DEPARTMENT OF PRINTING ENGINEERING
JADAVPUR UNIVERSITY
REVISED COURSE CURRICULUM OF 4-YEAR B.E. PRINTING ENGINEERING
(APPROVED IN BOS MEETING RES. NO. 02 DT. 16.09.2010)

First Year 1st semester	**Load (T-S)**	**Servicing Department**
1. Humanities-A	3-0	English Dept./Sociology Dept
2. Mathematics 1R	3-0	Mathematics Dept.
3. Engineering Mechanics	3-0	Power Engineering Dept.
4. Physics 1C	3-0	Physics Dept.
5. Printing Techniques	3-0	Printing Engineering Dept.
6. Programming Language	3-0	CSE Dept.
7. Printing Engineering Drawing	0-4	Printing Engineering Dept.
8. Workshop Practice	0-3	Power Engg. Dept.
9. Printing Techniques Lab	0-3	Printing Engineering Dept.
10. Programming Language laboratory	0-3	CSE Dept.

First Year 2nd semester:

1.Mathematics-IIR	3- 0	Maths. Dept.
2.Strength of Materials	3- 0	Power Engg. Dept.
3.Electrical Technology	3-0	Power Engg. Dept.
4.Electronics	3-0	IEE Dept.
5.Graphic Reproduction	3-0	Printing Engineering Dept.
6.Digital Typesetting	3-0	Printing Engineering Dept.
7.Graphic Reproduction Lab.	0-3	Printing Engineering Dept.
8.Digital Typesetting Lab.	0-3	Printing Engineering Dept
9.Electrical Technology Lab	0-4	Power Engg. Dept
10. Machine Shop	0-3	Power Engg. Dept

Second year 1st semester:

1. Paper Technology	3-0	Printing Engineering Dept.
2. Mathematics 3R	4-0	Mathematics Dept.
3. Mechanism	3-0	Printing Engineering Dept.
4. Computational Studies	3-0	CSE Dept.
5. Printing Electronics	3-0	Printing Engineering Dept.
6. Printing Material Science-1	3-0	Printing Engineering Dept.
7. Graphic Design & Layout Lab	0-4	Printing Engineering Dept.
8. Numerical Analysis & C Programming Lab.	0-3	CSE Dept.
9. Electronics Laboratory	0-3	IEE Dept.
10. Screen Process Printing Lab.	0-4	Printing Engineering Dept.

Second year 2nd semester:

1.Mathematics-IVR	4-0	Maths. Dept.
2.Printing Machine Design	3-0	Printing Engineering Dept.
3.Environmental Sciences	3-0	Printing Engineering Dept.
4.Packaging Techniques-I	3-0	Printing Engineering Dept.
5.Printing Material Science-II	3-0	Printing Engineering Dept.

6.Printing Surface Preparation	3-0	Printing Engineering Dept.
7.Printing Machine Design and Drawing Lab	0-3	Printing Engineering Dept.
8.Mechanical Systems Lab	0-3	Printing Engineering Dept.
9.Printing Surface Preparation Lab	0-4	Printing Engineering Dept.
10. Electronic Publishing Lab	0-3	Printing Engineering Dept.
Third year 1st semester:	**Load (T-S)**	**Servicing Department**
1. Flexo & Gravure	3-0	Printing Engineering Dept.
2. Offset Printing Machines	3-0	Printing Engineering Dept.
3. Fluid Mechanics	3-0	Printing Engineering Dept.
4. Data Base Management System	3-0	CSE Department
5. Color Sc. & Engineering	3-0	Printing Engineering Dept.
6. Packaging Technique II	3-0	Printing Engineering Dept.
7. Data Base Management System Lab.	0-3	CSE Dept.
8. Sheetfed Offset Printing Machines Lab.	0-4	Printing Engineering Dept.
9. Col. & Tone Repro. Lab.	0-4	Printing Engineering Dept.
10. Packaging Tech. Laboratory	0-3	Printing Engineering Dept.
Third year 2nd semester:		
1.Microprocessors	3-0	CSE Dept.
2.Estimating and Costing	3-0	Printing Engineering Dept.
3.Digital Imaging	3-0	Printing Engineering Dept.
4.Control Application in Printing	3-0	Printing Engineering Dept.
5.Planning and Finishing	3-0	Printing Engineering Dept.
6. Ink Technology	4-0	Printing Engineering Dept.
7.Microprocessors and Control Lab	0-3	CSE Dept.
8.Digital Imaging Lab	0-3	Printing Engineering Dept.
9.Flexo and Gravure Lab	0-4	Printing Engineering Dept.
10. Planning and Finishing Lab	0-3	Printing Engineering Dept.
Fourth Year 1st semester:		
1. Computer Graphics	3-0	CSE Department
2. Elective 1	3-0	Printing Engineering Dept.
3. Newspaper Printing	3-0	Printing Engineering Dept.
4. Non-impact printing	3-0	Printing Engineering Dept.
5. Computer Graphics Lab.	0-3	CSE Department
6. Web Offset Lab.	0-4	Printing Engineering Dept.
7. Seminar.	0-3	Printing Engineering Dept.
8. Project 1	0-4	Printing Engineering Dept.
Fourth Year 2nd semester:		
1.Data Communications & Networking	3-0	CSE Dept.
2.Industrial Management	4-0	Printing Engineering Dept.
3.Quality Control in Printing Industry	3-0	Printing Engineering Dept.
4. Elective-II	3- 0	Printing Engineering Dept.
5.Material Testing and Quality Control Lab	0-4	Printing Engineering Dept.
6.Digital Image Processing Lab.	0-4	Printing Engineering Dept.
7. Data Communications & NetworkingLab.	0-3	CSE Dept
8. Project-II	0-3	Printing Engineering Dept.
9.General Viva-Voce	0-0	Printing Engineering Dept.

