Interview- Using interviews in news. Technique of interviewing.

Module IV (15 hours)

The structure of editorial department. Functions of the editor, the editorial board the news editor, sub-editor. The board meeting, crucial decisions. Letters to the editor, its importance. Editorial and advertorials.Editing its significance. Symbols of editing. Manual subbing of agency/mofussil copy. Subbing news, features, sports, political and human interest stories and letters to the editor. Analysis of individual forms of writing selecting authors/writings. Style and techniques of language. Creative writing. Features selecting a topic. Types of features, the magazine scene in India.

Reference

1. ER Ram Kumar, Jaico Publishing House- Handbook of English Usage of Editors. Writers & Executives
2. KSR Menon.- Stylebook for journalists and writers
3. Doroty Bowles, Diance Bordon- Creative Editing
4. Plotnik Arthur- The Elements of Editing
5. John, Haris.- The Complete Reporter
6. Fred Fredler- Reporting for the Media
7. Adams- Printing Technology .

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*

	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT04 L13: Continuous Stationary & Security Printing

Teaching scheme **Credit:** 4

3Hours lecture and 1 Hr tutorial per week

Objective: *To gives knowledge about the security process and its importance in printing industry.*

Module I (15 hours)

Trends in the Computer Forms stationary – Demands for the computer forms.Basic designs of various types of forms for input and output – Fan fold forms, Computer letters and Mailers. Computer envelopes, Snap-out-forms, Tags and labels, Computer envelope, MICR cheques etc., Typography – designing of forms with computer based machines etc.Specifications, requirements, storage conditions etc., Carbon papers – varieties, specifications and manufacturing process.

Module II (11 hours)

Different types of Web-Offset Printing Presses. Construction and configuration – on-line operations such as numbering, perforating, sprocket hold punching and Zig-Zag folding etc.Different types of collators – Roll to Roll pack to pack – Programmable outers for continuous web-MICR cheque binding system. Machines used for packing and Despatch.

Module III (14 hours)

Spot patterns, Gaininess or noise. Combining AM and FM screening. Screen angles. Spot size. Claimed benefits for FM screening. Absence of rosettes and moire patterns. Improved rendition of detail. Smoother tonal transition. Photographic smoothness. Improved process colour simulation of spot colours. No restriction on reproducible gray levels. Tone value stability with increased inking. Smaller file size and speedier output through imagesetter. Decreased register sensitivity. Limitations associated with FM screening. Film imaging. Film contacting. Place making. Photomechanical proofing. High levels of dot gain. Fine screen rulings versus FM screening.

Module IV (14hours)

Platemaking. Exposure and tone transfer. Using FIM and AM screening together. Vaccum contact and Newton's rings. Negative working plates. Proofing. Negative proofing. Printing. Dot gain in printing. Influence of FM screening spot size. Influence of different screening algorithms. Tone value stability when printing. Sensitivity to register shifts. Colour shifts.

Reference

1. Gar Raihes., Forms for the 80's How to design produce them.
2. Kelvin Tritton, Stochastic screening

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 L14 Industrial Psychology

Teaching scheme **Credit:** 4
3Hours lecture and 1 Hr tutorial per week
Objective:
Helps to build job related skills and also helps to improve work performance in an organization.
Module I (13 hours)

Introduction - psychology as a science - areas of applications - study of individual - individual differences - study of behavior - stimulus - response behavior - heredity and environment - human mind - cognition - character - thinking - attention - memory- emotion - traits - attitude - personality

Module II (13 hours)
Organizational behavior - definition - development - fundamental concept - nature of people - nature of organization - an organizational behavior system - models - autocratic model - hybrid model - understanding a social - system social culture - managing communication - downward, upward and other forms of communication

Module III (14ours)
Motivation - motivation driver - human needs - behavior modification - goal setting - expectancy model - comparison models - interpreting motivational models - leadership - path goal model - style - contingency approach

Module IV (14hours)
Special topics in industrial psychology - managing group in organization - group and inter group dynamics -managing change and organizational development - nature planned change - resistance - characteristic of OD - OD process

Reference books
Davis K. & Newstrom J.W., "*Human Behavior At Work*", McGraw Hill International
Schermerhorn J.R. Jr., Hunt J.G. & Osborn R.N., "*Managing Organizational Behavior*", John Willy
Luthans, "*Organizational Behavior*", McGraw Hill, International
Morgan C.T., King R.A., John Rweisz & John Schoples, "*Introduction to Psychology*", McGraw Hill
Blum M.L. & Naylor J.C., Horper & Row, "*Industrial Psychology*", CBS Publisher

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	

PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT04 L15: Advertising Management

Teaching scheme **Credit:** 4

3Hours lecture and 1 Hr tutorial per week

Module I (13 hours)

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 behaviour. How Marketing firms use consumer behaviour, characteristics of advertising communications, achieving desired responses, stimulating attention and facilitating retension, human needs as a basis for appeals. Role of printing presses in advertising.

Module II (13 hours)

Factors involved in advertising planning decision making, basis for advertising objectives, Dagmar model, marginal analysis, methods of advertising. Media concept, structure of media, media characteristic publication media, TV and radio, direct mail and POP, out of home and other media. Media planning concept, media decision tool, media plan stratergy, media buying and scheduling, Advertising on the internet.

Module III (14hours)

Copy concept, copy structure, essential of a copy, creative approaches ,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 color, test of good layout, production of print advertising, production of TV/radio commercials.

Module IV (14hours)

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

Reference books:

1. Leon G. Schiff man and Lelie Lajar konar.,- Consumer Behaviour
2. Loudon, Della Bitta,- Consumer behaviour concepts and application
3. Charles J. Driksen and other- Advertising principles, problems and cases
4. David A. Aker and John G. Myers- Advertising Management
5. B .s. Rathor-Advertising management
6. Cyber Graphic, U.S.,http://www.cybergraphic.com

7. AVUS Internet, Germany, http://www.avus de.

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)* All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	*5 x 2 marks=10 marks*
PART B:	*Analytical/Problem solving questions* Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	*4 x 5 marks=20 marks*
PART C:	*Descriptive/Analytical/Problem solving questions* Two questions from each module with choice to answer one question.	*4 x 10 marks=40 marks*

PT04 L16: Marketing Management

Teaching scheme **Credit:** 4
3Hours lecture and 1 Hr tutorial per week
Objective: *Imparts concepts of marketing and emphasis the role of marketing in organization*

Module I (14 hours)
Needs, wants and demands, products, value, cast and satisfaction, exchange, transactions and relationships, markets, marketing and marketers, company orientation towards the market place-production concepts, product concept, selling concept, marketing concept, societal marketing concept. Adoption of marketing management-In business sector, in non profit sector, in international sector. Marketing as a managerial function, role of marketing in modern organizations.Corporate strategic planning- Corporate mission, strategic business unit identification, evaluating the current business portfolio, corporate new business plan. Business strategy Planning- Business mission, external environmental analysis, internal environment analysis, goal formulation, strategy formulation, are grain formulation, implementation, feed back and control. Market opportunity –Size of market, demand analysis, industry analysis, competition analysis, segmentation analysis. Product market selection, approaches to marketing planning-PIMS, BCG. Structure of marketing plan, process of marketing planning.
Module II (12 hours)
Concept of MIS, components of MIS, internal record system, marketing intelligence system, marketing research system, suppliers of MR, scope of MR. The research process-problem definition, statement of research objectives, research design, exploratory, descriptive, causative. Sources of data-

Primary source of data, secondary data, advantages of sec. data, new age of secondary information. Data collection-procedure, tools. Data analysis. Report and presentation.Identifying the company's competitors, industry concept of competition, market concept of competition, identifying the competitors strategies, determining the competitors objectives, assessing the competitors strengths & weakness. Estimating the competitions reaction patterns. Designing the competitive intelligence system.

