UNIVERSITY DEPARTMENTS

ANNA UNIVERSITY CHENNAI :: CHENNAI 600 025

REGULATIONS – 2009
CURRICULUM FROM I TO VII SEMESTERS FOR

B.E. PRINTING TECHNOLOGY (PART-TIME)

SEMESTER I

SL. NO	CODE NO	COURSE TITLE	L	T	P	C
THEORY						
1.	PTMA9111	Applied Mathematics	3	0	0	3
2.	PTPH 9111	Applied Physics	3	0	0	3
3.	PTCY 9111	Applied Chemistry	3	0	0	3
4.	PTGE9151	Engineering Mechanics	3	0	0	3
5.	PTEC 9161	Electronics Engineering	3	0	0	3
		TOTAL	**15**	**0**	**0**	**15**

SEMESTER II

SL. NO	CODE NO	COURSE TITLE	L	T	P	C
THEORY						
1.	PTMA9212	Transforms and Partial Differential Equations	3	0	0	3
2.	PTME9211	Mechanics of Machines	3	0	0	3
3.	PTCE 9213	Strength of Materials	3	0	0	3
4.	PTEE 9211	Electrical Drives & Control	3	0	0	3
5.	PTGE9261	Environmental Science and Engineering	3	0	0	3
		TOTAL	**15**	**0**	**0**	**15**

SEMESTER III

SL. NO	CODE NO	COURSE TITLE	L	T	P	C
THEORY						
1.	PTPT9021	Visual Communication	3	0	0	3
2.	PTME9261	Machine Design	3	0	0	3
3.	PTPT9252	Flexographic Printing	3	0	0	3
4.	PTPT9253	Colour Reproduction	3	0	0	3
5.	PTPT9254	Offset Platemaking	3	0	0	3
		TOTAL	**15**	**0**	**0**	**15**

SEMESTER IV

SL. NO	CODE NO	COURSE TITLE	L	T	P	C
THEORY						
1.	PTPT 9301	Printing Inks	3	0	0	3
2.	PTPT 9401	Packaging Materials	3	0	0	3
3.	PTPT 9303	Digital Data Handling	3	0	0	3
4.	PTPT 9403	Gravure and Screen Printing	3	0	0	3
5.	PTPT 9305	Web Offset Technology	3	0	0	3
		TOTAL	**15**	**0**	**0**	**15**

SEMESTER V

SL. NO	CODE NO	COURSE TITLE	L	T	P	C
THEORY						
1.	PTME9352	Microprocessor and Microcontroller	3	0	0	3
2.	PTPT 9353	Cost Estimation for Printing	3	0	0	3
3.	PTMG9361	Financial Management	3	0	0	3
4.	PTPT 9352	Paper and Board	3	0	0	3
PRACTICAL						
5.	PTME9358	Microprocessor and Microcontroller Laboratory	0	0	3	2
		TOTAL	**12**	**0**	**3**	**14**

SEMESTER VI

SL. NO	CODE NO	COURSE TITLE	L	T	P	C
THEORY						
1.	PTPT 9026	Colour Management	3	0	0	3
	PTPT 9302	Packaging Technology	3	0	0	3
3	PTPT 9402	Scheduling & Planning for Print Production	3	0	0	3
4	PTIE 9025	Human Resources Management	3	0	0	3
5		Elective – I	3	0	0	3
		TOTAL	**15**	**0**	**0**	**15**

SEMESTER VII

SL. NO	CODE NO	COURSE TITLE	L	T	P	C
THEORY						
1		Elective – II	3	0	0	3
2		Elective – III	3	0	0	3
3.	PTPT 9351	Electronic Publishing	3	0	0	3
PRACTICAL						
4.	PTPT 9354	Multimedia Lab	0	0	3	2
5.	PTPT 9451	Project work	0	0	12	6
		TOTAL	**9**	**0**	**15**	**17**

CUMULATIVE TOTAL: 106

ELECTIVES FOR B.E. PRINTING TECHNOLOGY

SL. NO	CODE NO	COURSE TITLE	L	T	P	C
1.	PTPT9022	Mass Communication	3	0	0	3
2.	PTPT9023	Newspaper and Periodical Publishing	3	0	0	3
3.	PTPT9024	Book Publishing	3	0	0	3
4.	PTPT9025	Advertising Techniques	3	0	0	3
5.	PTPT9027	Printing Machinery Maintenance	3	0	0	3
6.	PTPT9028	Quality Control in Printing	3	0	0	3
7.	PTPT9029	Security Printing	3	0	0	3
8.	PTEC9021	Electronic Communication	3	0	0	3
9.	PTGE9021	Professional Ethics in Engineering	3	0	0	3
10.	PTGE9022	Total Quality Management	3	0	0	3
11.	PTGE9023	Fundamentals of Nano Science	3	0	0	3
12.	PTIE9026	Information System Analysis and Design	3	0	0	3
13.	PTIE9035	Supply Chain Management	3	0	0	3
14.	PTMG9072	Entrepreneurship Development	3	0	0	3
15.	PTMA9261	Probability and Statistics	3	0	0	3
16.	PTME9035	Measurements and Control	3	0	0	3
17.	PTME9303	Hydraulics and Pneumatics	3	0	0	3
18.	PTMF9022	Non-Destructive Testing	3	0	0	3
19.	PTMF9401	Operations Research	3	0	0	3
20.	PTMG9071	Marketing Management	3	0	0	3

PTMA 9111   **APPLIED MATHEMATICS**   **L T P C**
             (Common to all branches of B.E / B.Tech (PT) Programmes)   **3 0 0 3**

UNIT I   MATRICES   **9**
Characteristic equation – Eigenvalues and Eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors – Cayley – Hamilton Theorem – Diagonalization of matrices - Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms .

UNIT II   FUNCTIONS OF SEVERAL VARIABLES   **9**
Partial derivatives – Homogeneous functions and Euler's theorem – Total derivative – Differentiation of implicit functions – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables - Maxima and minima of functions of two variables.

UNIT III   ANALYTIC FUNCTION   **9**
Analytic functions – Necessary and sufficient conditions for analyticity – Properties – Harmonic conjugates – Construction of analytic function – Conformal Mapping – Mapping by functions w = a + z , az, 1/z, **-** Bilinear transformation.

UNIT IV   COMPLEX INTEGRATION   **9**
Line Integral – Cauchy's theorem and integral formula – Taylor's and Laurent's Series – Singularities – Residues – Residue theorem – Application of Residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour with no pole on real axis.

UNIT V   LAPLACE TRANSFORMS   **9**
Existence conditions – Transforms of elementary functions – Basic properties – Transforms of derivatives and integrals – Initial and Final value theorems – Inverse transforms – Convolution theorem – Transform of periodic functions – Application to solution of linear ordinary differential equations with constant coefficients.

                                            TOTAL: 45 PERIODS

TEXT BOOKS:
1. Grewal B.S., Higher Engineering Mathematics (40th Edition), Khanna Publishers, Delhi (2007).
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill Co. Ltd., New Delhi (2007).

REFERENCES:
1. Glyn James, Advanced Modern Engineering Mathematics, Pearson Education (2007).
2. Veerarajan, T., Engineering Mathematics (For First Year), Tata McGraw-Hill Pub. Pvt Ltd., New Delhi (2006).

PTPH 9111   **APPLIED PHYSICS**   **L T P C**
                                                                        3 0 0 3

UNIT I   ULTRASONICS   9
Introduction – Production – magnetostriction effect - magnetostriction generator-piezoelectric effect - piezoelectric generator- Detection of ultrasonic waves properties – Cavitations - Velocity measurement – acoustic grating - Industrial applications – drilling, welding, soldering and cleaning – SONAR - Non Destructive Testing – pulse echo system through transmission and reflection modes - A, B and C –scan displays, Medical applications - Sonograms

UNIT II   LASERS   9
Introduction – Principle of Spontaneous emission and stimulated emission. Population inversion, pumping. Einstein's A and B coefficients - derivation. Types of lasers – He-Ne, CO_2, Nd-YAG, Semiconductor lasers - homojunction and heterojunction (Qualitative)- Industrial Applications - Lasers in welding, heat treatment and cutting – Medical applications - Holography (construction and reconstruction).

UNIT III   FIBER OPTICS & APPLICATIONS   9
Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – Double crucible technique of fibre drawing - Splicing, Loss in optical fibre – attenuation, dispersion, bending - Fibre optical communication system (Block diagram) - Light sources - Detectors - Fibre optic sensors – temperature and displacement - Endoscope.

UNIT IV   QUANTUM PHYSICS   9
Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh – Jeans' Law from Planck's theory – Compton effect - Theory and experimental verification – Matter waves – Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one-dimensional box - Electron microscope - Scanning electron microscope - Transmission electron microscope.

UNIT V   CRYSTAL PHYSICS   9
Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – 'd' spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – NaCl, ZnS, diamond and graphite structures – Polymorphism and allotropy - Crystal defects – point, line and surface defects- Burger vector.

                                                        TOTAL: 45 PERIODS
TEXT BOOKS:
1. Palanisamy, P.K., 'Engineering Physics' Scitech publications, Chennai, (2008).
2. Arumugam M. ' Engineering Physics', Anuradha Publications, Kumbakonam, (2007)
3. Sankar B.N and Pillai S.O. 'A text book of Engineering Physics', New Age International Publishers, New Delhi, 2007.

REFERENCES:
1. R. K. Gaur and S.C. Gupta, 'Engineering Physics' Dhanpat Rai Publications, New Delhi (2003)
2. M.N. Avadhanulu and PG Kshirsagar, 'A Text book of Engineering Physics', S.Chand and company, Ltd., New Delhi, 2005.
3. Serway and Jewett, 'Physics for Scientists and Engineers with Modern Physics', 6th Edition, Thomson Brooks/Cole, Indian reprint (2007)

PTCY 9111   **APPLIED CHEMISTRY**   **L T P C**
                                                                           3 0 0 3

UNIT I   WATER TREATMENT AND POLLUTION CONTROL   9
Treatment of water –impurities and disadvantages of hard water-Domestic and Industrial treatment - zeolite and ion exchange processes-Portable water-Boiler feed water – conditioning of boiler feed water. Scale and sludge formation –prevention –caustic embrittlement-boiler corrosion–priming and foaming Sewage treatment–Primary, secondary and tertiary treatment–significance of DO, BOD and COD-desalination – reverse osmosis. Control of water,air and land pollution.

UNIT II   FUELS   9
Classification of fuels-Proximate and ultimate analysis of coal- coke manufacture-Otto Hoffman by product method-cracking-thermal and catalytic (fixed bed and fluidized bed)-petroleum-refining-factions-composition and uses synthetic petrol-fischer drops methods- Bergius process- knocking-octane number and cetane number-Preparation, composition and uses of producer gas , water gas and natural gas. Flue gas analysis-Orsat apparatus- gross and net calorific values- calculation of minimum requirement of air(simple calculations)- Explosive range –spontaneous ignition temperature

UNIT III   THERMODYNAMICS AND SURFACE CHEMISTRY   9
Second law of thermodynamics-entropy and its significance- criteria for spontaneity- free energy-Gibbs, Helmholts and Gibbs-Helmholts equation-applications and problems – Adsorption –types of adsorption- adsorption of gases on solids- adsorption isotherm-Freundlich and Langmuir isotherms-adsorption of solutes from solutions- applications

UNIT IV   ELECTROCHEMISTRY - CORROSION AND CATALYSIS   9
Reversible and irreversible cells-electrode potentials-types of electrodes-cell reactions-Nernst equations- electrochemical and galvanic series-fuel cells and solar cells-corrosion-chemical and electrochemical-factors affecting corrosion-sacrifical anode-impressed current cathodic protection-surface treatment and protective coating-Catalysis –classification-characteristics of catalysis – auto catalysis- enzyme catalysis

UNIT V   POLYMERS-COMPOSITES AND NANOCHEMISTY   9
Polymers-definition-classification-thermoplastics and thermosetting plastics differences Preparation, properties and uses of polystyrene, bakelite, PET, polyurethane, Teflon, ureafromaldehyde, polycarbonates-Elastomers-Preparation, properties of Buna-S, nitrile, neoperene and butyl rubber, silicon rubber. Composites-FRP. Nanochemistry-introduction to nanochemistry- preparation and properties of nonmaterial-nano rods, nano wires-nanotubes-carbon nanotubes and their applications.

TOTAL: 45 PERIODS

TEXT BOOKS:
1. Dhara S S A text book of Engineering Chemistry, S.Chand & Co Ltd, New Delhi,2002
2. Jain. P.C and Monica Jain, Engineering Chemistry,Dhanpet Rai & Sons, New Delhi 2001

REFERENCES:
1. Puri B R.,Sharma L R and Madhan S. Pathania, Principles of Physical Chemistry, Shoban Lal Nagin Chand & Co. Jalandar-2000.
2. G.B. Sergeev, Nanochemistry.Elsevier Science, New York,2006
3. V.R.Gowarikar, N.V.Viswanathan and Jayadev Sreedhar, Polymer Science, Wiley Eastern Limited, Madras (2006).

PTGE9151 **ENGINEERING MECHANICS** **L T P C**
3 0 0 3

OBJECTIVE:
At the end of this course the student should be able to understand the vectorial and scalar representation of forces and moments, static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions. Further, he should understand the principle of work and energy. He should be able to comprehend the effect of friction on equilibrium. The student should be able to understand the laws of motion, the kinematics of motion and the interrelationship. The student should also be able to write the dynamic equilibrium equation. All these should be achieved both conceptually and through solved examples.