DEPARTMENT OF PRINTING ENGINEERING
JADAVPUR UNIVERSITY
SERVICING LOAD OF PROPOSED
REVISED COURSE CURRICULUM OF 4-YEAR B.E. PRINTING ENGINEERING
(APPROVED IN BOS MEETING RES. NO. 02 DT. 16.09.2010)

First Year 1st semester	**Load (T-S)**	**ServicingDepartment**	**Syllabus**
1. Humanities-A	3-0	English Dept./Sociology Dept	Existing
2. Mathematics 1R	3-0	Mathematics Dept.	do
3. Engineering Mechanics	3-0	Power Engineering Dept.	do
4. Physics 1C	3-0	Physics Dept.	do
5. Programming Language	3-0	CSE Dept.	do
6. Workshop Practice	0-3	Power Engg. Dept.	do
7. Programming Language laboratory	0-3	CSE Dept.	do
First Year 2nd semester:			
1.Mathematics-IIR	3- 0	Maths. Dept.	do
2.Strength of Materials	3- 0	Power Engg. Dept.	do
3.Electrical Technology	3-0	Power Engg. Dept.	do
4.Electronics	3-0	IEE Dept.	do
5.Electrical Technology Lab	0-4	Power Engg. Dept	do
6.Machine Shop	0-3	Power Engg. Dept	do
Second year 1st semester:			
1. Mathematics 3R	4-0	Mathematics Dept.	do
2. Computational Studies	3-0	CSE Dept.	do
3. Electronics Laboratory	0-3	IEE Dept.	do
4. Numerical Analysis & C-Programming Lab	0-3	CSE Dept.	do
Second year 2nd semester:			
1.Mathematics-IVR	4-0	Maths. Dept.	do
Third year 1st semester:	**Load (T-S)**	**Servicing Department**	
1. Data Base Management System	3-0	CSE Department	do
2. Data Base Management System Lab.	0-3	CSE Dept.	do
Third year 2nd semester:			
1.Microprocessors	3-0	CSE Dept.	do
2.Microprocessors and Control Lab	0-3	CSE Dept.	do

Fourth Year 1st semester:			
1. Computer Graphics	3-0	CSE Department	do
2. Computer Graphics Lab.	0-3	CSE Department	do
Fourth Year 2nd semester:			
1.Data Communications & Networking	3-0	CSE Dept.	do
2. Data Communications & NetworkingLab.	0-3	CSE Dept.	New (to be given By CSE Dept.)

DEPARTMENT OF PRINTING ENGINEERING
JADAVPUR UNIVERSITY

REVISED UG(B.E. Printing Engineering) SYLLABI
(Approved on BOS meeting, res. No. 02 dated 28.02.2011)

First Year First Semester

PRN/Hum/T/111 HUMANITIES-A

English - 2 Pds/week - 50 Marks Sociology - 2 Pds/week - 50 Marks HUMANITIES

1.Basic writing skills 2.Report, Covering Letter & Curriculum-Vitae writing 3.Reading and Comprehension 4.Selected Short Stories Text Book: ENGLISH FOR ALL SOCIOLOGY 1.Sociology: Nature and scope of Sociology - Sociology and other Social Sciences - Sociological Perspectives and explanation of Social issues 2. Society and Technology: Impact of Technology on the Society - A case study 3. Social Stratification: Systems of Social Stratification - determinants of Social Stratification - Functionalist, Conflict and Elitist perspectives on Social Stratification 4.Work: Meaning and experience of work: Postindustrial society- Post-Fordism and the Flexible Firm 5.Development - Conceptions of and approaches to development - The Roles of State and the Market in the Development 6. Globalization: The concept of globalization - globalization and the nation state - Development and globalization in post colonial times. 7. Industrial Policy and Technological change in India - The nature and Role of the State in India 8. Technology Transfer: The Concept and Types of Technology Transfer-Dynamics of Technology Transfer 9. Technology Assessment: The Concept - Steps involved in Technology Assessment 10. Environment: Sociological Perspectives on Environment - Environmental Tradition and values in ancient India 11.The Development of Management: Scientific Management - Organic Organization - Net Work organization - Post modern Organization - Debureaucratization - Transformation of Management 12. Technological Problems and the Modern Society: Selected Case Studies - Electric Power Crisis, Industrial and/or Environmental Disaster, or Nuclear Accident.

PRN/Math/T/112 MATHEMATICS-IR

Functions of a single variable, limit, continuity and differentiability, Successive differentiation, Rolle's theorem (statement only), Mean value theorem, Taylor's and Maclaurin's expansions, Indeterminate forms. Maxima and minima of functions of a

single variable. Fundamental theorem and mean value theorems of integral calculus, Evaluation of definite and improper integrals, Beta and Gamma functions. Functions of two variables, limit, continuity, partial derivatives. Euler's theorem for homogeneous functions, total derivatives. Maxima and minima, Lagrange's method of multipliers.

Integration by resolution into partial fractions. Some elementary properties of definite integrals (to be defined as the limit of a sum) Lengths and areas of plane curve. Volumes and surface areas of solids of revolution. Use of multiple integrals in calculation of areas and volumes. Numerical integration by Trapezoidal and Simpson's rules

PRN/PE/T/113 ENGINEERING MECHANICS

Elements of vector algebra, Basic dimensions and units, Newton's Laws, Equilibrium equations, Frictional forces, Centroid, Area moment of inertia, Differentiation and integration of vectors with respect to time, Rectilinear and curvilinear motion of particle, D'Alembert's Principle, Method of momentum, Work, Power & Energy.

PRN/CSE/T/114 PROGRAMMING LANGUAGE

Programming : Elementary concepts and terminology of a computer system and system software, Fortran77 and C programming.
Fortran : Program organization, arithmetic statements, transfer of control, Do loops, subscripted variables, functions and subroutines.
C language : Basic data types and declarations, flow of control- iterative statement, conditional statement, unconditional branching, arrays, functions and procedures.
Linear lists - arrays, linked lists, stacks and queues. Trees - binary trees, binary search trees, multiway trees. Graphs. Strings. Searching and sorting techniques. File structures -sequential, relative, indexed-sequential, direct.