Module III (13hours)

Concept in demand measurement, estimating current demand, estimating future demand-Survey of buyers intentions, composite of sales force opinions, expert opinion, market test method, time series analysis, statistical demand analysis. New product decisions. The era of new product, what is a new product, factors contributing new product development-Changing customers preferences, technological changes, govt. policy. New product development process- idea generation, identifying prospective customers, concept development & testing, feasibility analysis, product development, test marketing, commercialization.

Organization of new product, internet and new product development. Designing marketing strategies for market leaders, challenges, followers & Nichers-Market lead strategies-expanding the total market, defending market share, marketing strategies, expanding market share. Market challenger strategies- strategic objectives and opponents. Market follower strategies, market nichers strategies.

Module IV (15 hours)

Direct Marketing-nature, growth, advantages. Major tools of direct marketing, development of integrated direct marketing, maxi marketing model for integrated marketing, major decisions in direct marketing. Public relations-decisions in marketing PR, tools in marketing PR. Principles of personal selling- selling, the variety of selling styles & buying styles, negotiation, principled negotiation approved to bargaining, bargaining tactics, relationship management, when & how to use relationship management.Marketing organizations-evolution of marketing dept. ways of organizing marketing department, strategies for company wide marketing orientation. Marketing implementation-diagnostic skills, Evaluating and controlling marketing performance. Annual-plan control-Sales analysis, Market share analysis, financial analysis, customer satisfaction trading, corrective action. Profitability control, Efficiency control, Strategic control, Marketing controller concept.

Reference

1. Philip Kotler.- Marketing Management & Analysis Planning Implementation & Control
2. Rajan Saxena.- Marketing Management.

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)* All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	*5 x 2 marks=10 marks*
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: Descriptive/Analytical/Problem solving questions *4 x 10 marks=40 marks*

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

PT09 L17: Image Processing

Teaching scheme **Credit:** 4

3Hours lecture and 1 Hr tutorial per week

ModuleI(13 hours)

Basics of image processing-Introduction;Digital image representation,basic steps of image processing,elements of image processing system-image acquisition,storage,processing,communication,display.Fundamental concepts of digital image processing-introduction,objectives,visual perception-stucture of human eye, image formation int the eye, brightness adaptation and dicremination. A simple image model, sampling & quantization-uniform sampling & quatization, non-uniform sampling & quantization. Basic relations ship between pixels neighbours of pixels, connectivity, labelling & connected components.

Module II (13 hours)

Relations , equivalence transitive closure,distance measures, arithmetic or logic operations, image geometry,- basics of transformation, perspective transformation, camera model, camera calibration, photographic film- film structure & exposure,film characteristics, contrast, speed grainess, resolving power. Introduction , objectives, fourier transformation- fourier transform, discrete- fourier transform- two variable discrete fourier transform pair. Afew properties of 2 D- fourier transformation-seperability, translation, periodicity & conjugate, rotation distributivity and scaling, average value,sampling . Fast fourier transform- fft algorithms, no of operations, the inverse fft , implementation, Few other transformations- waqlsh transform, hadamard transform, discrete cosine transform.

Module III (14 hours)

Image enhancement- introduction, technique- spatial domain methods, frequency domain methods. Enhancement by point processing- some simple intensity transformation . Histogram processing, image substraction image averaginh,. Spatial filtering- some simple intensity transformation, smoothing filters , sharpening filters. Enhancement in the frequendy domain- low pass, filtering, high pass filtering, homo morphing filtering.

ModuleIV (14 hours)

Color image processing – color fundamentals, color models,ps-endo- colr image processing – full colr image processing- Image restoration-Introduction, Degradation model- degradation model for continous fuction, discrete formulation. Algebraic approach to restoration. Other approaches- removal of blur caused by uniform, linear motion, least mean square filter, constrained least square restoration, interactive restoration, restoration in thespatial domain, geometric transformations, spatial transformations, gray lenear interpolations.

Reference:

1. Digital imaging techniques (Block I)
2. Digital imaging techniques (Block II)
3. Digital imaging Processing – Gonzalez, woods, chanda.
4. Digital imaging Processing & analysis – manjumdar.
5. Digital imaging Processing and computing-Schaikoff.

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 L18 Supply Chain Management

Teaching scheme **Credit:4**
3Hours lecture and 1 Hr tutorial per week
Objective: *To impart knowledge about the flow of information, materials, money, manpower, and capital equipment***.**
Module I (12 hours)
Supply chain management (SCM) - concept of logistics and SCM - decision phases - design, planning and operation - decision areas - type of supply chain views - flows in supply chain - supply chain and competitive performance - performance measures for SCM - strategic fit - drivers of supply chain

Module II (13 hours)

Sourcing and procurement - sourcing - factors in source selection - vendor rating - qualitative and quantitative methods - purchasing - objectives and procedure - purchasing systems - tender method - computer based systems/EDI - inventory concept - functions of inventory - selective inventory control techniques - structure of inventory problem - costs associated with materials management - relevant costs

Module III (14 hours)
Independent demand items - probabilistic - single order quantities - payoff matrix - incremental analysis - mathematical formulation of discrete and continuous cases - independent demand items - deterministic and dynamic - deterministic inventory models without and with backordering - sensitivity analysis - quantity discount - all units and incremental discounts
Module IV (15 hours)
Independent demand items - probabilistic and dynamic inventory models - Q and P system models - dependent demand items - deterministic models - lot sizing models - lot by lot - EOQ - part period balancing - wagner-whitin method - concept of just-in-time - kanban - introduction to distribution requirement planning

Text books
1. Dobler D.W. & Burt D.N., Purchasing and Supply Management: Text and Cases, Tata McGraw Hill Publishing Company Limited
2. Tersine R.J., Principles of Inventory and Materials Management, Fourth Edition, Prentice Hall Inc.
3. Starr M.K. & Miller D.W., Inventory Control: Theory and Practice, Prentice Hall of India
4. Chopra S. & Meindl P., Supply Chain Management: Strategy, Planning, and Operation, Pearson Education Asia
Reference books
1. Christopher M., Logistics and Supply Chain Management, Pitman Publishing Company
2. John Mortimer (Editor), Logistics in Manufacturing: An IFS Executive Briefing, IFS Publications, U.K. & Springer-Verlag
3. Narasimhan S.L., Mcleavy D.W. & Billington P.J., Production Planning and Inventory Control, Prentice Hall of India
4. Raghuram G. & Rangaraj N., Logistics and Supply Chain Management: Cases and Concepts, Macmillan India Limited

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*

	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 L19: Scanners and Systems

Teaching scheme **Credit:** 4

3Hours lecture and 1 Hr tutorial per week

Objective*:* *This paper deals about the developments, working and calibration of Scanners***.**

Module I (13 hours)

Basic principles of a scanner – vario klishograph – The Neugebauer formula – Relative study of crosfield-Danippon Screen, Hell, Royal Zenith, Scitex and Itek colour scanner. Mechanics and functions of a scanner-signal flow in the scanning section-signal processing in the computer. Analog and digital computers- signal processing in the colour computer-Function of scale computer- The basic Mechanics of a exposing section- Operator's features- Poly chromatic Colour Removal (PCR) Pastel colour boost- flexible unsharp Masking-Scanner generated vignettes- Step and repeat-Expose cylinder-film loading, optical system.