UNIT I **BASICS & STATICS** **9**
Introduction - Units and Dimensions - Laws of Mechanics – Lame's theorem, Parallelogram and triangular Law of forces – Vectors – Vectorial representation of forces and moments – Vector operations on forces, dot product and cross product - Coplanar Forces – Resolution and Composition of forces – Equilibrium of a forces – Forces in space - Equilibrium in space - Equivalent systems of forces – Principle of transmissibility – Single equivalent force

UNIT II **EQUILIBRIUM OF RIGID BODIES** **9**
Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem - Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions – Examples

UNIT III **PROPERTIES OF SURFACES AND SOLIDS** **9**
Determination of Areas and Volumes – First moment of area and the Centroid of standard sections – T section, I section, Angle section, Hollow section – second and product moments of plane area – Rectangle, triangle, circle - T section, I section, Angle section, Hollow section – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia – Principal moments of inertia of plane areas – Principal axes of inertia - Mass moment of inertia – Derivation of mass moment of inertia for rectangular solids, prism, rods, sphere from first principle – Relation to area moments of inertia.

UNIT IV   **DYNAMICS OF PARTICLES**   **9**

Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion – Newton's law – Work Energy Equation of particles – Impulse and Momentum

UNIT V   **CONTACT FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS** **9**

Frictional force – Laws of Coloumb friction – simple contact friction – Rolling friction – Belt friction Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion – Impact of elastic bodies

                                                        TOTAL: 45 PERIODS

TEXT BOOK:

1. Beer,F.P and Johnson Jr. E.R, "Vector Mechanics for Engineers", Vol. 1 Statics and Vol. 2 Dynamics, McGraw-Hill International Edition, 2007.

REFERENCES:

1. Irving H. Shames, Engineering Mechanics - Statics and Dynamics, IV Edition – PHI / Pearson Education Asia Pvt. Ltd., 2003
2. Hibbeller, R.C., Engineering Mechanics, Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., 2000.
3. Ashok Gupta, Interactive Engineering Mechanics – Statics – A Virtual Tutor (CDROM), Pearson Education Asia Pvt., Ltd., 2002
4. J.L. Meriam & L.G. Karige, Engineering Mechanics Vol. I & Vol. II, V edition, John Wiley & Sons, 2006.
5. P. Boresi & J. Schmidt, Engineering Mechanics Statics & Dynamics, Micro Print Pvt. Ltec., Chennai, 2004.

PTEC9161   **ELECTRONICS ENGINEERING**   **L T P C**
                                                                     3 0 0 3

UNIT I   **SEMICONDUCTORS AND RECTIFIERS**   **9**

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

UNIT II   **TRANSISTOR AND AMPLIFIERS**   **9**

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

UNIT III   **POWER AND CONTROL ELECTRONIC DEVICES**   **9**

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

UNIT IV   SIGNAL GENERATORS AND LINEAR Ics   9
Sinusoidal oscillators – Positive feedback – RC phase shift, Hartley, Colpitts, Wein bridge oscillators – Multivibrators – Operational amplifier – Adder, multipliers, integrator and differentiators.

UNIT V   DIGITAL ELECTRONICS   9
Boolean algebra – Decoder , Encoder – Multiplexer , Demultiplexer – Half and full adders – Flip flops – Digital to Analog and analog to digital converters.

TOTAL: 45 PERIODS

TEXT BOOK:
1. Malvino, 'Electronic Principles', McGraw Book Co., 1993.

REFERENCES:
1. Grob. B and Schultz. M.E., 'Basic Electronics', Tata Mcgraw Hill, 2003.
2. Thomas L. Floyd, 'Electronic Devices', Pearson Education, 2002.
3. Thomas L. Floyd, 'Digital Fundamentals', Pearson Education, 2003.

PTMA 9212   TRANSFORMS AND PARTIAL DIFFERETIAL EQUATIONS   L T P C
(Common to all branches of BE / B.Tech (Part-Time) Programmes)   3 0 0 3

AIM:
To facilitate the understanding of the principles and to cultivate the art of formulating physical problems in the language of mathematics.

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

UNIT I   FOURIER SERIES   9
Dirichlet's conditions – General Fourier series – Odd and even functions – Half-range Sine and Cosine series – Complex form of Fourier series – Parseval's identity – Harmonic Analysis.

UNIT II   FOURIER TRANSFORM   9
Fourier integral theorem – Fourier transform pair-Sine and Cosine transforms – Properties – Transform of elementary functions – Convolution theorem – Parseval's identity.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS 9

Formation – Solutions of first order equations – Standard types and Equations reducible to standard types – Singular solutions – Lagrange's Linear equation – Integral surface passing through a given curve – Solution of linear equations of higher order with constant coefficients.

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9

Method of separation of Variables – Solutions of one dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions in Cartesian coordinates.

UNIT V Z – TRANSFORM AND DIFFERENCE EQUATIONS 9

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

TOTAL: 45 PERIODS

TEXT BOOK:
1. Grewal, B.S. "Higher Engineering Mathematics", Khanna Publications (2007)

REFERENCES:
1) Glyn James, "Advanced Modern Engineering Mathematics, Pearson Education (2007)
2) Ramana, B.V. "Higher Engineering Mathematics" Tata McGraw Hill (2007).
3) Bali, N.P. and Manish Goyal, "A Text Book of Engineering 7th Edition (2007) Lakshmi Publications (P) Limited, New Delhi.

PTME 9211 MECHANICS OF MACHINES L T P C
3 0 0 3

OBJECTIVE:
1. To understand the principles in the formation of mechanisms and their kinematics.
2. To understand the effect of friction in different machine elements.
3. To analyse the forces and toques acting on simple mechanical systems
4. To understand the importance of balancing and vibration.

UNIT I KINEMATIC OF MECHANICS 10

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

UNIT II GEARS and GEAR TRAINS 9

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

UNIT III   FRICTION   8

Sliding and Rolling Friction angle – friction in threads – Friction Drives – Friction clutches – Belt and rope drives – brakes – Tractive resistance.

UNIT IV   FORCE ANALYSIS   9

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

UNIT V   BALANCING AND VIBRATION   9

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

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Ambekar A.G., "Mechanism and Machine Theory" Prentice Hall of India, New Delhi, 2007
2. Shigley J.E., Pennock G.R and Uicker J.J., "Theory of Machines and Mechanisms", Oxford University Press, 2003

REFERENCES:

1. Thomas Bevan, "Theory of Machines", CBS Publishers and Distributors, 1984.
2. Ghosh.A, and A.K.Mallick, "Theory and Machine", Affiliated East-West Pvt. Ltd., New Delhi, 1988.
3. Rao.J.S. and Dukkipatti R.V. "Mechanisms and Machines", Wiley-Eastern Ltd., New Delhi, 1992.
1. John Hannah and Stephens R.C., "Mechanics of Machines", Viva Low Prices Student Edition, 1999.
2. V.Ramamurthi, Mechanisms of Machine, Narosa Publishing House, 2002.
3. Robert L.Norton, Design of Machinery, McGraw-Hill, 2004.

STANDARDS:

IS 2458:2001, Vocabulary of Gear Terms – Definitions related to Geometry.
IS 3756 : 2002, Method of Gear Correction – Addendum modification for External cylindrical gears with parallel axes.
IS 5267 : 2002 Vocabulary of Gear Terms – Definitions Related to Worm Gear Geometry.
IS 12328 : Part 1 : 1988 Bevel Gear Systems Part -1 Straight Bevel Gears.
IS12328 : 1988 Bevel Systems Part – 2 Spiral Bevel Gears.

PTCE 9213   **STRENGTH OF MATERIALS**   **L T P C**
                                                                 3 0 0 3

UNIT I   STRESS, STRAIN AND DEFORMATION OF SOLIDS   8
Rigid bodies and deformable solids – Tension, Compression and Shear Stresses –
Deformation of simple and compound bars – Thermal stresses – Elastic Constants –
Volumetric strains – Stresses on inclined planes – Principal stresses and principal
planes – Mohr's circle of stress.

UNIT II   TRANSEVERSE LOADING ON BEAMS AND STRESSES IN BEAMS 12
Beams – types transverse loading on beams – Shear force and bending moment in
beams – Cantilevers – Simply supported beams and over – hanging beams. Theory of
simple bending - bending formula – bending stress distribution – Load carrying capacity
– Proportioning of sections – Flitched beams – Shear stress distribution.

UNIT III   TORSION   6
Stresses and deformation in circular and hollows shafts – Stepped shafts – Shafts fixed
at the both ends – Stresses in helical springs – Deflection of helical springs.

UNIT IV   DEFLECTION OF BEAMS   10
Double Integration method – Macaulay's method – Area moment theorems for
computation of slopes and deflections in beams – Conjugate beam and energy method –
Maxwell's reciprocal theorems.

UNIT V   THIN CYLINDERS, SPHERES AND THICK CYLINDERS   9
Stresses in thin cylindrical shell due to internal pressure circumferential and longitudinal
stresses – deformation in thin cylinders –spherical shells subjected to internal pressure –
deformations in spherical shells - Lame's theory – application of theories of failure

                                                         TOTAL: 45 PERIODS
TEXTBOOKS:
1. Rajput.R.K. "Strength of Materials" S.Chand & co Ltd. New Delhi 1996
2. Jindal U.C. "Strength of Materials" Asian Books Pvt Ltd, New Delhi 2007

REFERENCES:
1. Egor.P.Popov "Engineering Mechanics of Solids" Prentice Hall of India, New
    Delhi 1997
2. Subramanian R. "Strength of Materials" Oxford University Press,   Oxford Higher
    Education series ,2007
3. Hibbeler , R.C, Mechanics of materials", Pearson Education, Low price
    Edition,2007

PTEE 9211   **ELECTRICAL DRIVES AND CONTROL**   **L T P C**
                                                        3 0 0 3

AIM:
To provide knowledge in the area of electrical dives and their control techniques

PREREQUISTE:
Basic Electrical Engineering

OBJECTIVE:
 To impart knowledge on
 I. Basics of electric drives
 II. Different speed control methods
 III. Various motor starters and controllers
 IV. Applications

UNIT I   INTROUDCTION   9
Fundamentals of electric drives – advances of electric drive-characteristics of loads – different types of mechanical loads – choice of an electric drive – control circuit components: Fuses, switches, circuit breakers, contactors. Relay – control transformers.

UNIT II   SPEED CONTROL OF DC MACHINES   9
DC shunt motors – Speed Torque characteristics - Ward Leonard method, DC series motor – series parallel control – solid state DC drives – Thyristor bridge rectifier circuits- chopper circuits.

UNIT III   SPEED CONTROL OF AC MACHINES   9
Induction motor – Speed torque Characteristics – pole changing, stator frequency variation - slip-ring induction motor – stator voltage variation - Rotor resistance variation, slip power recovery – basic inverter circuits- variable voltage frequency control.

UNIT IV   MOTOR STARTERS AND CONTROLLERS   9
DC motor starters : using voltage sensing relays, current sensing relays and time delay relays - wound rotor induction motor starters – starters using frequency sensing relays - DOI -starter and auto transformers starter.

UNIT V   HEATING AND POWER RATING OF DRIVE MOTORS   9
Load diagram, over load capacity, insulating materials, heating and cooling of motors, service condition of electric drive – continuous, intermittent and short time – industrial application.

TOTAL: 45 PERIODS

TEXT BOOKS:
1. N.K De and P.K Sen 'Electric Drives' Prentice Hall of India Private Ltd,2002.
2. Vedam Subramaniam 'Electric Drives' Tata McGraw Hill ,New Delhi,2007
3. V.K Mehta and Rohit Mehta ' Principle of Electrical Engineering' S Chand & Company,2008

REFERENCES:
1. S.K Bhattacharya Brinjinder Singh 'Control of Electrical Machines' New   Age International Publishers,2002.
2. John Bird 'Electrical Circuit theory and technology' Elsevier, First Indian Edition, 2006.

PTGE 9261   ENVIRONMENTAL SCIENCE AND ENGINEERING   L T P C
(Common to all branches)   3 0 0 3

AIM:
The aim of this course is to create awareness in every engineering graduate about the importance of environment, the effect of technology on the environment and ecological balance and make them sensitive to the environment problems in every professional endeavour that they participates.

OBJECTIVE:
At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity. The role of government and non-government organization in environment managements.

UNIT I   ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY   14
Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.
Field study of common plants, insects, birds
Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II   ENVIRONMENTAL POLLUTION   8
Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.
Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III   NATURAL RESOURCES   10
Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land

resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV   SOCIAL ISSUES AND THE ENVIRONMENT   7

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

UNIT V   HUMAN POPULATION AND THE ENVIRONMENT   6

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

TOTAL: 45 PERIODS

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

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

PTPT 9021   **VISUAL COMMUNICATION**   **L T P C**
                                                                              3 0 0 3

 AIM:
To understand the Importance of Visual Communication

OBJECTIVE:
To enable the student to
a. Understand the vehicles of visual communication and its analysis.
b. Understand the applications of visual communication

UNIT I   INTRODUCTION   6
Visual arts history, from cave drawings to video painting, identifying and analyzing hidden languages in various media and cultures.

UNIT II   PRINCIPLES OF VISUAL COMMUNICATION   11
Psychology of human vision, How the eye and brain process image, Visual grammer, Col,our form, Depth and movement, Visual theories, Perception, Semiotics, Visual story creation.

UNIT III   VISUAL ANALYSIS   9
Visual persuasion and propaganda, visual image analysis, stereotypes and the media, Ethics of visual story telling.

UNIT IV   PRINCIPLES OF DESIGN   9
Balance, Emphasis, Simplicity, Repetition, Rhythm, Proportion, Unity, Variety, The application of design principles in creating visual images, Case studies.

UNIT V   APPLICATION OF VISUAL COMMUNICATION   10
Overview of print, Photography, Video and Audio media, Study of techniques and methods of applying visual communication in newspapers, magazines, video, internet, advertising and public relations. Analysis of a visual event – film, TV, photo exhibit, advertisements, etc. Case studies.