PRN/T/115 PRINTING TECHNIQUES

An introduction to different printing processes such as letter press, lithography/offset, gravure, intaglio, flexography, and screen printing. A short history of the printing process. Letterpress: an introduction to typographic design, type details, measurements, point size, lead, page make-up, proof reading and corrections, general awareness of the factors which decide the choice of type face, etc. Methods for graphic block reproduction, line and halftone production. Introduction to letter press printing machines, introduction to different type setting methods. Lithography:

Nonimpact Printing: Introduction to digital printing, thermal printing, laser printing, ink jet printing etc. Screen Process Printing : Screen printing principle, Screen mesh, Screen printing frames, Screen pretreatment, Degreasing, Different method of stencil preparation, Multicolor

reproduction, Screen printing problems and solutions, Screen ink and their properties, Machinery configuration. Latest developments and applications in screen process printing.

References : * Stephens John, Screen Process Printing, Blueprint * Samuel Hoff, Screen Printing, A Contemporary Approach, Delmar Publishers * Appleton William, Screen Printing, A literature review, Pira International * Adams J. Michael, Faux D. David, Rieber J. Lloyd, Printing Technology, Delmar Publishers * Eldred Nelson R., Chemistry for the Graphic Arts, GATF * Lithographers Manual, GATF. * Photo-Engraving in Relief; Smith, Turner and Hallam; Pitman Publishing Corporation, London. * Printing Technology; Adams, Faux and Rieber.

Ph/T/1C PHYSICS-IC

1. Potential and intensity and their relation - gravitational and electrostatic examples, States of equilibrium, Work and Energy, Conservation of energy, 2. Surface tension, excess pressure inside a soap bubble, capillary rise- Jurin's law. Bernoulli's theorem and its applications. 3. Lens system (combination of thin lenses), eyepieces, microscope, 4. Nature of light waves,

Interference of light waves, Young's experiment, Spatial and temporal coherence, Fresnel bi-prism, Interference in thin film, Newton's rings, Measurement of film thickness and wavelength, Diffraction of light waves, Huygen's construction, Fresnel and Fraunhoffer diffraction, Fraunhoffer diffraction due to single slit and plane diffraction grating, Polarisation of light waves, Polarisation by reflection, Brewster's law, Double refraction- ordinary extraordinary rays, Polaroid. 5. Macroscopic and microscopic description, Thermal equilibrium, Zeroth law of thermodynamics, Concept of international practical temperture scale, Heat and Work, First law of thermodymamics and some applications, Reversible and irreversible processes, Carnot cycle, Second law of thermodymamics, Concept of entropy, Thermodynamic relations. 6. Electric potential and intensity, Flux of electric field, Gauss's law and its application to problems with spherical and cylindrical symmetry, Capacitance- parallel plate and spherical condensers. Biot-Savart law and Ampere's law in magnetostatics, Calculation of magnetic field in simple situations like (i) straight wire (ii) circular wire (at a point on the symmetry axis) and (iii) Solenoid, Time-varying fields, Faraday's law of electromagnetic induction, Self and mutual inductance. 7. Energy levels of the hydrogen atom and the Bohr atom model, X-ray spectra, X-ray diffraction, Bragg's law, Compton effect. De-Broglie waves, Particle diffraction, Uncertainty principle and its application.

PRN/CSE/S/111 PROGRAMMING LANGUAGE LABORATORY

Fortran : Program organization, arithmetic statements, transfer of control, Do loops, subscripted variables, functions and subroutines.
C language : Basic data types and declarations, flow of control- iterative statement, conditional statement, unconditional branching, arrays, functions and procedures.
Linear lists - arrays, linked lists, stacks and queues. Trees - binary trees, binary search trees, multiway trees. Graphs. Strings. Searching and sorting techniques. File structures -sequential, relative, indexed-sequential, direct.

PRN/S/112 PRINTING ENGINEERING DRAWING

Lettering, scale, orthogonal and isometric projections. sections, geometrical drawings, elementary machine drawing. Practical : Machine drawing-assembly and split up, drawing of machine elements.

PRN/S/113 PRINTING TECHNIQUES LABORATORY

1. Some study on the nomenclature of the type face for letter press processes and arrangement of type on the type case. 2. Composition and page make-up using foundry type. 3. Study of the letter press printing unit. 4. Composition and page make-up using digital type setting technique. 5. Study of the offset printing unit. 6. Study of the gravure printing unit. 7. Study of the flexography printing unit. 8. Measurements of the paper properties such as brightness, gloss, tearing strength, folding endurance, etc.

PRN/PE/S/114 WORKSHOP PRACTICE

Fitter Shop, Carpentry, Molding and Welding.

First Year Second Semester

PRN/Math/T/121 MATHEMATICS-IIR

Linear Algebra **:** Determinates, Solution of liner equations using determinants. Matrices: Definitions, operations and solution of equations.algebra of matrices, rank, inverse, system of linear equations, symmetric, skew-symmetric and orthogonal matrices. Hermitian, skew-hermitian and unitary matrices. eigenvalues and eigenvectors, diagonalisation of matrices, Cayley-Hamiltonian, quadratic forms.
Complex number. Demoiver's theorem. Exponential values of Sine and Cosine. Determinants (upto fourth order): definitions and properties.
Complex variable**:** Analytic functions, Cauchy's integral theorem and integral formula without proof. Taylor's and Laurent' series, Residue theorem (without proof) with application to the evaluation of real integrals.

Probability and Statistics: Set theory and elements of Boolean algebra, Definitions of probability and simple theorems, conditional probability, mean, mode and standard deviation, random variables, discrete and continuous distributions, Poisson, normal and Binomial distribution, correlation and regression
Application of calculus to plane curves . tangent and normal, curvature, convexity and concavity concepts.
Cartesian coordinates in three dimensions. Direction cosines, planes and straight lines. Standard equation of sphere, cone and cylinder.

PRN/PE/T/122 STRENGTH OF MATERIALS

Stress, Strain and Elasticity, Thermal Stress, Resilience and shock energy, Thin cylindrical and spherical shells under internal pressure, Shearing stress and strain, Elastic constants, Torsion of a circular shaft, Angle of twist, Torque and horse-power. Closed coil helical spring. Shearing force and bending moment in beams, Maximum moment and point of contraflexture, Simple theory of bending, Momentum of resistance, Section modulus, Deflection of beams - Analysis of stress principles, stress and strain. Mohr's circle for stress. Principle stress due to combined loading, Lami's equation.