Module II (13 hours)

Light source : Xenon lamp and laser exposure unit – scanner data terminal – disk drive unit- Scanner initialisation – cleaning the original - mounting copy of the scanning drums – cylinder change analyse optic procedure – setting focus, aperture and filter, adjusting the lamp house optics: centering the spot, setting vertical resolution – expose optic procedure- setting cylinder size – setting expose turret – setting laser power. Film procedure Loading film – unloading film – saftey precautions and environment conditions – general precautions.

Module III (13 hours)

Colour separation by flatbed scanners – Links from the Desktop to the High-end High end vertical type drum Scanners – its working principle – Mechanical and Optical consideration – Text and Graphis combination – Imagesetters – Raster Image Processor (RIP) – High fidility Colour Printing – Creating digital images – Designing the electronic page – Imaging System Technology and Operation – Elements of digital image processing system – Hardware and software – Cloning or pixel replacement – Data compression and transmission.

Module IV (15 hours)

Calibration – positioning traverse, setting the starting point of the original -–enlargement and final size, scan rate, format, auto format, customer values – Luminosity curves, tone, neutral tone boost, colour correction, removal and addition of colour cast, grey balance set up procedure, catchlight, color

negative scanning, limit and line mode.Image processing concept – Systems technology – Arrival of images on Disk – Electronic assembly and the layout- cleaning of optics – printer disk care – disk unit cleanliness- temperature and humidity control – scanner unit daily, weekly maintenance fault finding chart – operator error messages, machine fault messages.

References:

1. Eric Chambers, Reproduction Photography for lithography, GATF, 1979.
2. J. Michael Adams, David D. Faux, Llyod J. Ribber , Printing Technology,3rd ed., Delmar 1968.
3. Gary, G. Field Colour Scanning and Imaging System, GATF, 1990.
4. Crossfield Operator's manual-6500-8090-03A, 1989.
5. Surrey, Graphic Repro, Eaglehead Publishing Ltd., , U.K., 1984.
6. Dr. R. Molla, Eletronic Colour Separation, R.K. Printing & Publishing Company, West Virginia.
7. Bill Parsons, Electronic prepress: An Introduction, Delmar Publishers, 1994.

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 L20 Human Resource Management

Teaching scheme **Credit:4**

3Hours lecture and 1 Hr tutorial per week

Objective:

To impart knowledge about the importance of personnel management and activities of HR department.

Module I (13 hours)

Personnel management in organizational context - personnel environment - objectives of personnel management - the role of personnel functions - personnel activities - structure of the personnel department - analyzing and design of jobs - job analysis - job description - job specification - role analysis - the job design

Module II (13 hours)
Recruitment - selection - placement - induction - internal mobility - separations - performance appraisal - performance appraisal system - assessing potential - design of an effective appraisal system

Module III (13 hours)
Pay and benefits - pay structures - methods of payments - fringe benefits - occupational health and safety - working conditions occupational health and safety - social background and working conditions - ergonomics - regulatory environment - organisation commitment - measures for occupational health and safety

Module IV (15 hours)
Employee relations - management employee relations - managing discipline - managing grievance - managing stress - counseling - industrial relations implications of personnel policies - nature of employment relationships - place of unions in organisations - industrial conflict - managing for good industrial relations

Reference books
1. Venkata Ratnam C.S. & Srivasthava B.K., Personnel Management and Human Resources
2. Monappa A., Saiyaddin & Mirza S., Personnel Management, Tata McGraw Hill Publishers
3. Hersey Paul & Kenneth H Blanchard, Management of Organizational Behavior, Prentice Hall
4. Mc Greger Douglas, The Human side of Enterprise, McGraw Hill
5. Subramanyam K.N, Gin V.V., Industrial Relations in India

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*

	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 L021 Printing Plant Layout & Facility design

Teaching scheme **Credit:** 4

3Hours lecture and 1 Hr tutorial per week

Module I (15hours)

Printing press layout- Determining plant requirement site planning, new facility designing. Layout essentials- Direct product flow, Physical separation expansion. Importance of material movement. Few suggested design for hypothetical cases. Approachability of machines for service etc. Availability of service such as water, drainage, electric supply etc. Fundamentals of Foundation design. Vibration free mounting requirements. Variations of foundations General guidelines Structural requirements of foundations

Module II(14hours)

Receiving shipping, waste paper, & trash removal, ware housing and storing, maintenance, production office, flammable solvent storage, ink mixing , storage and pumping. Typical settings to be done on a sheet- fed and web press machine. Facility specification- Prepress area, Sheet fed press room, web offset press room, roll paper storage area, bindery, finishing, mailing & pumping

Module III (12 hours)

Materials control-Establishing clear specifications and standardisation of materials to be purchased. Inspection and testing of incoming materials as part of quality control, importance of proper handling and maintenance of records of performance of materials, Sampling.

Module IV(13 hours)

Different types of elevators and lowers handling materials in bulk and for large objects. Worm push plate, push through and belt conveyors: inking belts steel plate and slat conveyors; vibrating through conveyors. Automatic feeding devices for elevators and conveyers. Gravity chutes roller runways ; live rollers humper stacker and gadgets . Fork trucks and pallets, Automatic handling of papers and printing machines, handling of printing rolls in printing machines and their automatic feeding . Conveyor system in finished printing products and automatic counters. Control of paper handling.