                                                          TOTAL: 45 PERIODS
TEXT BOOKS:
1. Paul Martin Lester, "Visual Communication; Images with Messages", 3rd Edition, Thomson/Wadsworth, Belmont, California, 2003.
2. Kosternics, Charles and David Roberts, "Designing Visual Language", 2nd Edition, Allyn & Bacon, 1999.

REFERENCES:
1.   Horn, Robert, "Visual Language", Macro UV Publishers, 1999.
2.   Gregg Beryman, "Notes on Graphic Design & Visual Communication", Crisp Publications, 1990.
3.   Gunther R.Krers, Theo Van Ceeuwen, Routledge, Gunther R.Grers, "Reading Images –   The Grammer of Visual Design", Routledge Publishers, 1995.

PTME 9261   **MACHINE DESIGN**   **L T P C**
                                                                       3 0 0 3

OBJECTIVE:
- To familiarise the various steps involved in the Design Process
- To understand the principles involved in evaluating the shape and dimensions of a component to satisfy functional and strength requirements.
- To learn to use standard practices and standard data.
- To learn to use catalogues and standard machine components

**UNIT I   STEADY STRESSES AND VARIABLE STRESSES IN MACHINE
                MEMBERS   9**
Introduction to the design process – factor influencing machine design, selection of materials based on mechanical properties – Preferred numbers, fits and tolerances – Direct, Bending and torsional stress equations – impact and shock loading – calculation of principle stresses for various load combinations, eccentric loading – Design of curved beams – crane hook and 'C' frame – Factor of safety – theories of failure – stress concentration – design for variable loading – Soderberg, Goodman and Gerber relations.

UNIT II   DESIGN OF SHAFTS AND COUPLINGS   10
Design of solid and hollow shafts based on strength, rigidity and critical speed – Design of keys, key ways and splines – Design of crankshafts – Design of rigid and flexible couplings.

UNIT III   DESIGN OF TEMPORARY AND PERMANENT JOINTS   9
Threaded fastners – Design of bolted joints including eccentric loading, Knuckle joints, Cotter joints – Design of Welded joints, riveted joints for structures – theory of bonded joints.

UNIT IV   DESIGN OF ENERGY STORING ELEMENTS   8
Design of various types of springs, optimization of helical spings – rubber springs – Design of flywheels considering stresses in rims and arms, for engines and punching machines.

UNIT V   DESIGN OF BEARINGS AND MISCELLANEOUS ELEMENTS   9
Sliding contact and rolling contact bearings – Design of hydrodynamic journal bearings, McKee's Eqn., Sommerfield Number, Raimondi & Boyd – Selection of Rolling Contact bearings – Design of Seals and Gaskets – Design of Connecting Rod.

                                                        TOTAL: 45 PERIODS
Note : (Use of P S G Design Data Book is permitted in the University examination)

TEXT BOOKS:
1. Shigley J.E. and Mischke C.R., "Mechanical Engineering Design", Sixth Edition, Tata McGraw Hill, 2003.
2. Bhandrari V.B, "Design of Machine Elements", Second Edition, Tata McGraw-Hill Book Co., 2007.

REFERENCES:
1. Sundararajamoorthy T.V, Shanmugam N, "Machine Design", Anuradha Publications, Chennai.
2. Orthwein W, "Machine Component Design", Jaico Publishing Co, 2003.
3. Ugural A.C, "Mechanical Design – An Integral Approacho, McGRaw-Hill Book Co, 2004.
4. Spotts A.F., Shoup T.E, "Design and Machine Elements" Pearson Education, 2004.

STANDARDS:
IS 10260 : Part I : 1982 Terms, definitions and classification of Plain bearings Part 1 : Construction.
IS10260 : Part I : 1982 Terms, definitions and classification of Plain bearings Part 2 : Friction and Wear.
IS 10260 : Part I : 1982 Terms, definitions and classification of Plain bearings Part 3 : Lubrication.

PTPT 9252	FLEXOGRAPHIC PRINTING	L T P C
		3 0 0 3

AIM:
To give a complete understanding about the Flexographic printing process and flexographic printing machines.

OBJECTIVE:
To introduce the basic principles of flexographic printing process, plate preparation & mounting methods, parts of a flexographic press and maintenance & quality control in flexo press.

UNIT I   INTRODUCTION   9
Basic principles – design considerations, plate preparation, plate mounting, press, ink, substrates; Basic Press construction, Press types, Printing station - fountain rollers, anilox rollers, doctor blades, plate cylinders, impression rollers.

UNIT II   IMAGE CARRIER PREPARATION   9
Moulded rubber plates; Photopolymer plates - Sheet photopolymer, liquid photopolymer, Direct Imaged Plates, Plate considerations - plate handling, storage, wrap distortion, Ink & solvent compatibility.

UNIT III   MOUNTING AND PROOFING   9
Plate mounting procedures, plate staggering, plate make ready; Manual Mounting, Video mounting, Sleeve mounting, Pin mounting, Proofing procedure.

UNIT IV   PRINTING PRESS   9
Roll mechanics, unwind equipment, infeed, substrate treatment, web tension control, inking systems, drying systems, cooling rolls, in line laminating, rewind equipment, rotary die cutting/sheeting, Pressroom Practices

UNIT V   MAINTENANCE AND QUALITY CONTROL   9
Maintenance - press, mounting and proofing machines; quality control at press side, control of incoming materials, Wastage control, Troubleshooting.

TOTAL: 45 PERIODS

TEXT BOOKS:
1. "Flexography : Principles & Practices", 5th Edition, FTA, 2000.
2. "FIRST: Flexographic Image Reproduction Specifications & Tolerances", 3rd Edition, FTA, 2003.

REFERENCES:
1. Frederick R.Boyle, "The Flexo Environment", Foundation of Flexographic Technical Association, 2002.
2. Anthony White, "High Quality Flexography", Pira reviews of Printing, Pira International, 1992.
3. Donna C.Mulvihill, "Flexography Primer", GATF Press, 1991.
4. Helmut Kiphhan, "Handbook of Print Media", Springer Verlag, 2001
5. J.Michael Adams David, Fauz, Llyod, J.Rieber, "Printing Technology", 3rd Edition, Delmar   Publishers, 1988

PTPT9253   **COLOUR REPRODUCTION**   **L T P C**
                                                                     3 0 0 3

AIM:
To introduce the basic concepts involved in the reproduction of colour images.

OBJECTIVE:
This course imparts the fundamental concepts of Colour Science & measurement and gives an overview of colour reproduction techniques. It gives an exposure to in-depth exploration of issues involved in color reproduction in print media and concepts behind image adjustment techniques. It also introduces the basic concepts of Color Management Systems.

UNIT I   COLOUR SCIENCE & MEASUREMENT   9
Light, colour, Additive and Subtractive colour theory, Attributes of colour, Tristimulus values, Chromaticity diagram, CIELAB, Colour spaces, Colour difference, Spectrophotometer

UNIT II   PRINCIPLES OF COLOUR REPRODUCTION   9
Image Acquisition, Colour originals for reproduction. Reproduction objectives, Colour reproduction – photography, printing, display devices; Colour printing - Colour separation techniques, Screen angles and moire patterns.

UNIT III   COLOUR CORRECTION & IMAGE ADJUSTMENTS   9
Properties of coloured inks, Masking and its principles, Balanced inks, Jones Diagram, Gray balance, Masking equations, Neugebauer equation, Look Up Table, Image Adjustments - Colour correction, White point & Black point, Colour cast removal, USM, Black printer, UCR, GCR, UCA.

UNIT IV   SPECTRAL SENSITIVITIES, INK & PAPER   9
Light Source, color filter, photographic emulsion. Optics of ink film - first surface reflection, multiple internal reflections. Additivity and Proportionality rules.

UNIT V   COLOUR MANAGEMENT   9

Colour Management – Need, Open loop, Closed loop, Calibration, Characterization, Conversion, ICC, Profiles, Rendering intent, Gamut mapping. Digital proofing – Need & issues, Viewing conditions

TOTAL: 45 PERIODS

TEXT BOOKS:

1. John A.C. Yule and Gary G.Field, "Principles of colour reproduction" GATF Press, USA 2000.
2. Phil Green, "Understanding Digital Color", 2nd edition, GATF Press, 1999.

REFERENCES:

1. R.W.G. Hunt, "Reproduction of Colour in Printing, T.V. & Photography", Fountain Press, 1981.
2. Gary Field, " Color and its Reproduction", 3rd edition, GATF Press, 2004
3. Berns R S, "Billmeyer & Saltzman 's Principle of Colour Technology", 3rd Edition, Wiley, 2000
4. J.Michael Adams David, Fauz, Llyod, J.Rieber, "Printing Technology", 3rd Edition, Delmar Publishers, 1988.
5. Abhay Sharma, "Understanding Colour Management", Thomson Delmar, 2004.

PTPT 9254   OFFSET PLATEMAKING   L T P C
                                                            3 0 0 3

 AIM: To understand the process of Offset Plate making

OBJECTIVE: To make them aware of different materials, and equipments used to make a quality offset plate.

UNIT I   IMAGE PLANNING   8

Lithographic production – Introduction; planning layout – Information, type of work, Environment and working conditions, Preparing the layout; Imposition schemes; Book work – Margin calculations, Methods; Planning materials, tools, equipment, light tables.

UNIT II   METHODS OF IMAGE PLANNING AND ASSEMBLY   8

Direct ruling to plate – Metal keys, Burnout masks, Paper templates; Hand assembly – Negative assembly to Golden rod, Golden rod with plastic interleave, Peelable membrane substrates; Conventional positive assembly, Pin register systems; Planning softwares – Features.

UNIT III   PLATE CHEMISTRY, COATING AND PROCESSING   12

Base metals – Aluminium, Zinc, Stainless steel, Copper, Chromium, Nickel and their properties, Poly masters, paper masters. Graining – types; Contact angle and wettability; Anodisation – Process; Light sensitive materials – dichromated colloids, diazo, and photopolymer compounds; Type of plates – Albumin, Deep-etch, Multi metal, Wipe-on, PS positive and negative working plate chemistry, exposing, processing chemicals, procedures; Plate exposing unit; Light source – Types – advantages, disadvantages; Automatic plate processing machine– Design, method of use; Desensistizing process, gum, developing inks, lacquers and asphaltum. Waterless plates, performance characteristics; Electrophotographic plates – types, processing and use; Reflex plate making; Diffusion transfer plates. Plate handling and storage.

UNIT IV COMPUTER TO PLATE SYSTEMS 10

Computer to Plate Workflow. C-t-P plate making systems- Internal drum, External drum, Flat bed, Ink jet, Multi purpose systems. Plates for digital imaging- Tehrmal sensitive, Photopolymer, Silver halide, Silver hybrid plates, sensitivity, chemistry, mechanism of image formation and processing. Processless plates. Digital plate control wedge.

UNIT V QUALITY CONTROL 7

Quality Control – Importance; Quality aids – Star target, Dot gain scale, Stouffer gauge, Graduated halftone percentage scale, UGRA Plate control wedge, GATF standard offset colour control bar, Brunner control system, Dotmeter.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. A.L.Gatehouse and K.N.Roper, "Modern Film Planning and Platemaking", 2nd Edition, SITA Limited, 1983.
2. R.M.Adams II & F.J.Romano, "Computer-to-Plate – Automating and Printing Industry", 2nd Edition, GATF Press, 1999.

REFERENCES:

1. Lan Faux, "Modern Lithography", SITA Ltd., 1982.
2. Raymond N.Blair, Thomas M.Destree, Lithographer's Manual, GATF, 9th edition 1994.
3. Bob Thompson, "Printing Materials",Science & Technology,PIRA International, 1998.

PTPT9301 **PRINTING INKS** **L T P C**
3 0 0 3

AIM:

To understand the basic constituents and properties of various inks to aid the students in controlling the quality and also to troubleshoot the printing processes.

OBJECTIVES:

To study the raw materials, properties, manufacturing processes, testing, problems related to printing inks used for different printing processes and special inks.

UNIT I RAW MATERIALS - COLORANTS AND OILS 9

Colorants – Pigments Classification, Preparation and properties, Inorganic – white and coloured. Carbon black, Metallic, Ultramarine and Flourescent; organic – Diarylide yellow, Hansa yellow, Rhodamine, Lithol, Rubine, Rubine Toner, Phthalocyanine blue & green. Alkali blue, Benzidine orange, Toluidine red and Lake red C; Dyestuffs - Acid, basic, solvent and disperse dyes, Preparation and Properties and uses; Oils – drying, semi drying and non drying oils, Preparation, Properties and uses.

UNIT II RAW MATERIALS – BINDERS, SOLVENTS AND ADDITIVES 9

Resins – Natural Rosin and its derivatives and Gumarabic; Synthetic – Rosin modified fumaric, maleic and phenolic, pure phenolic, Alkyds, hydro carbons, polyamides, Polyvinyl, Ketone, Nitro Cellulose, Ethyl Cellulose, Epoxy resins, Acrylic resins and Varnishes - types; Solvents – Aliphatic & aromatic hydrocarbons, alcohols, esters, glycols & ketones; Additives – Properties and applications – Driers, Waxes, Antioxidants, plasticizers, wetting agents, defoaming agents and Antiskinning agents.

UNIT III   CONSTITUENTS AND MANUFACTURING OF DIFFERENT INKS   9
Ink composition for major printing process. Paste Inks – Single roll mill, Ball mill, Triple roll mill, Twin horizontal Mixture, Z-arm stirrer; Liquid Inks – Ball mill, Bead mill and attritor, Flow chart for ink manufacturing – weighing, mixing, grinding, testing and packing.