PRN/PE/T/123 ELECTRICAL TECHNOLOGY

Electrical units, Dimensions, Electro-magnetism, Magnetic circuits, DC and AC circuits, DC Generators and Motors, Motor starters, Electrical measuring instruments, AC Machines - Induction Motors &Alternators, Balanced three-phase circuits, Construction and operation of Transformers, Voltage variation devices, Different types of lamps used in printing, Hg-Vapour, Metal halide and Halogen lamps.

PRN/T/124 GRAPHIC REPRODUCTION

Basic principles of reproduction camera. Overview of reproduction cameras, Contact printer, Enlarger, Layout of a darkroom, Camera lens, Depth of field, Hyper focal distance, Aperture & Iris diaphragm, Panchromatic, Orthochromatic, Blue sensitive films, Process films, exposure, developer & their ingredients, development, film speed & sensitivity, Silver halide chemistry, Basic sensitometry, Gamma, Characteristic curve, Densitometry, Colour filters, Colour

separation, Halftone, Screen angles, Black printer, Colour correction. Digital photography and transmission scanner.

References : * Burden, J. W., Graphic Reproduction Photography, Focal Press, London. * Adams J. Michael, Faux D. David, Rieber J. Lloyd, Printing Technology, Delmar Publishers * Cogoli John E., Graphic Arts Photography : Black and white, GATF * Wentzel Fred, Graphic Arts Photography : Color, GATF * Eldred Nelson R., Chemistry for the Graphic Arts, GATF

PRN/T/125 DIGITAL TYPESETTING

Evolution of photocomposition: Evolution of phototype setting systems from hot-metal composition to digital composition environment. Desktop publishing. Text and image input devices: Types of input devices; Keyboards: layout coding and structures. Keyboards for multilingual word processing. Mouse. Storage media: Types of storage media. Magnetic memories, Semiconductor memories, Optical memories. Comparison and evaluation of various storage media. Output devices: Types. Display devices. Printers, plotters and typesetters. Software elements: Text editors. Word processors. Page layout packages. Graphics packages. OCR. Text file formats and file exchange. Page composition: Editing and correction. Text alignment. Tables and columns. Indexing. Scientific composition. Text image integration. Pagination. Digital typography: Generating methods of digital type faces. Font manipulation. Page description languages: Way of working. Postscript and display postscript and other page description languages.

References: * Adobe Systems Inc, PostScript Language Program Design, Addison-Wesley * Adobe Systems Inc, PostScript Language Reference Manual (ed2), Addison-Wesley * Barnett, Michael P., Computer Typesetting: Experiments and Prospects, MIT Press, Cambridge, Massachusetts. * Bate, J. St. J. & Wilson-Davies K., Desktop Publishing, BSP Professional Books * Bluhm A., Photo Composing, Pergamon, London. * Card, Michael. Word Processor to Printed Page: A Guide to Interfacing Word Processors and Phototypesetters, Blue Print, London * Edward Berg, N., The New Era of Electronic composition, GATF * Encyclopedia of Contemporary Typesetting, GATF. * French, C.S., Computer Studies, Galgotia Book Source Publishers, New Delhi. * Goossens, M. & Mittlebach, F. & Samarin, A., The Latex Companion, Addison Wesley. * Goossens, M. & Rahtz, S. & Mittlebach, F., The Latex Graphics Companion (Illustrating documents with Tex and Postscript), Addison Wesley. * Grosvenor, J. & Morrison, K. & Pim, A., The PostScript font handReferences: A directory of Type 1 fonts, Addison Wesley. * Health, Les & Faux, Ian, Phototypesetting, SITA Ltd.

* Holmes, Alan, Electronic Composition, Emblem Books Ltd. * Joh W. Seybold, Fundamentals of Modern Photo Composition. * Karow, Peter, Digital Typefaces: Description and formats, Springer-Verlag * Knuth, Donal E., Computers & Typesetting/B: Tex: The Program, Addison Wesley * Knuth, Donal E., Computers & Typesetting/E: Computer Modern Typefaces, Addison Wesley * Knuth, Donal E., The Metafont book, Addison Wesley * Knuth, Donal E., The Tex book, Addison Wesley * Lamport, L., Latex: A document preparation system, ed2, Addison Wesley. * Leslie, G.Health & Faux, Ian, Introductory Phototype Setting, GATF. * Philips, A., Computer Peripherals and Typesetting, HMSO. * Photo Composing Machines: A Survey of Users Views, British Printing Industries Federation. * Shapre, Charles, Electronic Composition: A Guide to the Revolution in typesetting, GATF * Sharma, M.C., Desktop Publishing on PC, BPB Publications, New Delhi. * Soblick Herman, M.A., Photo Composition Methods and

equipment, Guad Publishing Co., New York. * Wilson-Davies, K. & Bate J.St.J. & Card M., Desktop Publishing, Publisher's Guide Series, Blue Print, London.

PRN/IEE/T/126 ELECTRONICS

Passive circuits elements, resonance, network theorem, terminal characteristics of P-N junctions, Use of diode as clamper, clipper, rectifier filters. Terminal characteristics of bi-polar transistor. Transistor as a control device, concepts of current gain, cutoff, active and saturated transistors, load line and Q-point. Selection in connection with CE amplifier circuits. Self-biased CE configuration, CC configuration - DC condition, principle of operation and qualitative discussion on gain. Input and output impedance, signal handling capacity, frequency response, cascading of stages - RC coupling only. Terminal characteristics of zener diode and applications. Series mode and shunt mode voltage regulators. Feed back amplifiers - principles of operations, gain frequency response, input impedance, output impedance, distortion and noise reduction. Difference amplifiers, common mode gain, difference mode gain, CMRR. Input & output impedance, operational amplifiers - a basic building block. Terminal characteristics. Use of practical OP Amp as circuit element. Application of OP Amp as an inverter, voltage follower, adder, integrator, differentiator, log amplifier, instrumentation amplifier. Waveform generator-Astable, Monostable and Bistable multivibrators. Sweep

generation, constant current charging. Use of OP amps in waveform generation, Timer (555) and its applications.

le shooting

PRN/PE/S/121 ELECTRICAL TECHNOLOGY LABORATORY

To supplement the theoretical course on "Electrical Technology".