Text books:

1. Printing Plant & Facility Design- GATF
2. Material Handling for the printer – GATF

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*
	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT04 L22: Electronic Publishing

Teaching scheme **Credit:4**
3Hours lecture and 1 Hr tutorial per week
Objective: *This provides concepts of paperless printing and its importance in modern world.*

Module I (13 hours)
Electronic publishing. Cultural and social impact. Hybrid formats for books and magazines needing shelf-appeal. Readers adapt to the new media. Create your own books and other publications. Catering for minority interests and niches markets. Multimedia in perspective. Breaking the physical barriers of print. Limitless opportunities. Cooperative writing. Easy, economical publishing. Future trends. Turn your work into multimedia. Selecting authoring software. Multimedia hardware requirements. Adding pictures and sound the easy way. Adding sound is easy and economical. Musical opportunities. Morphing is a practical tool. Virtual reality as a publishing medium. Games as a medium for authors
Module II (14 hours)
Changes in the structure of corporations.New perspective on information. Data and information as objects. Simple solutions may be best for small operators. Comping with the flood. Creating search capabilities.Identify your market. Nontraditional book marketing. Begin with research. Marketing to

the world. Editorial publicity. Getting your disks and files safely to the right place. Prepublication offers for positive cash flow. Beware the digitized versions to vanity publishing.
Distributing your works. Virtual publications need have no physical existence. Wireless distribution. Publishing by shortware-the fax of the future? Broadcast your book to 20 million people. Distributing and selling on-line. Your own bulletin board. Distributing through on-line and disk catalogs. Financial success from free distribution. Physical distribution on disk and cards. Distribute by renting, and establish long-term relationships. Cutting mailing costs.

Module III (13 hours)

Crossing the media frontiers. Choosing a publishing program. Pause before rushing into digital publication. Paperless magazines can survive where print versions fail Customized newspaper. Keep security in proportion. The impact of electronic publishing on your career. Footloose wordsmiths. Librarians: essential or redundant? librarians become publishers and distributors. Writers and editors. Editors need new skills. Scientists & academics. Educations. Produce an e-book to help your business. E-books as agents for change. Guard and nurture your intellectual property rights. Test cases. Windfalls and pitfalls.

Module IV (14 hours)

Electronic diaries. Therapeutic benefits. Creating family chronicles. Tap into your expertise as well as your experiences. Publishing poetry and drama as multimedia. Opportunities for photographers, artists, and musicians.Science fiction flourishes on-line. Mass-market fiction. Interactive novels establish a new genre. Games as a new medium for fiction writers. Eliminating the out-of-print problem. Writing tips, tricks, and techniques. Keep it simple. Entertain as well as inform. Practical tools for writers. Good news for disabled wriers and readers.Reducing the hassless in OCR and scanning. Scanners differ greatly in their capabilities. Capturing screen images. Compression is essential, but can be problematical. Beware of viruses.

Reference

1. Colin Haynes, Paperless Publishing

Internal Work Assessment

60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)*	*5 x 2 marks=10 marks*
	All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	
PART B:	*Analytical/Problem solving questions*	*4 x 5 marks=20 marks*

	Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	
PART C:	*Descriptive/Analytical/Problem solving questions*	*4 x 10 marks=40 marks*
	Two questions from each module with choice to answer one question.	
		Maximum Total Marks: 70

PT09 L23 News paper and Periodical Publishing

Teaching scheme **Credit:** 4

3Hours lecture and 1 Hr tutorial per week

Objectives: *This paper deals about the complex process of news paper & periodical publishing industry and also describes about the principles of publication***.**

Module I (13 hours)

Determinants to work, Organisation; Owner, editorial organisation, management; Flow charts of staff in newspaper organisation; management, Incoming materials, Financial aspects, Production, advertising, distribution and promotion. The role of copy editors, city editors, news editors ,editorial cartoonist, artists, Sunday editor, sports editor, business editor, journalists & reporters; editorial responsibilities.

Module II (14 hours)

Manuscripts from editorial organisation: layout &design; Parts of a news paper The importance of visual appeal in page-making. Playing up/ down a story. Colour, boxing , Verbal and non- verbal languages in design. Graphics/ diagrams and illustrations and importance. Art work; colour, First proof; Lab work to be given to prepare a Newspaper and a periodical for a given manuscript.

Module III (13 hours)

Basic determinants of News; impact, unusual and prominent: Additional determinants of news; conflict, proximity, timeliness, currency. Gathering the news, source of news; Beat system, interviewing, wire services, syndicate, news writing, copy preparation, features &reviews, Editorial and opinion columns, sports and photo production; editing Manuscript editing, creative and substantive editing, technical editing, editing conference proceeding, editing a successful journal; copy desk, proof reading, photo editing.

Module IV (14 hours)

The Campus magazine, the professional magazine, writer-editor relationships, magazine copy editing, writing headlines and titles, picture editing and using colours, layout and design, printing, financial aspects of a new journal, completing journal issues. The press and the law libel, defence against libel, mitigation & damages.

References :

1. Melvin Mencher, B*asic News Writing*, Wm.C.brown Company Publishers, Dubuque, lowa
2. William L. Rivers, *News editing in the 80's*,Wadsworth publishing company, Belmont, California.
3. Robert H. Bohle, *From news to newsprint*, prentice hall, Inc.Englewood clefts, New Jersey.
4. William L Rivers, *Magazine editing in the 80's*, wadsworth publishing company, Belmont, California.
5. MO'Connor, *Editing Scientific Books and journals*, Pitman Medical.

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A: *Short answer questions (one/two sentences)* *5 x 2 marks=10 marks*
All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: *Analytical/Problem solving questions* *4 x 5 marks=20 marks*
Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: *Descriptive/Analytical/Problem solving questions* *4 x 10 marks=40 marks*
Two questions from each module with choice to answer one question.

PT09 L24 Digital Photography

Teaching scheme **Credit:** 4
3Hours lecture and 1 Hr tutorial per week

Objectives: *To impart the basic concepts of photography &camera controls.*
Gives an understanding of photographic processing methods & Digital Imaging.

Module I (14hours)
Imaging Systems: The production of images. Photographic & Digital Imaging. General characteristics of reproduction systems. Imaging chains. Reproduction of tone and color. Image quality expectations. Fundamentals of light & vision. **Photographic light sources**: characteristics. Light outputs- units, illumination law, Reflectors & luminaries-constancy of output – efficiency-operation & maintenance.

Types of lamps, flash bulb. Types of camera, special purpose cameras, Automatic camera, Digital cameras-principle, features & function.

Module II (13hours)
Camera features: Shutter system, Iris diaphragm, View finders- types & function. Flash synchronization. Focusing systems. Autos focus systems. Exposure metering systems. Battery power. Data Imprinting. **Camera movements:** Transitional & Rotational. Lens covering power. Control of image sharpness. Limits to lens tilt .Control of image shape.

Module III (14hours)
Sensitive materials & Image Sensors: Latent image formation. Image formation by charge coupled devices. Production of light sensitive materials and sensors. Coating the photographic emulsion. CCD. Size and formats of photographic & electronic sensors and media. Film coating. **Spectral sensitivity of photographic materials:** Types, Response to short wave radiation & visible radiation. Spectral sensitization. Determination of color sensitivity. Spectral sensitivity of digital camera. Principle of color photography. Reproduction of color.

Module IV (13hours)
Photographic processing: Developers & development, Replenishment. Techniques of development, fixing, washing, drying. **Hard copy output media:** Photographic papers, types of silver halide emulsion, Color photographic papers- processing & development techniques. Digital output.