UNIT IV   PROPERTIES, TESTING AND INK RELATED PROBLEMS   9
Viscosity, Tack, Colour, Gloss, Rub resistance, Length, Drying Characteristic, and Finess of grind gauge, light fastness, Standards on environmental concerns, end use applications, Ink problems related to printing processes – causes and remedies.
[
UNIT V   SPECIAL INKS AND INK DRYING MECHANISMS   9
Water based inks, Security inks, Radiation curable inks - IR, UV & EB – Raw materials, equipment used for drying. Ink drying mechanisms

                                             TOTAL: 45 PERIODS

TEXT BOOKS:
1. R.H.Leach, "The Printing Ink Manual", 5th Edn., Chapman & Hall, London, 2002.
2. Ronald E.Tood, "Printing Inks – Formulation, Principles, Manufacture and Quality Control Testing", PIRA International 1996.

REFERENCES:
1. Cliffwoof, "A Manual for Flexographic Inks", Fishbum Printing Ink Co. Ltd., Watford.
2. Charles Finley, "Printing Paper and Ink", Delmar Publishers, 1997.
3. Nelson R.Eldred, "What the Printer should Know about inks", 3rd Edition GATF Press, 2001.
4. Bob Thompson, "Printing materials Science and Technology", 2nd edition, 2004.

PTPT 9401   PACKAGING MATERIALS   L T P C
                                                                  3 0 0 3

AIM: To understand the properties of various packaging materials to aid in package designing & printing.

OBJECTIVE: To study the materials used for packaging and their properties and testing.

UNIT I   PLASTICS   9
Polymers – introduction, types, plastics in packaging – advantages, types – flexible and rigid packaging – Materials – Polyethylene, polypropylene, Polyethylene terephalate, polyvinyl chloride, polyamides, polystyrene, Ionomers, Nitrile polymers and cellulose derivatives.   Phenol formaldehyde, Urea formaldehyde, polyesters, Epoxy resins, polyurethanes, polycarbonate – preparation, properties, processing technology, applications, recycling, biodegradable materials.

UNIT II   WOOD, PAPER AND TEXTILE   9
Wood – Boxes, barrels, pallets, baskets, sacks – types, characteristic properties, Nature of wood, properties; Textile – Types of cloth, properties, and areas of application; Paper and Board – Folding box board, solid and corrugated fibreboard cartons – Materials, properties. Wrapping and multi wall papers, bags, sacks – Materials, properties application area, Laminating papers, recycling process.

UNIT III GLASS AND METALS 9

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

UNIT IV ANCILLARY MATERIALS 9

Labelling materials – Types of labels – Material properties, Label adhesives – characteristic properties and uses. Collapsible tube – materials and properties. closures and sealing – materials and properties, Cushioning Materials – properties and areas of application. Lacquers – properties, uses; Special additives for food grade films; Nano materials, Reinforcement – materials and properties.

UNIT V MATERIAL TESTING 9

Mechanical – Tensile, tear burst, impact, compression test, Elongation, barrier properties, WVTR test, Adhesion test, Optical – Gloss, haze and clarity; Chemical – Resistance test – solvents and chemicals, solubility test, burning test, solvent retention; Hardness and corrosion test for metals; Clarity and brittleness test for glass.

TOTAL: 45 PERIODS

TEXT BOOKS:
1. A.S.Athayle, "Plastics in Flexible Packaging", Multi-tech Publishing Co., First Edition, 1992.
2. Aaron L.Brody & Kenneth S.Marsh, "Encyclopedia of Packaging Technology", John Wiley Interscience Publication, II Edition, 1997.

REFERENCES:
1. A.S.Athayle, "Handbook of Packaging Plastics", Multi-tech Publishing Co.,First Edition, 1999.
2. Gunilla Johnson, "Corrugated Board Packaging", PIRA International, 1993.
3. Arthur Hirsch, "Flexible Food Packaging", Van Nostor and Reinhold, 1991.

PTPT 9303 **DIGITAL DATA HANDLING** **L T P C**
3 0 0 3

AIM:
To equip the students in related areas of information technology to help them in handling the digital workflow.

OBJECTIVE:
To provide exposure to the basic components of digital print production workflow like networking, file formats, Database management & security issues.

UNIT I WORKFLOW 9
Workflow-types, Automated workflow - components, File Preparation, Preflighting, Digital Imposition–preRIP, postRIP, OPI, Trapping, Postscript, PDF,Metadata–JDF, XML.

UNIT II NETWORKING 9
Data transmission fundamentals, Communication media, Data interfaces, Concepts and principles of computer networks, PAN, LAN, WAN, MAN, Network Topologies, Network

protocols – FTP, TCP/IP, Network Node components – Hubs, Bridges, Routers, Gateways, Switches, Internet – principles, Client/Server model

UNIT III   FILE FORMATS & COMPRESSION TECHNIQUES   9
File format – EPS, DCS, JPEG, GIF, TIFF, PNG, Comparison of file formats, ompression techniques, Lossy & lossless compression, RLE, Huffman compression, LZW, DCT, Wavelet, Fractal image encoding, Image quality evaluation, Audio compression, Video Compression

UNIT IV   DATABASE MANAGEMENT   9
Database, Types, Database Management, Database Languages, Query processing, Data storage, Backup & recovery, Distributed databases, Data Warehousing, Data Mining, Security issues, Access Control, Digital Asset Management

UNIT V   SECURITY   9
Security in Operating Systems, Principles of Network Security, Cryptography, Fire walls, Intrusion Detection Systems, Secure Email, Digital Rights Management

TOTAL: 45 PERIODS

TEXT BOOKS:
1. Helmut Kiphhan, "Handbook of Print Media", Springer Verlag, 2001
2. Phil Green, "Understanding Digital Color", 2nd edition, GATF Press, 1999.

REFERENCES:
1. Mani Subramanian, "Network Management: Principles & Practice", Addison Wesley, 1999
2. Sanjiv Purba, "Handbook of Data Management", Viva Books Private Ltd., 1999
3. Douglas E. Comer, "Computer Networks & Internets", 2nd Edition, Pearson Publications, 1999
4. Larry L. Pearson, Bruce S. Davie, "Computer Networks: A Systems Approach", Third Edition, Morgan Kauffman Publishers Inc., 2003
5. Abraham Silberschatz, Henry F. Korth, S.Sudharshan, "Database System Concepts", Fourth Edition, Tata McGraw Hill, 2002
6. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Third Edition, Pearson Education, 2003

PTPT 9403   GRAVURE AND SCREEN PRINTING   L T P C
3 0 0 3
AIM: To give a complete understanding on gravure and screen printing processes.

OBJECTIVE: To impart knowledge on
- The basic principles of Gravure printing process, cylinder preparation techniques & components of gravure printing unit.
- The basic principles of Screen printing process, stencil preparation methods & types of presses.
- Print problems & quality control in Gravure & screen printing process

UNIT I   GRAVURE PROCESS AND IMAGE CARRIER   12

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

UNIT II   GRAVURE PRINTING UNITS   9

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

UNIT III   SCREEN PRINTING COMPONENTS   7

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

UNIT IV   STENCIL PREPARATION AND PRESSES   10

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

UNIT V   PRINT PROBLEMS AND QUALITY CONTROL   7

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

TOTAL: 45 PERIODS

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

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

PTPT 9305   **WEB OFFSET TECHNOLOGY**   **L T P C**
                                                                              3 0 0 3

AIM: To give a complete understanding about the working of a web offset machine

OBJECTIVE:

- To make the students understand the reel feeding mechanisms, web tension controls, dampening and inking systems, registering mechanisms and settings involved in a web offset printing machine**.**

UNIT I   PRESS CLASSIFICATION AND INFEED UNITS   12
Development. Classification: blanket-to-blanket, in-line, common impression. Full size and narrow web presses. Job suitability and factors to be considered for selection, presses for producing continuous stationery. Roll stands. Automatic pasters: zero speed and flying paster. Web pre-conditioners, infeed units, dancer types, dancer system design, tension control systems. Automatic webbing up device, control of fan out using buzzle wheels, and web aligner concepts. Web break detectors. Reel handling and storage. Requirements of paper-roll and web.

UNIT II   PRINTING UNIT   10
Printing Unit – plate cylinder, blanket cylinder, lock-up mechanisms, plate bending machines, cylinder pressure and timing, unit configuration, webbing up options. Cylinder drives, Circumferential and lateral movement of plate cylinder. Automatic register control system concepts and design. Shaft less drives.

UNIT III   INKING & DAMPENING SYSTEM   9
Inking system: requirements, design concepts, requirements, metering, roller train design, form rollers, heat generation, ghosting. Roller setting. Dampening system: requirements, types, metering methods, column control. Ink agitators, automatic ink pumping systems. Keyless inking, dahlgren damping, spray, brush dampeners. Test forms. Print quality, measurement and control systems. Web offset printing problems,solutions and paper waste control.

UNIT IV   DRYING, CHILLING, FOLDING AND SHEETING UNITS   10
Dryers: need, types, construction and working. Silicone coating, Chilling units, construction. Operational care and maintenance. Folders, types and delivery. Former and its adjustment, R.T.F., nip rollers, turner bars, bay windows, side and cut off margin controls. Kickers, markers, perforators, slitters, operation and maintenance. Sheeting device and mechanism.

UNIT V   MAIL ROOM OPERATION   4
Products, sizes, formats, sections, Pagination, single/double/quadruple production, speed, time schedules, conveyor system, counter stackers, wrapping requirements, strapping requirements. Bundle addressing, system control, Programming and Telescopic conveyor for truck loading, copy storage system, Inserting.

                                                            TOTAL: 45 PERIODS

TEXT BOOKS:
1. W.R.Durrant, "Web Control : A Handbook for the Web Printer", 1997.
2. Edward J.Kelly, David B.Crouse and Robert R.Supansic, "Web Offset Press Operating", GATF Press, USA, 1982.

REFERENCES:
1. David B.Crouse, "Web Offset Press Troubles", GATF Press,1984.
2. John MacPhee, "Fundamentals of Lithographic Printing Vol.I Mechanics of Printing", GATF Press, 1998.
3. Helmutt Kipphan, "Handbook of Print Media", Springer, Heidelberg, 2000

PTME9352   MICROPROCESSOR AND MICROCONTROLLER   L T P C
3 0 0 3

OBJECTIVE:
To impart knowledge on 8085 Microprocessor and 8051 Microcontroller and its applications. In addition the basic concepts and programming of 8085 Microprocessor and 8051 Microcontroller are introduced which are very much required in the emerging field of automation.

UNIT I   8085 MICROPROCESSOR   10
Introduction-Architecture of 8085-Pin Configuration-Addressing Modes-Instruction set.

UNIT II   TIMING DIAGRAM AND PROGRAMMING   8
Instruction cycle-machine cycle-T states and Timing diagram of 8085- Calculation of instruction cycle timings- Assembly Language Programming using 8085 instructions.

UNIT III   PERIPHERALS AND INTERFACING   12
Basic interfacing concepts-8255 Programmable Peripheral Interface- interfacing input keyboards- interfacing output display-interfacing memory-A/D and D/A Converters Interfacing.

UNIT IV   8051 MICROCONTROLLER   9
Introduction- Architecture of 8051- Pin configuration- Ports- External Memory- counters and Timers- Serial and Parallel Data I/O- Interrupts – Assembly language programming

UNIT V   APPLICATIONS using Intel 8085 and 8051   6
Temperature Control- Stepper Motor Control- Traffic Light Controller. Measurement and speed control of DC motor.

TOTAL: 45 PERIODS

TEXT BOOKS:
1. Ramesh Gaonkar, "Microprocessor Architecture, Programming and Applications with 8085", Wiley Eastern, 1998.
2. Kenneth J.Ayala, "The 8051 Microcontroller, Architecture, Programming and applications",Thomson Delmar Learning, Indian Edition, 2007.

REFERENCES:
1. M.A. Mazidi and J.C. Mazidi, "The 8051 Microcontroller and Embedded systems", Pearson Education, 2006.
2. Douclas V.Hall, "Microprocessors and Interfacing, Programming and Hardware", Tata McGraw Hill, 1999.
3. L.A. Levental, Introduction to microprocessors Software and Hardware Programming", Prentice Hall Inc, 1978.
4. Aditya, P.Mathur, "Introduction to Microprocessors Software", Tata McGraw Hill, 1983
5. P.K.Ghosh and P.R.Sridhar, "Introduction to Microprocessors for Engineers and Scientists", Prentice Hall of India, 2001.

PTPT 9353   **COST ESTIMATION FOR PRINTING**   **L T P C**
                                                                    3 0 0 3

AIM:
To introduce the basic concepts in cost estimation

OBJECTIVE:
To impart knowledge on
1. Basic concepts of costing, pricing, estimating and investment analysis
2. Estimating cost of printing materials and different processes for various print jobs

UNIT I   **COSTING AND PRICING**   **7**
Costing systems - cost; profit; price; functions of costing; costing models; types of costing – marginal costing, job costing, budgeting costing; types of budgets; budgetary control; sales forecasts and budgets for printing and allied industries; relationship between cost control and budgetary control.

UNIT II   **ESTIMATING**   **5**
Cost estimating, price estimating, estimator needs; procedure for selling, estimating, pricing, and quoting for printing; estimating methods; production planning; computerized estimating.

UNIT III   **ESTIMATING PRINTING MATERIALS AND PROCESS**   **12**
Paper- sheet and web; ink; toners; pre-press; machine printing – sheet-fed offset, web offset, flexography, gravure, screen printing, digital printing; post press; e-publishing.

UNIT IV   **PRINT COSTING**   **12**
Classification of cost; elements of cost; costing of direct materials; costing of machine operations; costing of manual operations; costing – typesetting, scanning, plate-making, printing, binding and finishing operations.