PRN/PE/S/122 MACHINE SHOP

Machine Shop - Working in Lathe, Shaping, Drilling and Milling machines, Basic concepts of machine tools and cutting tools.

PRN/S/123 GRAPHIC REPRODUCTION LABORATORY

1. Study of different darkroom equipments 2. Study of developing solution 3. Procedure and handling the film, exposing, processing and drying 4. Preparation of line negative 5. Production of positives by contact printing 6. Preparation of halftone 7. Preparation of continuous tone bromide photograph using Enlarger

8. Retouching 9. Densitometric analysis 10. Digital reproduction photography 11. Digital inputting of transmission originals using transparency scanner

PRN/S/124 DIGITAL TYPESETTING LABORATORY

1. Getting acquainted with a digital typesetting environment: Equipments and softwares used. 2. Generating digital type faces, font manipulation 3. Paragraph setting, text alignment and pagination. 4. Tabulation and columns, indexing 5. Scientific and multilingual word processing. 6. Text and image integration: OLE and other techniques 7. Page composition utilities: macros, search and replace routines etc. 8. Text file format and file exchange. 9. Designing a text editing software. 10. Programming and control of output devices (eg. DMP, Laserprinter etc)

Second Year First Semester

PRN/Math/T/211 MATHEMATICS-IIIR

Ordinary Differential Equations: First order exact and linear equation, Second and higher order linear differential equations with constant coefficients, Euler-Cauchy equations, method of variation of parameters, initial and boundary value problems, Laplace transforms. Solution of linear differential equation with constant coefficients by Laplace transform, solution of differential equations in series, Bessel's and Legendre's differential equations.
Legendre polynomials and Bessel's functions of the first kind.
Partial Differential Equations: Variables separable method, solutions of one dimensional heat, wave and two dimensional Laplace equations.

PRN/T/212 PAPER TECHNOLOGY

Raw materials for paper manufacturing - structure of cellulose, hemicellulose, and lignin and extractives. Pulping mechanical and chemical pulping, different types of paper produces from different types of pulp. Bleaching, wastepaper utilisation and de-linking, stock preparation. Internal sizing, effect of fillers to improve printability of paper, Colouring of paper. Fourdrinier paper machine, cylinder machine, Pressing, Drying. Calenders, Super calenders, Embossers, Surface treatment of paper and board-lamination, corrugating, paper reinforcement by polymer addition, different types of coating. Paper

cutting. Standard sizes of papers. Fibre analysis. Paper defects - dirt in papers, speck analysis. Properties of paper - Structural properties, Physical properties, Strength properties, optical properties, resistance properties, chemical properties. On-line measurement of paper properties.
Reference: James P. Casey, Pulp and Paper (volume 1-4)

PRN/T/213 MECHANISM

Linkages, four bar linkages. Velocity analysis; instantaneous axis, relative velocity methods, Crank, rocker, draglink, non-parallel equal crank linkage; automobile steering mechanism; Slider crank, swinging block; oscillating arm quick return mechanism; Whitworth quick return mechanism, isosceles linkage; toggle: pantograph: universal joint; Geneva drive, Pawl & Ratchet. Transmission of Motion by direct contacts; pitch point angle of action, pressure angle, conjugate curves. Cam and follower; plate cams; cylindrical cams; displacement; velocity and acceleration diagrams. Bodies in rolling contact; Gears, spur gears, bevel gears, rack and pinions, worm gears; reverted gear trains; epicyclic gear trains. Belt drives, stepped pulley; chain drive; continuous feed systems: web feed systems; Differential screws; intermittent motion. Different mechanisms related to offset printing machines.

PRN/CSE/T/214 COMPUTATIONAL STUDIES

Numerical Methods: Truncation errors, round off errors and their propagation; Interpolation; Lagrange, Newton's forward, backward and divided difference formulas, least square curve fitting, solution of non-linear equations of one variables using bisection, false position, secant and Newton Raphson methods; Rate of convergence of these methods, general iterative methods. Simple and multiple roots of polynomials. Solutions of system of linear algebraic equations

using Gauss elimination methods, Jacobi and Gauss-Seidel iterative methods and their rate of convergence; ill conditioned and well conditioned system. eigen values and eigen vectors using power methods. Numerical integration using trapezoidal, Simpson's rule and other quadrature formulas. Numerical Differentiation. Solution of boundary value problems. Solution of initial value problems of ordinary differential equations using Euler's method, predictor corrector and Runge Kutta method.

PRN/T/215 PRINTING ELECTRONICS

Pulse, Digital waveform characterisation, duration and period, Rise and fall time; overshoot and undershoot, linearity of sweep and its measure, etc. Basis logic gates: AND, OR, NOT, NAND, NOR, EXOR etc. Logical symbols and truthtables. Boolean

algebra, and DeMorgans theorem. Concept of universal logic. Characterisation of TTL and CMOs gates - speed of operation, power dissipation, Fan out, current and voltage parameters, power supply requirements etc. Number system and code. Combination logic, standard representation for logical function. Minimization technique (Karnaugh Map), design example. Sequential circuits--Flip-Flop families, Registers and counters. Memory design, Ram, Rom, Prom, Epron and E-square prom devices. Analogue to digital and Digital to analogue convertors. Successive approximation type. Dual slope type and comparator type, A-O convertor. Introduction to computer system design, CPU memory, I/O and peripheral Interface (Block level) and system integration philosophy.