Text Book:

1. Ralph E Jacobson, Sidney F ray , Geoffreyy A Attridge, Norman R Axford.*The manual of photography Photography & digital imaging*: 9th ed,

ReferenceBooks:

1. Barbara London, John Upton, KenKobre, Betsy Brill ,*Photography 7 th ed* ,Prentice Hall.
2. George H Wallace, Chuck Gloman *Digital Photography Solutions*,

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A: Short answer questions (one/two sentences) *5 x 2 marks=10 marks*

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: Analytical/Problem solving questions *4 x 5 marks=20 marks*

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: Descriptive/Analytical/Problem solving questions *4 x 10 marks=40 marks*

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

PT09 L25 Packaging Science

Teaching scheme **Credit:** 4

3Hours lecture and 1 Hr tutorial per week

Objectives: *Helps to get an idea of packaging industry and imparts a comprehensive study about packaging materials, testing & evaluation, barcoding, and environmental concerns.*

Module I (14hours)

Introduction to package-Functions and applications of Package, packaging marks , package design-considerations for package design. Folding Carton parts-trends in packaging- testing of material for printing and packaging – Bursting strength, puncture resistance, grammage, drop test, mechanical test tensile strength, modulus of elasticity, Flexural test optical test, chemical test.

Module II (14hours)

Flexible Packaging-Characteristics-pouch styles,pillow pouches, three side seal pouches, Four side seal pouches, stand- up pouches-forming pouches,retort pouches -bulk and heavy duty bags-bag in box. Barcoding-Barcode structures.Types-verifying/analysing, printed barcodes.UPC and flexo printing, upc film masters & printing capability test. SCS Shipping contain barcode printing

Module III (13hours)

Role of plastic in packaging, thermal properties-mechanical properties-barier properties-surfaces and addition-optical characteristics-electrical characteristics-adheshion ,adhesives-types-reactive, hot melt, solvent borne, water borne, pressure sensitive, remoistenable, cold seal, UV and e-beam curing-Heat

sealing-sealing methods-bar/thermal, impulse, band, hot wire/hot knife sealing, ultrasonic, friction, hot gas & contact, radiant, dielectric , magnetic, induction, solvent sealing.

Module IV (13hours)

Food Packaging, Developments in food processing & packaging, Introduction to food packaging technology. Future trends in food packaging- Anti- microbial packaging systems-food safety- Anti-microbial packaging –Antimicrobial agents. Antimicrobial mechanisms- Technical factor for antimicrobial system. Oxygen scavenging packaging- package inserts-Intelligent packaging-Applications and technologies- Freshness and microbial indicator, Time temperature indicator, gas concentrator indicator

Reference Books:

1. *Innovations in food packaging* (edited by Jung. H Han), Elsivier academic Press
2. Susan. E. M Selke, John D Culter, Ruben J Hernandez, *Plastic Packaging (2E)* , Hanser Publishers, Meenich.

Internal Work Assessment
60%- Test papers (Minimum 2)
30%- Assignments/Term project/any other mode decided by the teacher
10% - Other measures like Regularity and participation in Class.
Total Marks =30

University Examination Pattern

PART A: *Short answer questions (one/two sentences)* *5 x 2 marks=10 marks*
All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: *Analytical/Problem solving questions* *4 x 5 marks=20 marks*
Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: *Descriptive/Analytical/Problem solving questions* *4 x 10 marks=40 marks*
Two questions from each module with choice to answer one question.

Global Electives
ME09 L22: Quality Engineering and Management

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To analyze key definitions of quality, focusing on a customer-centric approach.*
- *To provide knowledge on the managerial tools and techniques on quality*
- *To analyze the relationship of statistics to a process and to use the statistical tools*
- *To analyze and generate acceptance sampling plans*
- *To provide knowledge on the reliability and life testing of components and systems*

Module I (14 hours)

Concepts of quality: Quality – Quality control – Quality assurance – Quality management- Quality costs

Total Quality Management: Axioms – Management commitment- Deming's approach – Quality council – Customer satisfaction and retention – Employee involvement and empowerment – Suggestion system – Quality circle – Continuous process improvement – Juran's trilogy – PDSA cycle – Kaizen – Six-sigma – Crosby's quality treatment

Module II (13 hours)

Management tools and techniques: Benchmarking – ISO quality management systems – Quality function deployment – Quality by design – Failure mode and effect analysis – Affinity diagram – Block diagram – Pareto chart – Fish bone diagram – Flow chart – Run chart – Scatter diagram – Tree diagram – Matrix diagram

Module III (14 hours)

Statistical tools 1-control charts: Basic concepts - Attributes and variables - Random and assignable causes of variations- Patterns of variation - Measures of central tendency and dispersion - Probability distributions: Binomial, Poisson and Normal

Control charts for variables : $\bar{X}$, R and sigma charts – Details of construction and uses

Control charts for attributes: p, np, c and u charts – Details of construction and uses

(Numerical problems included)

Module IV (13 hours)

Statistical tools 2- Acceptance sampling, Reliability and Life testing: Sampling Vs inspection - OC curve - Single and double sampling plans - ATI - AOQL - Life testing - Bathtub curve – MTBF - OC curve for Life testing - System reliability (Numerical problems included)

Reference Books

1. Bester Field, Dale H, Carol Boeterfreld – Muchna, Glen H, Boeterfreld Mery Boeterfeld-Scare, 2003, *Total Quality Management*, 3rd edition, Pearson, Education, New Delhi.
2. Logethetis, N. (1992), *Managing for Total Quality*, Prentice Hall International, Englewood Cliffs, NJ.,
3. Grant.E.L., *Stastical Quality Control*, McGraw Hill
4. Juran J.M, Gryna I.M., *Quality Planning and Analysis*, Tata McGraw Hill Publishing Company
5. Montgomery, Douglas C, 2001, *Introduction to Statistical Quality Control*, Fourth edition, John Wiley and Sons, Inc, New Delhi
6. Gerals M Smith- 2004, *Statistical Process Control and Quality Improvement*- 5th edition, Pearson Education, New Delhi

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Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

PART A: *Short answer questions (one/two sentences)* *5 x 2 marks=10 marks*
All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: *Analytical/Problem solving questions* *4 x 5 marks=20 marks*
Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: *Descriptive/Analytical/Problem solving questions* *4 x 10 marks=40 marks*
Two questions from each module with choice to answer one question.

Maximum Total Marks: 70

ME09 L23: Industrial Safety Engineering

Teaching scheme **Credits: 4**
3 hours lecture and I hour tutorial per week

Objectives

- *To provide on concept of safety in industry, principle of accident prevention, major hazards, consequences and concept of reliability.*

Pre-requisites: *Nil*

Module I (14 Hours)
Introduction to the concept of safety-Need-safety provisions in the factory Act-Laws related to the industrial safety-Measurement of safety performance, Safety Audit, Work permit system, injury and accidents-Definitions-Unsafe act –unsafe condition- causes, investigations and prevention of accidents, hazards, type of industrial hazards-nature, causes and control measures, hazard identifications and control techniques-HAZOP, FMEA,FMECA etc.