UNIT V   **INVESTMENT ANALYSIS**   **9**
Time value of money, compound value, present value, annuities, pay back method, average rate of return and internal rate of return method; break even analysis – analysis, calculation of break even point, margin of safety, sensitivity analysis and profit graphs.

                                                TOTAL: 45 PERIODS

TEXT BOOKS:
1. Hugh Speirs, "Print Estimator's Handbook", 2nd edition, Pira International Ltd., 2004
2. Don Merit, "Printing Estimating Primer", GATF Press, 2000
3. Philip K. Ruggles, "Printing Estimating", Fourth edition, Delmar Publishers, 1996

REFERENCES:
1. "Cost Accounting for Printers", Part I and Part II, British Printing Industries Federation, 1982
2. K. S. Venkataraman and K. S. Balaraman, "Estimating Methods and Cost Analysis for Printers", Ramya Features and Publications, 1987
3. Dipl.-Ing. B. D. Mendiratta, "Printer's Costing and Estimating", Printing India Publications Pvt. Ltd., 1999.
4. Hugh M. Speirs, "Print Estimators – The Handbook", BPIF, 1996.
5. N. D. Vohra, "Quantitative Techniques in Management", Tata McGraw Hill Publishing Company Limited, 1990

PTMG 9361   **FINANCIAL MANAGEMENT**   **L T P C**
                                                                              3 0 0 3

AIM:
To provide sufficient knowledge in financial management for an Engineer/Technologist to handle practical situations.

OBJECTIVE:
* To know about basic financial terminologies
* To enable an Engineer/Technologist to get a complete knowledge on various investment & financial decisions and financial models

UNIT I   FINANCIAL ANALYSIS   8
Finance function – Statements of financial information – Balance Sheet – Profit and Loss Account – Funds flow statement – Cash flow statement – Ratio analysis.

UNIT II   COST ANALYSIS   8
Cost concepts – Marginal costing and profit planning – Break Event Analysis – Decision Involving alternative choice – Budgetary Control.

UNIT III   VALUATION & INVESTMENT DECISION   8
Valuation and bonds – shares – Present value and bonds, Preference share – Equity share – Pay back Period – Discounted Payback – Accounting Rate of Return – Net present value – Internal Rate of Return – Modified Internal Rate of Return.

UNIT IV   FINANCIAL DECISION   8
Cost of Capital – Cost of equity, debt, Preference – Optimal capital budget – Source of long term finance – Raising long term finance – Capital structure – Traditional theory – MM theory – Capital structure planning.

UNIT V   DIVIDEND DECISION   13
Dividend policy – Dividend decision – Form of dividends – Gorden's Model – Water's Model – Corporate dividend behaviour – Working Capital Management :
Concepts of working capital – Determinants – Estimating needs – Cash management – Credit Management.

                                                             TOTAL: 45 PERIODS

TEXT BOOKS:
1. Prasanna Chandra, Financial Management, Theory and Practice, Tata McGraw Hill, New Delhi, 6th Ed. 2004.
2. I.M. Pandey, Financial Management, Vikas Publishing House Pvt. Ltd., 8th Ed, 2004, New Delhi (7th Report).

REFERENCES:
1. Dr.S.N. Maheshwari, Financial Management, Principles & Practice, Sulthan Chand & Son, New Delhi, 2004.
2. James C. Van Hrone & John M. Wachowicz Ja, Fundamentals of Financial management, Prentice Hall India Pvt. Ltd., Eastern Economy Edition, New Delhi 2004, 11th Edition.
3. Brigham Eugene F., Ehahardt Michael C., Financial Management – Theory & Practice, Cengage Learning India, New Delhi, 2006.
4. M.Y. Khan & P.K. Jai, Financial Management, Text, Problems & Cases, Tata McGraw Hill, 4th Edition, 2004.

PTPT 9352   **PAPER AND BOARD**   **L T P C**
                                                                          3 0 0 3

AIM:
To give an overview of the paper manufacturing process & its properties.

OBJECTIVE:
 To impart knowledge on manufacturing processes, properties and testing of paper and board used for different printing processes and paper related problems in printing.

UNIT I   RAW MATERIALS & PROCESSING   9
Sources, kinds of cellulose fibres – Pulping – Mechanical, Thermo-mechanical and Chemical processes – Bleaching techniques – Stock preparation – Beating & refining – Fillers, Sizing, Dyeing – Non-fibrous additives and consistency.

UNIT II   PAPER AND BOARD MANUFACTURING   9
Paper making machines, Head boxes and inlets, Forming Section, Press and dryer section, wires, felts, automation; Calendaring – types. Board manufacturing – cylinder machines.

UNIT III   PAPER AND BOARD COATING & CLASSIFICATION   9
Paper and board coating – Pigments, binders and additives – Techniques. Main classes of paper and board; paper and board sizes; paper requirement for different printing processes; paper handling, de-Inking; recycling; end-use.

UNIT IV   PAPER AND BOARD PROPERTIES   12
Structural – Formation, 2-sidedness, grain direction; Physical – GSM, caliper, bulk, porosity, smoothness, dimensional stability, curl, moisture content and relative humidity, Cobb tester, Optical -Gloss, brightness, colour, opacity; Chemical – pH, ash content; Mechanical – Tensile, burst, tear, internal bonding, fold endurance, stiffness, pick resistance, absorbency.

UNIT V   PAPER PROBLEMS IN PRINTING   6
Fluff, hickey, picking, piling, slurring and doubling, curl, chalking set-off, mottle, poor ink drying, show through, strike through mis-register, static electricity, blistering, web break.

                                                     TOTAL: 45 PERIODS
TEXT BOOKS:
1. Lawrence H.Wilson, "What the printer should know about paper", GATF Press, Third Edition, 2000.
2. Kenneth W.Britt, "Handbook of Pulp and Paper Technology" CBS Publishers, 1984.

REFERENCES:
1. Lothar Gottsching & Heikki Pakarinen, "Paper making Science and Technology", Book-7, Fapet OY Publishing, 2000.
2. Charles Finley, "Printing Paper and Ink", Delmar Publisher, 1997.
3. Bob Thompson, "Printing materials Science and Technology", Pira International Publications 2nd edition, 2004.
4. J.P.Casey (Ed.), "Pulp and Paper Chemistry and Chemical and Technology", Vol.I to IV, Wiley Interscience, 1983.

PTME9358   **MICROPROCESSOR AND MICROCONTROLLER**
                              LABORATORY   **L T P C**
                                                       0 0 3 2

OBJECTIVE:
To impart knowledge and hands on training in 8085 processor and 8051 microcontroller to perform functions such as arithmetic operation and interfacing.

1. Study of 8085 Microprocessor and 8051 Microcontroller trainer kits and identifying the components.
2. 8085 and 8051 Assembly language programs
   i) Arithmetic operation ii) Ascending/descending order and finding largest/ smallest number in an array.
3. 8085 and 8051 Assembly Language Program for code conversion
   i) BCD to binary ii) binary to BCD
4. 8051 Assembly Language Program for timer operations.
5. Interfacing of 8 bit A/D and D/A converters using 8085 and 8051
6. Stepper motor interface using 8085 and 8051
7. Display unit interface with 8051 and 8051

TOTAL: 45 PERIODS

PTPT 9026   **COLOUR MANAGEMENT**   **L T P C**
                                                                 3 0 0 3

AIM:
To understand the intricacies of colour management.

OBJECTIVE:
To give an insight into the advanced concepts of Colour management & an overview of various color management workflows.

UNIT I   COLOUR SCIENCE   9
Light, Colour, Source, Object, Observer, Color spaces, Colour difference, Colour Measurement - Spectrophotometer, Colorimeter, Instrument calibration & limitation.

UNIT II   COLOUR MANAGEMENT   9
Need for colour management, device characteristics, closed and open loop colour control, calibration, characterization, conversion, International colour consortium.

UNIT III   PROFILES   9
Profile Structure, Creating scanner, digital camera, computer monitor, printer (Press and Proofer profiles, calibration, gamut, fluorescence, Profile quality, Profile editing, Profiling softwares

UNIT IV   CONVERSION   9
CMM, Gamut boundaries, Rendering Intent, Gamut mapping – influencing factors, algorithms, Colour appearance models

UNIT V   WORKFLOW   9

Colour Management workflows – RGB workflow, CMYK workflow, embedded workflow, assumed workflow, Internet workflow, Soft proofing, Hardcopy proofing, Colour management in applications(Photoshop), Operating System

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Abhay Sharma, "Understanding Colour Management", Thomson Delmar, 2004.
2. Adams R.M. & Weisberg J.B., "GATF Practical Guide to Colour Management", 2nd. Ed. GATF Press, 2000.

REFERENCES:

1. Green P., "Understanding Digital Colour", 2nd. Ed. GATF Press, 1999.
2. Berns R.S, "Billimeyer & Saltzman's Principles of Colour Technology", 3rd Ed. Wiley, 2000.'
3. Bruce Fraser, Chris Murphy, & Fred Bunting, "Real World Color Management", 2nd Edition, Peachpit Press
4. Mark D.Fairchild, "Color Appearance Models", Second Edition, John Wiley & Sons Ltd., 2005
5. Phil Green, Lindsay MacDonald, "Colour Engineering", John Wiley & Sons Ltd., 2002

TECHNICAL LITERATURE ON WEB

1. www.color.org
2. www.apple.com/colorsync

PTPT 9302   PACKAGING TECHNOLOGY   L T P C
**   3 0 0 3**

AIM:

To introduce the different technologies involved in packaging industry.

OBJECTIVE:

To study the fundamentals, designs in packaging, manufacturing process, testing of packaging and specialty packaging in detail.

UNIT I   FUNDAMENTALS OF PACKAGING   6

Definition, historical background, functions of packaging types and selection of package, packaging hazards, interaction of package and contents, shelf life estimation, materials and machine interface, life cycle assessment

UNIT II   PACKAGE DESIGN   7

Fundamentals, factors influencing design, consumer, research and sales promotion through package design, graphic design, Structural design – cans, bottles, folding cartons, corrugated boxes, bar codes and tags.

UNIT III   MANUFACTURING PROCESS   12

Folding carton manufacturing -Cutting; creasing; die making punching –cartooning Machineries – types, flexible pouches forming machines, corrugated box manufacturing process, Rigid boxes manufacturing process, Drums – types of drums, moulded pulp containers; three piece and two piece can; seam treatment   types, Collapsible tube; metal foil packaging; bag making machinery – multiwall, tube forming; robots used in packaging.

UNIT IV   SPECIALITY PACKAGING   13

Aerosol packaging, shrink and stretch wrapping, blister packaging, anti-static packaging, aseptic packaging, oven able package; Cosmetic packaging, confectionery packaging, hardware packaging, textile packaging, food packaging; child resistant and health care packaging, chub packaging, electrostatic dischar protective packaging, export packaging, lidding, medical packaging, modified atmospheric packaging, RFID in packaging.

UNIT V   PACKAGE TESTING   7

Testing – bursting, tear, tensile; drop test - inclined impact, Horizontal impact, bridge impact, vibration Test, stacking and compression test, corrugated board testing, hot track method, layer gauge method,

                                                                TOTAL: 45 PERIODS

TEXT BOOKS:
1. Bill Stewart, "Packaging Design Strategies", Pira International Ltd, 2nd Edition 2004.
2. F.A. Paine, "Fundamentals of Packaging", Brookside Press Ltd., London, 1990.
3. Aaron L.Brody & Kenneth S.Marsh, "Encyclopedia of Packaging Technology",
    John Wiley Interscience Publication, II Edition, 1997.

REFERENCES:
1. Walter Stern, "Handbook of Package Design Research", Wiley Interscience, 1981.
2. Paine, "Packaging Development", PIRA International, 1990.
3. Arthur Hirsch, "Flexible Food Packaging", Van Nostor and Reinhold, New York, 1991.
4. E.P.Danger, "Selecting Colour for Packaging", Grover Technical Press, 1987.
5. Susan E.M.Salke & et al, Plastics Packaging, Hansar, 2nd edition 2004.

PTPT 9402   SCHEDULING AND PLANNING FOR PRINT PRODUCTION   L T P C
                                                                3 0 0 3

OBJECTIVE:
After this course the student should:
a. Understand the concepts of Scheduling and its importance in the printing Industry.
b. Should have complete knowledge of the various applications of inventory and project management with respect to the Printing Industry.

UNIT I   INTRODUCTION   11

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

UNIT II   SEQUENCING   11

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

UNIT III   INVENTORY MANAGEMENT   8

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

UNIT IV   MATERIALS & CAPACITY REQUIREMENT PLANNING   6

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

UNIT V   CPM & PERT   9

Introduction, Network construction, Problems, Resource analysis & allocation, Application & case studies.

TOTAL: 45 PERIODS

TEXT BOOKS:

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

REFERENCES:

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

PTIE 9025   HUMAN RESOURCES MANAGEMENT   L T P C
3 0 0 3

OBJECTIVE:

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

UNIT I   INDIVIDUAL BEHAVIOR   9

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

UNIT II   GROUP BEHAVIOR   9

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

UNIT II   DYNAMICS OF ORGANIZATIONAL BEHAVIOR   9

Organizationl Climate, the Satisfactory –Organizational change –the Change Process & Change Management.

UNIT IV   HUMAN RESOURCES PLANNING   9

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

UNIT V   HUMAN RESOURCES DEVELOPMENT   9

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

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Stephen R. Robbins, "Organizational Behavior", PHI, 1998.

REFERENCES:

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

PTPT9351   **ELECTRONIC PUBLISHING**   **L T P C**
                                                                            3 0 0 3

AIM:
To give an overview of the workflow and its components in electronic publishing.

OBJECTIVE:
To impart knowledge on application of electronic publishing in various areas, basic workflow followed in electronic publishing, softwares & tools needed and the emerging trends.