PRN/T/216 PRINTING MATERIAL SCIENCE-I

Interfacial surface tension, spreading of liquid on a surface, capillary action. Viscosity, Poiseuille's equation.
Radiation - Refraction, reflection, absorption and transmission of electromagnetic radiation in solids. Reflectivity, Transmitivity, Absorptivity. Concept of Black & White bodies. Various Lamps and light sources and their working principles.
Simple microscope, Qualitative discussions on Laser and its working principles. Holography - Elementary examples.
Heat transfer, Conduction, Convection, Heat capacity, thermal conductivity, thermal expansion of materials.
Concept of energy band diagram for materials; conductors, semiconductors and insulators in terms of energy bands. Electrical conductivity, effect of temperature on conductivity in materials, intrinsic and extrinsic semiconductors, dielectric properties of materials.
Origin of magnetism in metallic and ceramic materials, paramagnetism, diamagnetism, antiferromagnetism, ferromagnetism, ferrimagnetism in materials and magnetic hysteresis.
Advanced materials: Smart materials exhibiting ferroelectric, piezoelectric, optoelectronic, semiconducting behaviour; lasers and optical fibers; photoconductivity and superconductivity in materials.

PRN/IEE/S/211 ELECTRONICS LABORATORY

1. Familiarization with Electronic Components like R, L, C and active devices. 2. Familiarization with Electronic Workshop Tools and their use. Soldering Practice. 3. Study of the Characteristic of PN-Junction Diode, Clipper, Clamper, Rectifier circuits and Zener regulators. 4. Characteristics of BJT (CE mode). 5. Study of a CE Amplifier. 6. Studies on the applications of operation amplifier - voltage follower, summer, integrator, differentiator, astable multivibrator. 7. Timer-555 : Monostable and astable multivibrator using 555.

PRN/S/212 GRAPHIC DESIGN AND LAYOUT LABORATORY

A complete design and layout of magazine /periodicals/brochure/leaflet/booklet is to be submitted at the end using following steps 1. .Fundamentals of design principles, Introduction to design and page layout softwares like QuarkXpress, Freehand, Indesign etc 2. The Interface palettes and toolbox 3. Creating Boxes: Intro to Boxes, Auto Create Text Box, Create Text/Picture Boxes, Import/export Text, Highlighting/deleting Text, 4. Formatting Text : Preference Palette, Changing Fonts, Size and Resize, Type Styles, Color/shades, Kerning Type, Tracking Words, Horizontal/vertical Scaling, Smart Quotes,Text BaseLines , Text Orientation, Convert Text to Box 5. Working With Lines and Creating Pictures : Create Picture Box, Resize Picture Box,

Import Pictures, Resizing Pictures Within a Box, Cropping Pictures, Rotating Picture Boxes, Rotating Pictures Within Box, Skewing Pictures Within Box, Flipping a Picture, Modifying Color and Shade of Pictures, Contrast Settings to Pictures, Custom Halftone Screens, Listing and Updating Picture Paths 6. Multiple Items: Select Multiple Items, Duplicate/step and Repeat , Group and Ungroup Items, Lock Items, Stacking Order of Items, Space and Align Items, Anchor Images Into Text 7. Text and Images: Measurement Palette, Text Over Images, Wrap Text Around Image/box, Clipping Paths, Runaround, Special Clipping Effects, Rotate/skew and Flip Text/Box, Text Inside Image Shapes 8. Beziers: Introduction to Beziers 9. Formatting Paragraphs: Alignment, Leading, Indents, Hanging Indents, Paragraph Spacing, Drop Cap' Insert Rule Above/below, Tab Inserts, Widow and Orphan Line Control, Hyphenation and Justification 10. Tables : Create New Table, Table Placement, Resizing Rows and Columns, Insert/Delete Columns and Rows, Convert Tables to Text, Creating Tables in a Web Document 11. Style Sheets: Create New Style Sheet, Paragraph Based on Existing, Apply a Style Sheet, Append Style Sheets, Compare Style Sheets 12. Master Pages: Create New Master Pages, Format and Apply Master Pages, Modify Master GuidesSetting Web Page Properties, Number Pages, Linking Text with Master Pages 13. Working With Color: Overview Of Color Models, Colors Palette, Create New Color , Edit/duplicate/delete Colors, Re-color Text, Re-color Frame/gap, Re-color Box , Color Blends 14. Layers: Intro to Layers Palette, Creating New Layers, Arranging Layers, Merge Layers, Determine Item Layer, Creating Items on a Layer, Moving Items to Different Layer Locking Items on Layers 15. Libraries: Create Library, Add/delete Library Items 16. References: Create a Book, Add/delete Chapters, Status Columns, Page Numbering Books, Synchronize Chapters, Print Chapters, Create New List, Build and Preview List References : * Mortimer Pamela, Document Design Primer, GATF * Blanchard Russell W., Graphic Design, Prentice-Hall, Inc. * Croy Peter, Graphic design and reproduction techniques, Focal Press

PRN/CSE/S/213 NUMERICAL ANALYSIS AND C PROGRAMMING LABORATORY

To supplement the theoretical courses on "Computational Studies" and "Programming Language".

PRN/S/214 SCREEN PROCESS PRINTING LABORATORY

1. Study of different tools, materials and equipments used in screen printing 2. Preparation of screen stencil in direct photographic stencil process and reproduction through it 3. Preparation of screen stencil in indirect photographic stencil process and reproduction through it 4. Preparation of screen stencil in direct and indirect photographic stencil process and reproduction through it 5. Preparation of screen stencil in capillary direct film process and reproduction through it 6. Printing of multicolour job 7. Printing on different types of substrate 8. Printed Circuit Board (PCB) making using Screen Process Printing 9. Study of different running on problems and troub

Second Year Second Semester

PRN/Math/T/221 MATHEMATICS-IVR

Sequence and infinite series, convergent and divergent series, comparison tests, D'Alembert's ratio test, Cauchy's root test.
Fourier Series, Fourier integrals, Dirichlet's condition, odd and even functions, Half range series. Vector Calculus: Vectors, position vectors, addition and subtraction of vectors, components of a vector, scalar and vector products of two vectors scalar and vector triple products application to mechanics, Work done by a force, linear velocity in terms of angular velocity. Differentiation of a vector point functions, Gradient, divergence and curl, vector identities, directional derivatives, line, surface and volume integrals, Stokes, Gauss and Green's theorems (without proofs) with applications.