Module II (14 Hours)
Concept of Industrial hygiene, programmes-Recognition –Evaluation- Control, Noise- source –effects and noise control, exposure limits –standards, Hearing conservation programmes, Fire –fire load-control and industrial fire protection systems, Fire Hydrant and extinguishers, Electrical Hazards, protection and interlock-Discharge rod and earthling device, safety in the use of portable tools.

Module III (13 Hours)
Logics of consequence analysis-Estimation-Toxic release and toxic effects-Threshold limit values, Emergency planning and preparedness, Air pollution-classification- Dispersion modeling -pollution source and effects- -control method and equipments-Gravitational settling chambers-cyclone separators-Fabric filter systems-scrubbers etc.

Module IV (13 Hours)
Concept of reliability-Definition-Failure rate and Hazard function, System reliability models-series, parallel systems, reliability hazard function for distribution functions-exponential-normal –lognormal-weibull and gamma distribution.

Text books

1. Thomas J. Anton, *Occupational Safety and Health Management*, McGraw Hill
2. Ian T.Cameron & Raghu Raman, *Process Systems Risk Management*, ELSEVIER Academic press.
3. C.S.Rao, *Environmental Pollution Control Engineering*, New Age International Limited
4. L. S. Srinath, *Reliability Engineering*, East west Press, New Delhi.

Reference books

1. Frank E. McErloy,P.E; C.S.P, *Accident Prevention Manual for Industrial Operations*,NSC Chicago.
2. Lees F.P, *Loss Prevention in Process Industries*, Butterworths, New Delhi.
3. BHEL,*Occupational Safety Manual*, Tiruchirappalli.
4. Dr. A.K. Gupta, *Reliability, Maintenance and Safety Engineering*, Laxmi Publications, New Delhi.

Internal Continuous Assessment (Maximum Marks-30)

60% - Tests (minimum 2)

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

10% - Regularity in the class

University Examination Pattern

PART A: Short answer questions (one/two sentences) *5 x 2 marks=10 marks*

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: Analytical/Problem solving questions *4 x 5 marks=20 marks*

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: Descriptive/Analytical/Problem solving questions *4 x 10 marks=40 marks*

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

Maximum Total Marks: 70

ME09 L25: Energy Engineering and Management

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To provide knowledge on energy conservation and management.*
- *To impart the basics of renewable energy technology*

Pre-requsites: *Nil*

Module I (13 hours)
Energy and environment: Introduction – fossil fuel reserves – world energy consumption – green house effect – global warming – renewable energy sources – environmental aspects utilization – energy prices – energy policies

Module II (14 hours)

Energy conservation: Industrial energy use – energy surveying and auditing – energy index – energy cost – energy conservation in engineering and process industry, in thermal systems, in buildings and non conventional energy resources schemes.

Module III (14 hours)

Energy technologies: Fluidized bed combustion – fluidized bed boilers – waste heat recovery systems – heat pump and refrigerators – wind energy collectors and storage systems – insulated pipe work systems.

Module IV (13 hours)
Energy management: Energy management principles – energy resources management – energy management information systems – computerized energy management. Costing techniques – cost optimization – optimal target investment schedule – financial appraisal and profitability.

Text Books

1. W. R. Murphy, G. Mc Kay, *Energy Management*, Butterworths, London

Reference Books

1. O. Callaghn, *Design and Management for energy conservation*, Pergamon Press, Oxford
2. D. Merick, *Energy - Present and Future Options*, vol 1 and 2, John Wiley and Sons
3. N. A. Chaigier, *Energy Consumption and Environment*, McGraw Hill

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

PART A: Short answer questions (one/two sentences) *5 x 2 marks=10 marks*
All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: Analytical/Problem solving questions *4 x 5 marks=20 marks*
Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: Descriptive/Analytical/Problem solving questions *4 x 10 marks=40 marks*
Two questions from each module with choice to answer one question.

Maximum Total Marks: 70

EE09 L23 Process Control and Instrumentation

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To create an awareness of the different transducers used in industry and signal conditioning*
- *To familiarize the process control elements and their control characteristics*

Module I (12 hours)
Signal Conditioning – Analog – Digital - Signal conversions - Process Control Principles - Identification of elements, block diagram, the loop, control system evaluation stability, regulation, evaluation criteria, and cyclic response.

Module II (13 hours)

Final Control Element: Final control operation, signal conversions, analog electrical signal, digital electrical signals, Direct action – pneumatic signals, Actuators – electrical actuators, pneumatic actuators, control elements – fluid valves. Signal Conditioning of Transducers- Temperature Transducers - flow transducers

Module III (14hours)

Controller Principles - Process characteristics, control system parameters, controller modes, discontinuous controller modes, continuous controller modes, composite controller modes.

Analog Controllers - Electronic controller – Direct action, reverse action, proportional mode, integral mode, derivative mode, composite controller modes. Pneumatic controllers – implementation of PI, PID, PD. Design consideration.

Module IV (15hours)

Control Loop Characteristics: Control system configurations, cascade control, multivariable control, feed forward control, Split range control, inferential control, Adaptive control, control system quality – loop disturbance, optimum control, measure of quality, Stability, process loop tuning

Text Books

1. Curtis D. Johnson, *Process Control Instrumentation Technology,* Pearson Education.

Reference Books

1. Curtis D. Johnson, *Microprocessors in Process Control*, PHI
2. George Stephanopoulis, *Chemical Process Control*
3. Caughner, *Process Analysis and Control*
4. Deshpande and Ash, *Elements of computer process control of Industrial processes*, ISA
5. Jayantha K. Paul, *Real- Time microcomputer control of Industrial processes*, Kluwer Publications, Netherlands.
6. S. K. Singh, *Computer Aided Process Control*, PHI2
7. Dale E. Seborg, Thomas F. Edgar, Duncan A. Mekkichamp, *Process Dynamics and Control*, Wiley India

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

PART A: Short answer questions (one/two sentences) *5 x 2 marks=10 marks*

All questions are compulsory. There should be at least one question from each Module and not more than two questions from any Module.

PART B: Analytical/Problem solving questions *4 x 5 marks=20 marks*

Candidates have to answer four questions out of six. There should be at least one question from each Module and not more than two questions from any Module.

PART C: Descriptive/Analytical/Problem solving questions *4 x 10 marks=40 marks*

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

Maximum Total Marks: 70

EE09 L24 Mechatronics

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives:

- *To provide knowledge on the fundamentals of mechatronics, Numerical control machine tools, part programming and robotics*.

Module I (14 hours)

Introduction to Mechatronics.- Mechatronics in manufacturing- Mechatronics in products-Scope of Mechatronics.

Fundamentals of numerical control-advantages of NC systems- Classification of NC systems- Point to point and contouring systems- NC and CNC – Incremental and absolute systems-Open loop and closed loop systems-features of NC machine tools- Fundamentals of machining-Design consideration of NC machine tools-Methods of improving machine accuracy and productivity- Special tool holders

Module II (13 hours)

System devices: System drives-hydraulic systems, DC motors, stepping motors, AC motors- Feedback devices-Encoders, pulse digitizers, resolvers, Inductosyn, tachometers.- Counting devices-Flip Flops, counters ,decoders, digital to analog converters. Interpolation- linear interpolator-circular interpolators, CNC software interpolator-Flow of data in NC machines.