UNIT I   INTRODUCTION   9
Internet, WWW, Web2.0, Broadband, Print Ondemand, eBook, eJournals, eNewspaper, internet advertising, Digital libraries, eReaders – eInk, Epaper, Electronic Publishing-Advantages, Issues.

UNIT II   PUBLISHING   9
Areas of publishing – Legal, STM, Book Publishing – Manuscript, Anatomy of a book, Layout & Design, Journal Publishing - Layout & Design, Web Publishing - Layout & Design, Accessibility, usability, standards, Publishing on Handheld devices - Layout & Design. Reference database – PUBMED etc. Index – author, volume, keyword.

UNIT III   WORKFLOW   9
Authors, Publishers, ePublishing Companies; Workflow – Receiving Jobs (FTP), Pre-editing, Copy editing, Proof reading, Graphics, Pagination, Quality Control, Output – Print, Proof, Web, Handheld devices; Workflow softwares, File management - File aming conventions, Storage, Metadata, Searching, Digital Asset Management, Re-purposing, PDFX/3 workflow.

UNIT IV   SOFTWARES & TOOLS   9
Conventional workflow, XML workflow, STM Typesetting softwares, Pagination softwares, Image manipulation softwares, Markup languages – fundamentals, Presentation technologies   - (HTML, CSS, WML, XSL/XSL-FO), Representation technologies (XML, DTD, W3C XML Schema, DSDL), Transformation technologies (SAX, DOM, XSLT),   Scripting languages (ASP, Perl), Unicodes for non-English characters.

UNIT V   EMERGING TRENDS   9
Future publishing Models, Digital Rights Management, Business models in Internet, Marketing, Recent trends

                                                          TOTAL: 45 PERIODS

TEXT BOOKS:
1. Harold Henke, "Electronic Books and ePublishing: A Practical Guide for Authors", 1st edition, Springer, 2001.

REFERENCES:
1. William E Kasdorf, "The Columbia Guide to Digital Publishing", Columbia University Press, 2003
2. Cady & McGregor, "Mastering the Internet" , 2nd edition, Business Promotion Bureau Publications, 1996
3. Deitel & Deitel, Neito, Sadhu, "XML How to Program", Pearson Education Publishers, 2001

4. Eric Ladd, Jim O' Donnel, "Using HTML 4, XML and Java", Prentice Hall of India – QUE, 1999
5. Scot Johnson, Keith Ballinger, Davis Chapman, "Using Active Server Pages", Prentice Hall of India, 1999.
6. Helmut Kiphhan, "Handbook of Print Media", Springer Verlag, 2001

PTPT9354   **MULTIMEDIA LABORATORY**   **L T P C**
                                                               0 0 3 2

AIM:
To give a hands on experience in creating multimedia projects.

OBJECTIVE:
To Impart knowledge on
- Creating movies in software like flash and Director using animation, special effect, text, graphics, audio and video.
- Editing of audio and video.

1. Components of Multimedia
2. Multimedia software
3. Story board, Slide and Theatre Metaphase
4. Creating presentations using Text, Pictures Graphics, Audio and Video
5. Adding special effects to presentation
6. Animation
7. Interactivity
8. Authoring

                                                    TOTAL: 45 PERIODS

PTPT9451   **PROJECT WORK**   **L T P C**
                                                               0 0 12 6

The objective of Project work is to enable the students to work in convenient groups of not more than four members in a group on a project involving some design and fabrication work or theoretical and experimental studies related to the respective engineering discipline.

Every project work shall have a guide who is a member of the faculty of the University. Six periods per week shall be allotted in the time table for this important activity and this time shall be utilized by the students to receive directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by the guide and also to present in periodical seminars or viva to review the progress made in the project.

Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, project work details, estimation of cost and conclusions. This final report shall be in typewritten form as specified in the guidelines.

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

PTPT 9022   **MASS COMMUNICATION**   **L T P C**
                                                                                3 0 0 3

AIM:
To understand the concepts of mass communication

OBJECTIVE:
To enable the student to understand
- The concepts of verbal and non-verbal communication
- The concepts of journalism

UNIT I   INTRODUCTION   9
Verbal and non-verbal communication, personal communication and mass communication, theories, principles and techniques of communication, history and role of mass media in society.

UNIT II   NEWS REPORTING AND EDITING   9
Fundamentals of reporting, news gathering, evaluation, news writing & newsroom procedures, Depth reporting, Trend reporting, Investigative reporting, Economic and Science reporting, Preparation of news copy for publication, Copy reading, Rewriting, Proof reading, Page making, Typography, Picture editing.

UNIT III   WRITING   9
Newspaper feature and magazine, non-fiction writing, writing editorials, analytical articles, reviews, columns, commentaries & analysis.

UNIT IV   BROADCAST JOURNALISM   9
Gathering & reporting news for ratio & television. The structure, functions and administration of a news and public affairs department in a broadcast station. Radio/TV station management.

UNIT V   AUDIO-VISUAL COMMUNICATION   9
Audio-visual aids & techniques, use of non-projected and projected aids as black boards, Charts, Graphs, etc. Film appreciation, principles and techniques of various types of communication research.

                                                              TOTAL: 45 PERIODS
TEXT BOOKS:
1. Denis McQualil, "Mass Communication Theory; An Introduction to Theories of Mass Communication", 5th Edition, Melvin L.De Fluer, Sandra Bale-Rokeach, Sage Publications,l 1999.
2. Stanley J.Baran, Dennis K.Davis, "Mass Communication Theory Foundations, Ferment and Future", 3rd Edition, Wadsworth Publishing, 2002.

REFERENCES:
1. Jennings Bryant, Dolf zillmann, "Media Effects; Advances in Theory and Research, 2nd Edition, Lea Publishers, 2002.
2. Melvin L.Deflear, Sandra Bale-Rokeach, "Theories of Mass Communication", 5th Edition, Allyn and Bacon Publishers, 1999.
3. Arthur Asa Berger, "Essentials of Mass Communications Theory", SAGE Publications, 1995.

PTPT9023   **NEWSPAPER AND PERIODICAL PUBLISHING**   **L T P C**
                                                                                    3 0 0 3

AIM: To understand the newspaper and periodical publishing workflow

OBJECTIVE:
This course provides a detailed knowledge on the operations of newspaper and magazine companies, including their organizational structure, management functions, editorial process, production workflows and the legal issues.

UNIT I   NEWSPAPER ORGANISATION & MANAGEMENT   9
Organizational structure & functions - Owner, editorial organization, management, Incoming materials, financial aspects, Production, advertising, distribution and promotion. The role of copy editors, city editors, news editors, editorial cartoonist, artists, Sunday editor, sports editor, business editor, journalist & reports; editorial responsibilities.

UNIT II   NEWS AND EDITING   11
Basic determinants of News; Impact, unusual and prominent; Additional determinants of news; Conflict, proximity, timeliness, currency, gathering the news, sources of news; Beat system, interviewing, wire services, syndicate, news writing, copy preparation, features & reviews, editorial and opinion column, sports, photo production; Editing - manuscript editing, creative and substantive editing, technical editing.

UNIT III   PERIODICAL PUBLISHING   6
Types of magazines, Difference between writing for a magazine & newspaper, structure of a magazine's editorial department & roles, Designing a layout for magazine, story design, page design, web design; Redesigning.

UNIT IV   PRODUCTION & WORKFLOW   11
Manuscript from editorial organization: Layout & design, composition; Advertisements, Digital Newsroom, Archival of news; Press & web publishing workflows, RSS, Distributed production workflow; Press, Paper, Finishing; Off-prints and re-prints; Semi-commercial printing,

UNIT V   LEGAL ASPECTS   8
The press and the law libel, defence against libel, mitigation & damages, Digital Rights Management, Watermarking, Readership strategies & trends, Distribution model for newspapers & magazines, Future developments
                                                            TOTAL: 45 PERIODS

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

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

PTPT9024   **BOOK PUBLISHING**   **L T P C**
                                                                                   3 0 0 3

AIM:
To understand the book publishing workflow

OBJECTIVE:
To impart knowledge on
Areas of publishing, editorial process, production management, distribution methods and legal aspects involved in book publishing

UNIT I   PUBLISHING ORGANISATION   7
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.

UNIT II   EDITORIAL PROCESS AND DEVELOPMENT   9
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 agency, author publisher relationship, writing textbooks for children

UNIT III   PRODUCTION & ESTIMATING IN BOOK PUBLISHING   10
Pre-production planning, manuscript, layout & design, imposition, composition, anatomy of books; printing techniques; production process; technical aspects of production; Quality control – proofing stage; financial aspects; first copy cost, manufacturing cost, overheads; economics of publishing – net book, non-net book, variation in price, published price of the book

**UNIT IV   PROMOTION CHANNELS, DISTRIBUTION OUTLETS AND SALES
                   TECHNIQUES   10**
Direct promotion techniques, mail order advertising, subscription books, direct mail promotion, library purchases, export and import of books, publishers and booksellers catalogues, publicity campaign, paperback distribution, the central book clearing house, economics of distribution, the role of booksellers, book marketing council, book development council

**UNIT V   DIGITAL PUBLUSHING AND LEGAL ASPECTS OF BOOK
                PUBLISHING   9**

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

TOTAL: 45 PERIODS

TEXT BOOKS:
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

REFERENCES:
1. Roy Paul Nelson, "Publication Design", Wm.C.Brown Company Publishers, Dubugue, Lowa, 1983
2. Charles Clark, "Publishing Agreement", Gearge Allen & Unwin, London, 1984
3. "British Production Practice", 2nd Edition, Publishers Association, British Printing Industries Federation, 1984
4. Hugh Williamson, "Methods of Book design", Yale University Press, 1983
5. John Peacock, "Book Production", Blueprint, 1995.

**PTPT9025   ADVERTISING TECHNIQUES   L T P C
                                                                    3 0 0 3**

AIM:
To understand the concepts of Advertising.

OBJECTIVE:
To Enable the student to understand
a. Role of the media
b. Advertising Production and Business in detail

UNIT I   INTRODUCTION   9
Advertising concept, development and scope of advertising, economic and Social roles of advertising, legal aspects of advertising, major institutions Involved in advertising. Meaning of consumer behavior. How marketing firms use consumer behavior, characteristics of advertising communications, achieving desired responses, stimulating attention and facilitating retention, human needs as a basis for appeals. Role of printing presses in advertising.

UNIT II   ADVERTISING PLANNING   9
Factors involved in advertising planning decision making, basis for advertising Objectives, Dagmar model, Marginal analysis, Methods of advertising appropriation.

UNIT III   ADVERTISING MEDIA AND MEDIA PLANNING   9
Media concept, structure of media, media characteristics, publication media, TV and Ratio, direct mail and POP, out of home and other media. Media planning concept, media decision tools, media plan, media plan strategy, media buying and scheduling. Advertising on the Internet.

UNIT IV   ADVERTISING PRODUCTION   9

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

UNIT V   ADVERTISING BUSINESS AND COORDINATION   9

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

TOTAL: 45 PERIODS

TEXT BOOKS:

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

REFERENCES:

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

PTPT9027   PRINTING MACHINERY MAINTENANCE   L T P C
                                                                 3 0 0 3

UNIT I   MAINTENANCE MANAGEMENT PERSPECTIVE   9

Objectives and functions,Problems and challenges, Organisation, Maintenance methods, Criticality determination, Categorization, Economic aspects of maintenance. Emerging trends.

UNIT II   TOTAL PLANNED MAINTENANCE   9

System components, documentation, facility register, records, safety related issues. Spare parts management. Maintenance schedules and control system. Inspection and lubrication, purpose, lubricants, lubricating systems.

UNIT III   TOTAL PRODUCTIVE MAINTENANCE   9

Six big losses, measuring the losses. Evaluating equipment effectiveness. Prepress maintenance, Press maintenance, Printing and allied equipment maintenance. Electrical components maintenance: Motors, Electric brakes. Mechanical components maintenance: Bearings, Clutches, Drives.

UNIT IV   ERECTION AND TESTING   9

Foundation requirements, Condition based maintenance: Condition monitoring, Techniques, Vibration analysis, Thermography, Non destructive testing methods and diagnostic instruments.

UNIT V   RECONDITIONING AND REPLACEMENT THEORY   9
Repairs and reconditioning methods for various parts, roller comprising, re-rubberizing. Replacement policy, replacement of items, Determination of   average life.

TOTAL: 45 PERIODS

TEXT BOOKS:
1. Venkataraman.K, "Maintenance Engineering and Management", Printice-Hall of India Private Limited., 2007.
2. P.Goplakrishnan, A.K.Banerji, "Maintenance and Spare Parts Management", Printice- Hall of India, 1977.

REFERENCES:
1. H.P.Garg, "Industrial Maintenance", S.Chand & Company Ltd., 1990.
2. Kenneth E.Rizzo, "Total Production Management", Second Edn., GATF Press.
3. N.D.Vohra, "Quantitative Techniques in Management", Tata McGraw – Hill Publishing Co. Ltd.
4. Herschell L. Apfelberg, "Maintaining Printing Equipment", GATF Press.
5. Lidley R.Higgins.P.E., L.C.Morrow, "Maintenance Engineering", Handbook, McGraw – Hill Publishing Co. Ltd.

PTPT9028   QUALITY CONTROL IN PRINTING   L T P C
3 0 0 3
UNIT I   INTRODUCTION   8
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

UNIT II   STATISTICAL QUALITY CONTROL   7
Fundamental Statistical Methods, tools such as control charts and sampling methods, control chart techniques and interpretation, selection and collection of data, interpretation of data and statistical inference.

UNIT III   MATERIALS CONTROL   5
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.

UNIT IV   PROCESS CONTROL   15
Need for establishing clearly meaningful job specifications and acceptable tolerance limits, process variability and measures of variability, establishing in process inspection and control procedures for every production department, developing of quality monitoring checklists for all processes, checklists of definable and measurable attributes of products, waste and spoilage reduction as part of quality control.