PRN/T/222 PRINTING MACHINE DESIGN

Basic idea of machine design, analysis, itemization, empericism, approximation and synthesis, design decision. Permanent and detachable fastening devices, bolts, nuts, screw, keys, pin and retainers, their types and appropriate applications. Threaded joints, types and causes of threaded failures; Bolts without and with preloading; joints using gaskets. Torque transmitting elements: Shaft couplings, pulleys - their types and design features. Kinematic analysis of spur and bevel gears, worms and worm wheels. Specification and selection of bearings. Simple structure and foundation equipment. Basic idea of design & analysis, Concepts of fits & tolerances, design of typical machine elements, Design & drawing of gear box, worm, worm wheel, stop-valve, journal

bearing, clutch, etc. Design aspects of sheetfed offset and web offset printing machines.

PRN/T/223 ENVIRONMENTAL SCIENCES

Overview of air pollution control strategy, Factors affecting control approach selection, Engineering analysis of air pollution problems. Particulate control Technology: modification of particulate characteristics by different processes, settling chambers, cyclone separators, different types of filters, electrostatic precipitators, and wet scrubbers. Characteristics and analysis of the sewage: Need for analysis, main characteristics of the sewage, Biochemical characteristics, aerobic and anaerobic decomposition. Treatment of sewage and disposal: Screens, Grit chambers, Sewage sedimentation and chemical precipitation, biological treatment, sludge

treatment and disposal. Sound pollution and Control technique in Printing and packaging industry; Health hazards in Printing and Packaging industry.

References: * Water supply and waste water engineering; B.S.N. Raju, Tata McGraw Hill Publishing Company, New Delhi, 2000. * Air Pollution Control Technology; Robert M. Bethea, Van Nostrand Reinhold Company, New York, 1978.

PRN/T/224 PACKAGING TECHNIQUES-I

Introduction: Definition; Packaging criteria: appearance, protection against chemical and physical hazards, functions regarding end use performance and machine performance, cost and cost effectiveness and disposability. Packaging Materials, Properties And Packaging Forms: Wood: properties, decay and preservation of woods, forms of wood; Paper and paper boards: properties, types and their applications; Corrugated boards; Glass: properties, kind of glasses, glass package forms, their finishes and closers; Metals and Foils: Properties and uses, package forms; Polymers: Types, their properties and applications; laminates, fibers; adhesives: properties, kinds and their applications. Aerosols. Generals packaging forms: bag, pouch, blisters, strip, collapsible tubes, cans. Packaging Production: Manufacturing and fabrication processes: Injection molding, blow molding, thermoforming, rotational molding, extrusion, compression molding; Lamination: processes and their applications; Labeling; Varnishing; Decorating: vacuum metallizing, electroless and electrolytic plating; filling; sealing; Cartoning: die cutting and punching. Food packaging: Food decay, methods of food preservations; Aseptic packaging: definition, sterilization methods.

References: * Evans, C.W. John, Trends in Paper and Paperboard Converting, Lockwood Trade Journal Co. * Handbook of Package Design Research, Walter Stern Wiley Intascience. * Hankn, Joseph F., Handbook of Package Engineering, McGraw Hill Co. * Long, Robert P., Package Printing, Graphic Magazines. * McGuive, Patric E., Packaging and Paper Converting, Palmerton Publishing Co., New York.

* Paine, F.A., Fundamentals of Packaging, Brookside Press Ltd., London. * Paine, F.A., The Packaging Media, Blackie & Sons Ltd., London. * Patne, A.M., Development in Binding and Packaging, MIPT, Pune. * Plastics Engineering Handbook, The Society of Plastics Industry Inc., VNR, New York. * Sutnar, Ladislav, Package Design: The Force of Visual Selling, Arts Inc., New York.

PRN/T/225 PRINTING MATERIAL SCIENCE-II

Atomic structure and bonding in materials, Structure of materials: Crystal systems, unit cells and space lattice; determination of structures of simple crystals by X-ray diffraction; Miller indices for planes and directions, Fick´s laws of diffusion, doping of semiconductors and surface hardening of metals.
Introduction to organic chemistry, Hydrocarbons, Alcohols, Fatty acids, Amines & Amides. Polymers: classification, polymerization, structure and properties, additives for polymer products, processing and application, Introduction to photopolymers,
Liquids & suspensions, emulsions, surfactants, adhesives & their general properties. Pigments and dye staffs, oils, resins, solvents etc. Composites, Alloys, Corrosion and environmental degradation of materials (metals, ceramics and polymers).
Reference: * Handbook of Plastics * R.H. Leach, Printing Ink Manual

PRN/T/226 PRINTING SURFACE PREPARATION

An introduction to different types of plates used in lithography, Flow chart of plate making procedures, details of plate graining, basic properties of the colloidal coatings, Surface chemistry of the plate coatings: colloidal coatings, diazo and photo polymers; the Albumen process of plate making, the deep-etch process of plate making, Wipe-on process of plate making, P.S. plate making, Bi-metal plate making, waterless plate making for lithography, Introduction to Computer-to-plate Technology References: * Photolithography; B.E. Tory, Graphic Arts Monthly, Chicago. * Lithographers Manual, GATF. * Advances in Printing Plate Technology, PIRA. * The Complete Guide to Waterless Printing,; John O'Rourke, Quantum Resources Inc.

PRN/S/221 PRINTING MACHINE DESIGN AND DRAWING LABORATORY

1. Design and drawing of shafts. 2. Design and drawing of pulleys. 3. Design and drawing of different types of gears.

4. Design and drawing of printing cylinders. 5. Design and drawing of different types of rollers used in printing machines. 6. Design and drawing of bearings, clutch, etc. 7. Design and drawing of delivery grippers used in sheet fed machines. 8. Design and drawing of front lays and side lays used in sheet fed machines.