Module III (13 hours)

NC Part programming: Manual Programming-Concepts-tape formats- tab sequential- fixed block word address and variable block formats- Part Programming examples-Point to point programming and simple contour programming- Computer aided programming- Concepts – Post processor programming languages- APT programming-Part programming examples.

Module IV (14 hours)

Industrial Robotics: Basic concepts- Robotics and automation- Specification of Robots- Resolution, Repeatability and accuracy of manipulator- Classification of Robots- Industrial application- Robot drives- Characteristics of end of arm tooling- Sensors-Tactile, proximity and range sensors- contact and non-contact sensors- velocity sensors- touch and slip sensors- Force and torque sensors- Programming- Lead through programming- Textual programming- Programming languages - On line and offline programming- Intelligent Robots.

References

1. Yoram Koren, *Computer Control of Manufacturing Systems*, McGrawHill
2. Michel P. Groover, *Industrial Robots-Technology, Programming and Applications*, McGrawHill
3. Fu K.S , Gonzales et al, *Robotics-Control, sensing, vision and intelligence*, McGrawHill.

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)* All questions are compulsory. There should be at least one question from each Module and not more than two questions from any Module.	*5 x 2 marks=10 marks*
PART B:	*Analytical/Problem solving questions* Candidates have to answer four questions out of six. There should be at least one question from each Module and not more than two questions from any Module.	*4 x 5 marks=20 marks*
PART C:	*Descriptive/Analytical/Problem solving questions* Two questions from each Module with choice to answer one question.	*4 x 10 marks=40 marks*

Maximum Total Marks: 70

EE09 L 25 Robotics and Automation

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To give an introduction of industrial robotics and automation*

Module I (14 Hours)

Automation and Robotics - Robotics in Science Fiction - A Brief History of Robotics - The Robot and Its Peripherals-Robot Activation and Feedback Components - Position Sensors - Velocity Sensors - Actuators - Power Transmissions Systems - Robot Joint Control Design- Introduction to Manipulator Kinematics - Homogeneous Transformations and Robot Kinematics -Manipulator Path Control - Robot Dynamics - Configuration of a Robot Controller.

Module II (13 Hours)

Types of End Effectors - Mechanical Grippers - Other Types of Grippers - Tools as End Effectors - The Robot/End Effector Interface - Considerations in Gripper Selection and Design - Sensors in Robotics - Tactile Sensors - Proximity and Range Sensors - Miscellaneous

Sensors and Sensor-Based Systems - Uses of Sensors in Robotics - Introduction to Machine Vision - The Sensing and Digitizing Function in Machine Vision - Image Processing and Analysis - Training and Vision System - Robotic Applications.

Module III (14 Hours)
Methods of Robot Programming – Lead through Programming Methods - A Robot Program as a Path in Space - Motion Interpolation - WAIT, SIGNAL, and DELAY Commands - Branching - capabilities and Limitations of Lead through Methods - The Textual Robot Languages - Generations of Robot Programming Languages - Robot Language Structure - Constants, Variables, and Other Data Objects - Motion Commands - End Effector and Sensor Commands - Computations and operations - Program Control and Subroutines - Communications and Data Processing - Monitor Mode Commands.

Module IV (13 Hours)
Introduction to robot intelligence and task planning- state space search-problem reduction-use of predicate logic-means –end analysis-problem-solving –robot learning-robot task planning-expert systems and knowledge learning.

Text Books

1. Mikell P. Groover- et. Al, *Industrial robotics, Technology, programming and Applications*, McGraw Hill

2. K. S. Fu, R. C. Gonzalez, C. S. G. Lee, *Robotics, Control, Sensing and Intelligence*, McGraw Hill

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)* All questions are compulsory. There should be at least one question from each Module and not more than two questions from any Module.	*5 x 2 marks=10 marks*
PART B:	*Analytical/Problem solving questions* Candidates have to answer four questions out of six. There should be at least one question from each Module and not more than two questions from any Module.	*4 x 5 marks=20 marks*
PART C:	*Descriptive/Analytical/Problem solving questions* Two questions from each Module with choice to answer one question.	*4 x 10 marks=40 marks*

Maximum Total Marks: 70

EC09 L24: Electronic Packaging

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *Introduction to packaging technologies, technology drivers, electrical performance, thermal management, materials, optoelectronics, RF integration, reliability, system issues, assembly, and testing.*

Module I (13 hours)
Introduction – role of packaging – IC packaging – MEMS packaging – consumer electronics packaging – medical electronics packaging – Trends – challenges
Electrical Design - Interconnect Capacitance, Resistance and Inductance fundamentals - Transmission Lines (basic concepts) - Clock Distribution - Noise Sources - power Distribution – signal distribution – EMI - Digital and RF Issues
Module II (13 hours)
Thermal Management - Heat-transfer fundamentals - Thermal conductivity and resistance - Conduction, convection and radiation – Cooling requirements
Reliability - Basic concepts - Environmental interactions - Thermal mismatch and fatigue – failures – thermo mechanically induced – electrically induces – chemically induced-
Module III (10 hours)
Single chip packaging – functions, types, materials processes, properties, characteristics, trends
Multi chip packaging – types, design, comparison, trends
IC assembly – purpose, requirements, technologies – wire bonding, TAB, flip chip

Wafer level packaging - technologies, reliability, wafer level burn – in and test

Module IV (10 hours)

Passives – discrete, integrated, embedded – encapsulation and sealing – fundamentals, requirements, materials, processes

PWB – fundamentals, standards, limitations – microvia boards – PWB assembly – SMT- Through hole assembly – design challenges

Testing - Need for testing – Electrical testing – design for test

Text Books

1. Tummala, Rao R., *Fundamentals of Microsystems Packaging*, McGraw Hill

Reference Books

1. Blackwell (Ed), *The electronic packaging handbook*, CRC Press
2. Tummala, Rao R, *Microelectronics packaging handbook*, McGraw Hill
3. Bosshart, *Printed Circuit BoardsDesign and Technology*,TataMcGraw Hill

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)

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

10% - Regularity in the class

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)* All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	*5 x 2 marks=10 marks*
PART B:	*Analytical/Problem solving questions* Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	*4 x 5 marks=20 marks*
PART C:	*Descriptive/Analytical/Problem solving questions* Two questions from each module with choice to answer one question.	*4 x 10 marks=40 marks*

Maximum Total Marks: 70

CH09 L24 Industrial Pollution Control

Teaching scheme **Credits: 4**

3 hours lecture & 1 hour tutorial per week

Objectives

- *To impart the basic concepts of industrial pollution control*
- *To develop understanding about water, air, light pollution control*

No Pre-requisites

Module 1 (13hours)

Classification of industrial wastewater - types of pollutants and their effects - monitoring and analysis methods - water pollution laws and standards - industrial wastewater treatment - processes and equipment

Module 2 (13hours)

Water pollution control in industries - pulp and paper, textile processing, tannery wastes, dairy wastes, cannery wastes, brewery, distillery, meet packing, food processing wastes, pharmaceutical wastes, chlor-alkali industries, fertilizer industry, petrochemical industry, rubber processing industry, starch industries, metal industries, nuclear power plant wastes, thermal power plant wastes.