UNIT V   QUALITY CONTROL INSTRUMENTATION   10
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 colour printing. Minimum instrumentation necessary to produce a product consistent with the appropriate quality level.

TOTAL: 45 PERIODS

REFERENCES:
1. Miles Southworth & Donna Southworth, "Quality and Productivity in the Graphic Arts", Graphic Arts Publishing Company, 1990
2. Douglas C.Montgomery, "Introduction to Statistical Quality Control", John Wiley, 1985
3. Brian Rothery, ISO 9000, "Productivity & Quality", Publishing Private Ltd., 1992
4. Kelvin Tritton, "Colour Control for Lithography", PIRA International, 1992
5. Mortimer,A., "Colour Reproduction in Printing Industry", PIRA International, 1991.
6. Ken Holmes, "Implementing ISO 9000", 2nd edition, PIRA International, 1995
7. Phil Green, "Quality Control for Print Buyers", Blue Print, 1992.
8. Casey, J.P. (Ed), "Pulp & Paper Chemistry and Chemical Technology", Vol.II, Wiley Interscience, 1983
9. Ronald E.Todd, "Printing Inks – Formulation Principles, Manufacture and Quality Control Testing Procedures", PIRA International, 1994.
10. Apfelberg, H.L., Apfelberg, M.J., "Implementing Quality Management in Graphic Arts", GATF, 1995.

PTPT9029   **SECURITY PRINTING**   **L T P C**
                                                                      3 0 0 3

AIM:
To understand the different technologies involved in security printing

UNIT I   CURRENCY PRINTING   9
Creation & Graphics, Making of a bank note, Application of Computers in Designing Currency, Signatures &numbering, Manufacturing of bank notes, Paper specifications, Watermark & Other Protective devices, Digital Watermark Currency Circulation & Bank maintenance, special issues counterfeiting.

UNIT II   CHEQUE PRINTING, NUMBERING AND BAR CODING   9
Introduction, Pre-Encoding, Printing Tolerance, Testing Equipment, E13B Characters, RBI Specifications, Principles of Cheque Design, and Numbering with MICR Ink on Rotary presses, Trouble Shooting, Modulus Systems, Weighed & Unweighted. Introduction, Principles of Bar coding, Types of Coding EAN 13 Code, Code 39 ACA etc. Typical Bar Code Machines & Print Wheels, Scanners and their functions.

UNIT III   COMPUTER FORMS   9
Paper Characteristics, Form Construction & Specification, Form Label Combination Intelligent Electronic Forms, Form Automation, Form Manufacturing & Printing.

UNIT IV   HOLOGRAMS, CREDIT CARDS & PASSPORTS   9
Introduction, Manufacturing process, Holographic Recording & Master Origination, Finishing Process, Types of Holograms, Security Holograms, Click Holograms, Sterograms, Anigram etc..Introduction, Materials Used of Specifications, Embossing, Magnetic Strip Recording and Specifications, Manufacturing Techniques.

UNIT V   SECURITY INKS & COATING   9
Introduction, UV Curing, Light tell Photo chromic inks, Monochromic Inks, Invisible Phosphorescent inks, Water Resistant Inks.

                                                TOTAL: 45 PERIODS

TEXT BOOK:
1. Martin Monestics, "The Art of Paper Currency", Quarlet Books Ltd.,1983

REFERENCES:
1. Leibigner, "Numbering Machines & Systems", Company Leibigner Numbering Systems.
2. William H.Erdei, "Barcode - Design, Printing & Quality Control", McGraw Hill Inc., 1998.
3. R.Narayanan, "Computer Stationery &MICR – Cheque Production" , Association for Research & Development in Printing, 1998.
4. http:/www.printuniversity.org.
5. http:/www.printingforall.virtualave.net
6. http:/www.creedengineers.com

PTEC9021	ELECTRONIC COMMUNICATION	L T P C
		3 0 0 3

OBJECTIVE:
To impart knowledge of basic communication system, noise, modulation, wave propagation, digital communication and working of transmitters and receivers.

UNIT I   INTRODUCTION TO COMMUNICATION SYSTEMS   9
Information – Transmitter – Channel noise – Receiver – Need for modulation – external noise – Atmospheric noise – Extr terrestrial noise – industrial noise – Internal noise – Thermal agitation noise – Soft noise – Transit time noise- Miscellaneous noise – signal to noise ratio – Noise figure.

UNIT II   ANALOG AND PULSE MODULATION   9
Amplitude modulation – Modulation index – Frequency modulation – Phase modulation – DSB-SC, SSB, Vestigial side band. Information in a Communication system – Coding – Noise in a information carrying channel. PWM, PPM, PCM.

UNIT III   RADIATION AND PROPAGATION OF WAVES   9
Fundamental of EM waves – Propagation – Ground waves – Sky wave propagation – Ionosphere – Space waves – Tropospheric scatter.

UNIT IV   DIGITAL COMMUNICATION   9
Emergence of data communication systems – Characteristics of data transmission circuits – Band with requirement – Data transmission rate – Noise – Cross talk – Echo suppressor distortion- Equalizer – Digital codes. Voice and video digitization. Leased line – ISDN – Broadband.

UNIT V   COMMUNICATION SYSTEM   9
Radio communication – AM and FM transmitter and receiver – Microwave communications – Satellite communication – Fibre optic communication (block diagram representation). TDM and FDM.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Schoenbeck, "Electronics Communication – Modulation and Transmission", 2nd Edition, Prentice Hall India, 1999.
2. George Kennedy, "Electronics Communication Systems", Tata McGraw Hill Publishing Co. Ltd., 1995.

REFERENCES:

1. Roddy and Coolem, Electronics and Communication", 4th Edition Prentice Hall, 1999.
2. Roy Blake, "Electronic communication systems", Thomson – Delmar, 2005.
3. Luuis E. Frenzel Jr., "Principles of Electronic Communication System", McGraw Hill, 2002.
4. William Schweber, "Electronic Communication System", Prentice-Hall of India, 2005.
5. B.P. Lathi, " Modern Digital and Analog Communication System", Oxford University press,2003.

PTGE9021	PROFESSIONAL ETHICS IN ENGINEERING	L T P C
		3 0 0 3

UNIT I   ENGINEERING ETHICS   9

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

UNIT II   ENGINEERING AS SOCIAL EXPERIMENTATION   9

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

UNIT III   ENGINEER'S RESPONSIBILITY FOR SAFETY   9

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

UNIT IV   RESPONSIBILITIES AND RIGHTS   9

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

UNIT V   GLOBAL ISSUES   9

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

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York (2005).
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, (2000).

REFERENCES:
1. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, (1999).
2. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, (2003)
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, (2001)
4. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, (2004)
5. David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press, (2003)

PTGE9022   **TOTAL QUALITY MANAGEMENT**   **L T P C**
                                                                     3 0 0 3

UNIT I   INTRODUCTION   9
Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM – TQM Framework - Contributions of Deming, Juran and Crosby – Barriers to TQM.

UNIT II   TQM PRINCIPLES   9
Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement – PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III   TQM TOOLS & TECHNIQUES I   9
The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types.

UNIT IV   TQM TOOLS & TECHNIQUES II   9
Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Cost of Quality – Performance measures.

UNITV   QUALITY SYSTEMS   9
Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – Case studies of TQM implementation in manufacturing and service sectors including IT.

                                                      TOTAL: 45 PERIODS

TEXT BOOK:
1. Dale H.Besterfiled, et at., "Total Quality Management", Pearson Education Asia, Third Edition, Indian Reprint (2006).

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

PTGE9023   **FUNDAMENTALS OF NANOSCIENCE**   **L T P C**
                                                                         3 0 0 3

UNIT I   INTRODUCTION   10
Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thinfilms-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II   PREPARATION METHODS   10
Bottom-up Synthesis-Top-down Approach: Precipitation, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III   PATTERNING AND LITHOGRAPHY FOR NANOSCALE DEVICES   5
Introduction to optical/UV electron beam and X-ray Lithography systems and processes, Wet etching, dry (Plasma /reactive ion) etching, Etch resists-dip pen lithography

UNIT IV   PREPARATION ENVIRONMENTS   10
Clean rooms: specifications and design, air and water purity, requirements for particular processes, Vibration free environments: Services and facilities required. Working practices, sample cleaning, Chemical purification, chemical and biological contamination, Safety issues, flammable and toxic hazards, biohazards.

UNIT V   CHARECTERISATION TECHNIQUES   10
X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques- AFM, SPM, STM, SNOM, ESCA, SIMS-Nanoindentation

                                                            TOTAL: 45 PERIODS
TEXT BOOKS:
1. A.S. Edelstein and R.C. Cammearata, eds., "Nanomaterials: Synthesis, Properties and Applications", Institute of Physics Publishing, Bristol and Philadelphia, 1996.
2. N John Dinardo, "Nanoscale charecterisation of surfaces & Interfaces", 2nd Edition, Weinheim Cambridge, Wiley-VCH, 2000

REFERENCES:
1. G Timp (Editor), "Nanotechnology", AIP press/Springer, 1999
2. Akhlesh Lakhtakia (Editor), "The Hand Book of Nano Technology,Nanometer Structure", Theory, Modeling and Simulations", Prentice-Hall of India (P) Ltd, New Delhi, 2007.

PTIE9026   **INFORMATION SYSTEMS ANALYSIS AND DESIGN**   **L T P C**
                                                                  3 0 0 3

OBJECTIVE:
To impart knowledge on the basics of systems analysis and design required for developing application software in a given environment.

UNIT I   **6**
Information and Management - types of information, Examples of Information systems, Information Systems analysis overview, Information gathering - sources

UNIT II   **10**
System Requirements specifications, Feasibility analysis, Data flow diagrams – logical and physical DFDs, Process specification methods, Decision tables

UNIT III   **12**
Logical database design – ER model, Normalizing relations; Data input methods; Database Management Systems – database design, Object oriented systems modeling

UNIT IV   **8**
Designing outputs, Security of Information systems, E-commerce

UNIT V   **9**
System design example: Document and data flow diagrams, Feasibility of the system, System specifications, Database design, Control, audit and test plan

TOTAL: 45 PERIODS

REFERENCES:
1. V. Rajaraman, Analysis and Design of Information Systems, PHI, 2004
2. Jeffrey L Whitten et al, Systems Analysis and Design Methods, McGrawHill, 2003

PTIE9035   **SUPPLY CHAIN MANAGEMENT**   **L T P C**
                                                                  3 0 0 3

OBJECTIVE:
To cover the basics of supply chain concepts, associated networks, tools and techniques required for evaluating various supply chain processes .

UNIT I   STRATEGIC   **5**
Objective, decision phases, process views, examples, strategic fit, supply chain drivers and metrics

UNIT II   SUPPLY CHAIN NETWORKS   **10**
Distribution networks, Facility networks and design options, Factors influencing, Models for facility location and capacity allocation, Transportation networks and design options, Evaluating network design decisions

UNIT III   MANAGING DEMAND AND SUPPLY IN A SUPPLY CHAIN   **10**
Predictable variability in a supply chain, Economies of scale and uncertainty in a supply chain – Cycle and safety Inventory, Optimum level of product availability, Forward Buying, Multi-echelon cycle inventory

UNIT IV   SOURCING AND PRICING IN A SUPPLY CHAIN   10

Cross-Functional drivers, Role of sourcing in a supply chain, Logistics providers, Procurement process, Supplier selection, Design collaboration, Role of Pricing and Revenue Management in a supply chain

UNIT V   INFORMATION TECHNOLOGY AND COORDINATION IN A SUPPLY
**   CHAIN   10**

The role of IT in supply chain, The supply chain IT frame work, Customer Relationship Management, Supplier relationship management, Future of IT in supply chain, E-Business in supply chain, Bullwhip effect – Effect of lack of co-ordination in supply chain, Building strategic partnerships, CPFR

TOTAL: 45 PERIODS

TEXT BOOK:

1. Sunil Chopra and Peter meindl, "Supply Chain Management , Strategy, Planning, and operation", PHI, Third edition,2007

REFERENCES:

1. Jeremy F.Shapiro, "Modeling the supply chain", Thomson Duxbury ,2002
2. James B.Ayers, "Handbook of Supply chain management", St.Lucle press, 2000.

PTMG 9072   ENTREPRENEURSHIP DEVELOPMENT   L T P C
**   3 0 0 3**

OBJECTIVE:

Study of this subject provides an understanding of the scope of an entrepreneur, key areas of development, financial assistance by the institutions, methods of taxation and tax benefits, etc**.**

UNIT I   ENTREPRENEURSHIP   9

 Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur - Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth.

UNIT II   MOTIVATION   9

Major Motives Influencing an Entrepreneur – Achievement Motivation Training, Entrepreneurial Skills - Self Rating, Business Game, Thematic Appreciation Test – Stress Management, Entrepreneurship Development Programs – Need, Objectives.

UNIT III   BUSINESS   9

Small Enterprises – Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.

UNIT IV   FINANCING AND ACCOUNTING   9

Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, Management of working Capital, Costing, Break Even Analysis, Network Analysis Techniques of PERT / CPM – Taxation – Income Tax, Excise Duty – Sales Tax.

UNITV   SUPPORT TO ENTREPRENEURS   9

Sickness in small Business – Concept, Magnitude, Causes and Consequences, Corrective Measures – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. S.S.Khanka "Entrepreneurial Development" S.Chand & Co. Ltd. Ram Nagar New Delhi, 1999.
2. Kurahko & Hodgetts, " Enterprenuership – Theory, process and practices", Thomson learning 6th edition.