Module 3 (13hours)

Air pollution control in industries: source and classification of industrial air pollutants - monitoring equipment and method of analysis - damages to health, vegetation and materials -

air pollution laws and standards - treatment method in specific industries - thermal power plants - cement - fertilizers - petroleum refineries - iron and steel - chlor-alkali - pulp and paper

Module 4 (13hours)
Industrial odour control - sources and solutions - odour control by adsorption and wet scrubbing - industrial noise control methods - sludge treatment and disposal - industrial hazardous waste management, waste minimization. Environmental Impact Assessment and risk assessment-Environmental Audit and Environmental management system- Concept of common effluent treatment plants.

References:
1. Nelson & Nemerow, Industrial Water pollution-Origin, Characteristics and treatment, Addison, Wesley Publishing Co.
2. Gerard Kiely,Environmental Engineering, McGraw Hill
3. Rao M.N. & Rao H,Air Pollution, Tata McGraw Hill
4. Sincero A.P.& Sincero G.A., Environmental Engineering, A Design Approach, Prentice Hall of India
5. Rao C.S., Environmental Pollution Control Engineering, New Age Int. Pub.
6. Mahajan S.P., Pollution Control in Process Industries, Tata McGraw Hill
7. Babbitt H.E, Sewage & Sewage Treatment, John Wiley
8. Abbasi S.A, & Ramasami E, Biotechnical Methods of Pollution Control, Universities Press(India) Ltd.

Internal Continuous Assessment *(Maximum Marks-30)*
60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

University Examination Pattern

PART A: Short answer questions (one/two sentences) *5 x 2 marks=10 marks*

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: Analytical/Problem solving questions *4 x 5 marks=20 marks*

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: Descriptive/Analytical/Problem solving questions *4 x 10 marks=40 marks*

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

Maximum Total Marks: 70

AN09 L24 Project Management

Teaching scheme
3 hours lecture and 1 hour tutorial per week **credits 4**

Objectives:

To give an exposure to the major aspects of project viz. Project Planning, Analysis, Selection, Implementation and review.

Module I (13 hours)

Planning -Capital Expenditures -Phases of Capital Budgeting -Levels of decision Making -Facets of Project analysis-Feasibility Study -Objectives of Capital Budgeting -Resource Allocation framework Key Criteria-Elementary Investment strategies -Portfolio planning tools -Generation of ['project Ideas Monitoring the environment -Corporate appraisal -Scouting for project ideas -Preliminary Screening Project rating index -Sources of Positive net present value

Module II (14hours)

Analysis -Market and demand analysis -Situational analysis and specification of objectives -Collection of secondary information -Conduct of market survey -Characterization of Market -demand Forecasting -Market planning -Technical analysis-Material inputs and utilities -Manufacturing process/technology -Product Mix -Plant capacity -Location and site -machineries and equipments -Structures and civil works -Project charts and layouts -Work schedule -Financial Analysis -Cost of project -means of finance -Estimates of sales and Production -Cost of production -Working capital requirements and its financing -Profitability projections -Break even point -projected cash flow statements and balance sheets

Module III (13hours)

Project Cash flows -Basic I single amount -Future value of an annuity -Present value of a single amount -Present Value of an annuity-Cost of capital -Cost of debt capital -cost of preference capital -Rate of return -Cost of external equity and retained earnings -Determination of weights -Appraisal criterion -Net present value Cost benefit ratio-Internal rate of return-Urgency -payback period

Module IV (14hours)

Implementation-Forms of Project organization -Project planning -Project control -Human Aspects of Project management -Network Techniques -Development of Network -Time estimation -Critical path determination -Scheduling under limited resources -PERT Model-CPM Model -Network Cost System -Project review-Initial; review -Performance evaluation-Abandonment **analysis**

Text Book:

Prasanna Chandra, *Projects Planning, Analysis, Selection, Implementation and Review·. Fourth Edition,* Tata McGraw-Hill.

Reference books

I. Dennis Lock, *Project Management,* Grower Publications

2. Prasanna Chandra, *Financial Management Theory and Practice,* Tata McGraw Hill Publishers

3. Parameswar P Iyer, *Engineering Project management,* Vikas publishers

4. Gido & Clements, *Success/iii Project Management,* Vikas Publishers

5. Harold.T..Amrine John.A.Ritchey, *Manufacturing Organisation and Management,* Pearson Education

Internal Continuous Assessment *(Maximum Marks-30)*

6 60% - Tests (minimum 2)

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

10% - Regularity in the class

University Examination Pattern

PART A:	*Short answer questions (one/two sentences)* All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.	*5 x 2 marks=10 marks*
PART B:	*Analytical/Problem solving questions* Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.	*4 x 5 marks=20 marks*
PART C:	*Descriptive/Analytical/Problem solving questions* Two questions from each module with choice to answer one question.	*4 x 10 marks=40 marks*

Maximum Total Marks: 70

AN09 L25 Research Methodology

Teaching scheme

3 hours lecture and 1 hour tutorial per week **credits 4**

Objective

To give an exposure to the major aspects of research and research approaches.

Module 1 (13hours)

Introduction – meaning of research- objectives of research-motivation in research- types of research-research approaches – significance of research- research methods Vs methodology – criteria for good research

Module 2(14hours)

Defining research problem- what is a research problem- selecting the problem- necessity of defining the problem- literature review – importance of literature review in defining a problem- critical literature review – identifying gap areas from literature review

Module 3 (14hours)

Research design–meaning of research design-need–features of good design- important concepts relating to research design- different types – developing a research plan

Method of data collection–collection of data- observation method- interview method- questionnaire method – processing and analyzing of data- processing options- types of analysis- interpretation of results

Module 4 (13hours)

Report writing – types of report – research report , research proposal, technical paper- significance- different steps in the preparation – lay out, structure and language of typical reports- simple exercises - oral presentation – planning, preparation, practice- making presentation – answering questions-use of visual aids-quality and proper usage-Importance of effective communication with illustrations.

Reference books

1. Coley.S.M and Scheinberg C.A 1990 , *Proposal writing*, Newbury- Sage Publications.
2. Leedy.P.D, *Practical research planning and Design*, 4th edition ,MW Macmillan publishing company.
3. Day Ra,1989 "*How to write and publish a scientific paper*", Cambridge University Press .
4. Earl Babbie,1994, *The practice and Social Research*,Wordsworth Publishing Company,
5. J.H. Ansari, Mahavir – ITPI Reading Material on Planning Techniques

Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)

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

10% - Regularity in the class

University Examination Pattern

PART A: *Short answer questions (one/two sentences)* *5 x 2 marks=10 marks*

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

PART B: *Analytical/Problem solving questions* *4 x 5 marks=20 marks*

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

PART C: *Descriptive/Analytical/Problem solving questions* *4 x 10 marks=40 marks*

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

Maximum Total Marks: 70