REFERENCES:

1. Hisrich R D and Peters M P, "Entrepreneurship" 5th Edition Tata McGraw-Hill, 2002.
2. Mathew J Manimala," Enterprenuership theory at cross roads: paradigms and praxis" Dream tech 2nd edition 2006.
3. Rabindra N. Kanungo "Entrepreneurship and innovation", Sage Publications, New Delhi, 1998.
4. EDII " Faulty and External Experts – A Hand Book for New Entrepreneurs", Entrepreneurship Development Institute of India, Ahmedabad, 1986.

PTMA9261   **PROBABILITY AND STATISTICS**   **L T P C**
                                                                      3 0 0 3

UNIT I   RANDOM VARIABLES   9

Discrete and Continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions - Functions of random variable.

UNIT II   TWO-DIMENSIONAL RANDOM VARIABLES   9

Joint distributions – Marginal and Conditional distributions – Covariance – Correlation and Linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT III   TESTING OF HYPOTHESIS   9

Sampling distributions - Tests for single mean, Proportion, Difference of means (large and small samples) – Tests for single variance and equality of variances – χ^2-test for goodness of fit – Independence of attributes.

UNIT IV   DESIGN OF EXPERIMENTS   9

Completely randomized design – Randomized block design – Latin square design - 2^2 - factorial design.

UNIT V   STATISTICAL QUALITY CONTROL   9
Control charts for measurements (̄X ̄ and R charts) – Control charts for attributes(p, c and np charts) – Tolerance limits -   Acceptance sampling.

TOTAL: 45 PERIODS

TEXT BOOKS:
1. J. S. Milton and J.C. Arnold, " Introduction to Probability and Statistics", Tata McGraw Hill, 4th edition, 2007 (For units 1 and 2).
2. R.A. Johnson and C.B. Gupta, "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 7th edition, 2007 (For units 3, 4 and 5).

REFERENCES:
1. J.L. Devore, "Probability and Statistics for Engineering and the Sciences", Thomson Brooks/Cole, International Student Edition, 7th edition, 2008.
2. R.E. Walpole, R.H. Myers, S.L. Myers, and K Ye, "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia , 8th edition, 2007.
3. S.M. Ross, "Introduction to Probability and Statistics for Engineers and Scientists, 3rd edition, Elsevier, 2004.
4. M.R. Spiegel, J. Schiller and R.A. Srinivasan, "Schaum's Outlines Probability and Statistics", Tata McGraw Hill edition, 2004.

PTME9035   **MEASUREMENTS AND CONTROL**   **L T P C**
                                                                              3 0 0 3

OBJECTIVE:
- To understand the principle and use of sensors for measurement of different parameters.
- To understand the concept of feedback control systems and their applications.

UNIT I   MEASUREMENTS   9
General concepts – Units and standards – Measuring instruments – sensitivity, readability, range accuracy, precision – static and dynamic response – repeatability hysteresis – systematic and random errors – correction – calibration.

UNIT II   INSTRUMENTS   9
Transducer, Modifying (intermediate) and Terminal stages – Mechanical and electrical transducers – preamplifiers – charge amplifiers – filters – attenuaters – D' Arsonval – CRO – Oscillographs – records – micro processor based data logging, processing and output.

UNIT III   PARAMETERS FOR MEASUREMENT   9
Dimension, displacement velocity, acceleration, impact – Force, torque, power – strain-pressure – humidity- temperature – flow-Time, frequency and phase angle – noise and sound level. Radio tracer techniques – Flow visualization – shadow-graph inter-ferometer, Schlieren, Laser doppler anemometer.

UNIT IV   AUTOMATIC CONTROL SYSTEMS   9
Basic elements – feedback principle implication of measurements – Error detectors – final actuating elements – Two position, multiposition, floating, pro-portional controls – relays – servo amplifiers – servo motors – mechanical, Electrical, magnetic, electronic, hydraulic, pneumatic systems.

UNIT V   APPLICATION OF CONTROL SYSTEMS   9
Governing of speed kinetic and process control – pressure, temperature, fluid level, flow-thrust and flight control – photo electric controls.

<div align="right">**TOTAL: 45 PERIODS**</div>

TEXT BOOKS:
1. E.O.Doeblin, "Measurement Systems, Application and Design", Mc Graw Hill International Edition, 4th Ed., 1990.
2. I.J.Nagarath and M.Gopal, "Control Systems Engineering", John wiley & Sons, 2nd Ed., Ch.1-4, 1982.

REFERENCES:
1. J.P.Holman and N.J.Gajda Jr., "Experimental Methods for Engineers", Mc Graw Hill International Edition, 5th Ed., 1989.
2.   T.G.Beckwith and N.L.Buck, "Mechanical Measurements", Addision Wesley Pub, Co., 1969.
3. W.H.Bureau, "What the printer should know about paper", GATF, 1983.
4. J.P.Casey, "Ed. Pulp and Paper, Chemistry & Chemical Technology", Vol. Wiley-Interscience Publication, 1981.

PTME9303   HYDRAULICS AND PNEUMATICS   L T P C
<div align="right">**3 0 0 3**</div>

OBJECTIVE:
This course will give an appreciation of the fundamental principles, design and operation of hydraulic and pneumatic machines, components and systems and their application in recent automation revolution.

UNIT I   FLUID POWER PRINCIPLES AND FUNDEMENTALS (REVIEW)   3
Introduction to Fluid power- Advantages and Applications- Fluid power systems – Types of fluids- Properties of fluids Basics of Hydraulics – Pascal's Law- Principles of flow – Work, Power and Torque. Properties of air– Perfect Gas Laws.

UNIT II   HYDRAULIC SYSTEM AND COMPONENTS   13
Sources of Hydraulic power: Pumping Theory – Pump Classification- Construction, Working, Design, Advantages, Disadvantages, Performance, Selection criterion of Linear, Rotary- Fixed and Variable displacement pumps, Hydraulic Actuators: Cylinders – Types and construction, Hydraulic motors Control Components: Direction control, Flow control and Pressure control valves- Types, Construction and Operation- Applications – Types of actuation. Accessories: Reservoirs, Accumulators, Intensifiers, Pressure Switches- Applications- Fluid Power ANSI Symbol.

UNIT III   HYDRAULIC CIRCUITS   9
Industrial hydraulic circuits- Regenerative, Pump Unloading, Double-pump, Pressure Intensifier, Air-over oil, Sequence, Reciprocation, Synchronization, Fail-safe, Speed control, Hydrostatic transmission, Accumulators, Electro hydraulic circuits, Mechanical Hydraulic servo systems.

UNIT IV   PNEUMATIC SYSTEM   8

Compressors- Filter, Regulator, Lubricator, Muffler, Air control Valves, Quick Exhaust valves, Pneumatic actuators, Servo systems. Introduction to Fluidics, Pneumatic logic circuits.

UNIT V   DESIGN OF HYDRALIC AND PNEMATIC CIRCUITS   12

Designing the components of hydraulic system for Drilling, Planning, Shaping, Punching, Press. – Selection, fault finding and maintenance of hydraulic components- Sequential circuit design for simple application using cascade method, Electro pneumatic circuits. Selection criteria of pneumatic components – Installation fault finding and maintenance of pneumatic components. Microprocessor and PLC- Applications in Hydraulic and Pneumatics- Low cost Automation – Hydraulic and Pneumatic power packs- case studies.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Anthony Esposito," Fluid Power with Applications", PHI / Pearson Education, 2005.

REFRENCES:

1. Shanmugasundaram.K, "Hydraulic and Pneumatic controls", Chand & Co, 2006.
2. Majumdar, S.R., "Oil Hydraulics Systems- Principles and Maintenance", Tata McGraw Hill, 2001
3. Majumdar, S.R., "Pneumatic Systems – Principles and Maintenance", Tata McGraw Hill, 2007.
4. Micheal J, Pinches and Ashby, J.G., "Power Hydraulics", Prentice Hall, 1989.
   Dudelyt, A Pease and John J Pippenger, "Basic Fluid Power", Prentice Hall, 1987

PTMF 9022	**NON-DESTRUCTIVE TESTING**	**L T P C**
		3 0 0 3

OBJECTIVE:

On completion of this course, the students are expected to be conversant with
     i) Principles of various NDT techniques
     ii) The equipment required for the NDT
     iii) The mechanism involved in there NDT techniques
     iv) Applications of NDT and recent trends in NDT

UNIT I   LIQUID PENETRANT AND MAGNETIC PARTICLE INSPECTION   9

Liquid penetrant systems – processing cycles – inspection of surface defects – Generation of Magnetic fields – Magnetic particle inspection equipments – Demagnetization – Applications and limitations.

UNIT II   RADIOGRAPHY   11

Production of x-rays – Characteristic rays and white ray – Tube current and Voltage – Sources of 8 rays – Half life period – Penetrating power – Absorption of x and y rays – Radiation contrast and film contrast – exposure charts – pentameters and sensitivity – Safety.

UNIT III   EDDY CURRENT INSPECTION   7
Eddy current production – Impedance concepts – Inspection of magnetic materials – Inspection of non magnetic materials – influences of various parameters – Advantages and limitations.

UNIT IV   ULTRASONIC TESTING   10
Production of ultrasonic waves – Different types of waves – normal beam inspection – Angle beam inspection – thickness measurements – Applications.

UNIT V   RECENT TECHNIQUES   8
Non destructive inspection– Instrumentation for non destructive testing – Principles of holography- Principle of acoustic emission – Applications of holographic techniques– advantages and limitations – Other techniques.

TOTAL: 45 PERIODS

TEXT BOOK:
1. Barry Hull and Vernon John, "Non Destructive Testing", MacMillan, 1988.

REFERENCES:
1. Americal Society of Metals, Metals Hand Book, 9th Edition, Volume 11 (1980)
2. Birchan, D, "Non Destructive Testing", Oxford University Press, 1977.
3. Proceedings of the 10th International Acoustic Emission Symposium, Japanese Society for Non Destructive Inspection, Sendai, 1990.
4. Holler, P., "New Procedures in Non Destructive Testing" Springer Verlag, 1983.

PTMF 9401   **OPERATIONS RESEARCH**   **L T P C**
                                                              3 0 0 3

OBJECTIVE:
To provide knowledge and training in using optimization techniques under limited resources for the engineering and business problems.

UNIT I   LINEAR MODELS   15
The phase of an operation research study – Linear programming – Graphical method – Simplex algorithm – Duality formulation – Sensitivity analysis.

UNIT II   TRANSPORTATION MODELS AND NETWORK MODELS   8
Transportation Assignment Models –Traveling Salesman problem Networks models – Shortest route – Minimal spanning tree – Maximum flow models – Project network – CPM and PERT networks – Critical path scheduling – Sequencing models.

UNIT III   INVENTORY MODELS   6
Inventory models – Economic order quantity models – Quantity discount models – Stochastic inventory models – Multi product models – Inventory control models in practice.

UNIT IV   QUEUEING MODELS   6
Queueing models - Queueing systems and structures – Notation parameter – Single server and multi server models – Poisson input – Exponential service – Constant rate service – Infinite population – Simulation.

UNIT V   DECISION MODELS   10

Decision models – Game theory – Two person zero sum games – Graphical solution – Algebraic solution – Linear Programming solution – Replacement models – Models based on service life – Economic life – Single / Multi variable search technique – Dynamic Programming – Simple Problem.

**   TOTAL: 45 PERIODS**

TEXT BOOK:

1. H.A. Taha, Operations Research, Prentice Hall of India, 2003, Sixth Edition.

REFERENCES:

1. Shennoy, Srivastava, Operation Research for Management, Wiley Eastern, 1994.
2. M.J.Bazara, Jarvis, H. Sherali, Linear Programming and Network Flows, John Wiley, 1990.
3. Philip and Ravindran, Operations Research, John Wiley, 1992.
4. Hillier and Libeberman, Operations Research, Holden Day, 1986.
5. Frank,S. Budnick, Dennis, McLeavy, Principles of Operations Research for Management, Richard D Irwin, 1990.
6. Tulsian and Vishal Pasdey – Quantitative Techniques Pearson – Asia 2002.

**PTMG9071   MARKETING MANAGEMENT   L T P C
                                                                    3 0 0 3**

OBJECTIVE:

To introduce the basic concepts of marketing, product pricing, marketing planning and sales promotion.

UNIT I   CONCEPTS IN MARKETING   9

Definition, Marketing Process, Dynamics, Needs, Wants and Demands, Marketing concepts, Environment, Mix, types, Philosophies, Selling Vs Marketing, Consumer Goods, Industrial Goods, Product, Hierarchy.

UNIT II   BUYING BEHAVIOUR AND MARKET SEGMENTATION   9

Cultural, Demographic factors, Motives, Types, Buying Decision, Segmentation factors, Demographic, Psychographic and Geographic Segmentation, Process, Patterns.

UNIT III   PRODUCT PRICING AND MARKETING RESEARCH   9

Objectives, Pricing, Decisions and Pricing Methods, Pricing Management, Introduction, Uses, Process of Marketing Research.

UNIT IV   MARKETING PLANNING AND STRATEGY FORMULATION   9

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

UNIT V   ADVERTISING, SALES PROMOTION AND DISTRIBUTION   9

Characteristics, Impact, Goals, Types, Sales Promotion – Point of purchase, Unique Selling propositions, Characteristics, Wholesaling, Retailing, Channel Design, Logistics Modern Trends in Retailing.

**   TOTAL: 45 PERIODS**

TEXT BOOKS:
1. Govindarajan, M., "Modern Marketing Management", Narosa Publishing House, New Delhi 1999.
2. Green Paul, E. and Donald Tull, "Research for Marketing Decisions", 1975.
3. Ramaswamy, V.S. and S.Namakumari, "Marketing Environment Planning, Implementation and control the Indian Context", 1990.

REFERENCE:
1. Philip Kotler, "Marketing Management – Analysis Planning Implementation and Control".