PRN/S/222 MECHANICAL SYSTEMS LABORATORY

1. Study of different types of Cams/followers (Spatial cam, ecentric cam, Plate cam, Cylinder cam, etc.) used commonly in printing machines and their related equipments. 2. Study of the basic principle of dampening system in offset machines. 3. Study of the sheet transport system used in offset machines. 4. Study of the inking system used in offset machines. 5. Study of web tension in offset press. 6. Study of Weissenburg effect of visco-elastic substances. 7. Study of double ecentric bearings used on the blanket cylinder journal. 8. Study of the differential gear tooth meshing. 9. Determination of shore hardness of different types of rubber material and to compare with IRHD. 10. Study of different types of mechanical properties of printing materials. 11. Study of different types of rheological properties of printing materials.

PRN/S/223 PRINTING SURFACE PREPARATION LABORATORY

1. Graining of the Al plate and grain measurement. 2. Anodizing of the Al plate. 3. Imposition of the negative and positive films for black and white and colour jobs. 4. Preparation of the offset plate using Egg-Albumen process. 5. Preparation of the offset plate using Deep-etch (Gum, Glue, PVA) process. 6. Preparation of the offset plate using wipe-on process. 7. Preparation of the P.S. plate for offset process. 8. Preparation of the nylo plate for letter press and flexography. 9. Some study on the quality control devices used for quality control purpose.

PRN/S/224 ELECTRONIC PUBLISHING SYSTEM LABORATORY

1. An introduction to electronic publishing environments: equipment, software used. 2. Mark-up languages and their utilities. 3. Graphics animation, morphing, tweening. 4. Audio input and editing. 5. Video input and editing 6. Multimedia editing 7. Analyzing various web publishing tools. 8. Web designing and web publishing. 9. Aspects of presentation slides and other electronic communication aids. 10. Working with server side languages.

Third Year First Semester

PRN/CSE/T/311 DATABASE MANAGEMENT SYSTEM

Linear lists-arrays, linked lists, stacks and queues. Trees - binary trees, binary search trees, multiway trees. Graphs. Strings. Searching and sorting techniques. File structures - sequential, relative, indexed - sequential, direct. Broad introduction to database management systems and the design, implementation and applications of databases. Topics include an overview of DBMS architectures; concepts and implementations of the rotational models; SQL; database design and modeling techniques, and issue such as recovery, concurrency, physical implementation concerns and performance and management aspects. Alternative approaches to design database systems (for example object oriented or extended relational systems); distributed databases; database machines; and database interfaces and languages.

PRN/T/312 FLUID MECHANICS

Fluid Properties: Relation between stress and strain rate for Newtonian fluids Hydrostatics, buoyancy, manometry, Concept of local and convective accelerations; control volume analysis for mass, momentum and energy conservation, Differential equations of continuity and momentum (Euler's equation of motion); concept of fluid rotation, stream function, potential function; Bernoulli's equation and its applications, Qualitative ideas of boundary layers and its separation; streamlined and bluff bodies; drag and lift forces, Fully-developed pipe flow; laminar and turbulent flows; friction factor; Darcy Weisbach relation; Moody's friction chart; losses in pipe fittings; flow

measurements using venturimeter and orifice plates, Dimensional analysis; similitude and concept of dynamic similarity; importance of dimensionless numbers in model studies. Rheological models and equations, plastic, pseudo plastics, dilatant and thixotropic substances. Visco-elastic fluids and visco-elasticity of printing materials. Effect of rheological properties of inks, polymers etc. Flow of non-Newtonian fluids in ducts. Flow of non-Newtonian fluids through annular gap. Weissenberg effect.

PRN/T/313 OFFSET PRINTING MACHINES

Feeding: Sheet transport in sheet fed offset machines: different types of feeding, feed board control, front lays and side lays, feed board detectors, different types of insertion systems, grippers, intermediate sheet transport. Printing Couples: the plate cylinder, the blanket cylinder, and the impression cylinder, cylinder arrangement, cylinder bearers, cylinder gears, the inking system, ink flow, ink metering, ink distribution, pyramid design, roller setting, the dampening system, blanket fitting, packing, and blanket tension. Delivery systems: Infrared drying, UV drying, and sheet delivery control. The perfector Press: Separate unit perfector press, Blanket-to-Blanket perfector press, and the Convertible press. Press Lubrication: Gravity-fed lubrication, continuous lubrication, intermittent lubrication, Cascade lubrication, and Grease-gum lubrication. Trouble Shooting: Paper problems, ink problems, plate problems, and print quality problems.

References: * Lithography, Ian Faux, Blue Print. * Printing Technology; Adams, Faux and Rieber, * Lithographers Manual, GATF

PRN/T/314 COLOUR SCIENCE AND ENGINEERING

Fundamentals of Color, Importance of Definitions of color: Hue, Brightness and Lightness, Colorfulness and Saturation, Elementary Principles of Color, Elementary Principles of Color Reproduction, Color Measurement, Calculations of Tristimulus Values, Calculations of Selected

Ordinates, Chromaticity Diagrams, CIE Color Spaces, Color-Difference Specification, Digitizing Color, Color Conversion and Separation, Tone Reproduction and Color Balance, Spectral Sensitivities for Color Separation, , Paper and Ink, Halftone dots- Murray-Davis and Yule-Nielson equations, Additivity and Proportionality of Densities, Mathematical Analysis of Color Correction, Neugebauer Equations, Four-Color Printing and the Black Printer, Color Management System, Color matching and mixing, Color proof

References: * John A. C. Yule, Principles of Color Reproduction: Applied to photomechanical reproduction, color photography, and the ink, paper, and other related industries , GATF * Phil Green, Understanding Digital Color, GATF Press

PRN/T/315 PACKAGING TECHNIQUES-II

Different types of distribution hazards - mechanical hazards, climatic hazards etc. Basic considerations for protection of packaged items. Theory of cushioning, application of stress analysis to packaging behavior. Optimum cushioning selection. Shock absorption. Different cushioning materials. Suspension systems of the packaged items. Impact vibration, design consideration for isolation of vibratory forces. Evaluation and testing of package performance. Drop tester, inclined impact tester, Compression and vibration testing. Principle of accelerometer. Laboratory transport testing methods. Economy of packaging, influence of moisture, protective functions. Dehumidification, humidity control and dehumidification methods Shelf life of packaged articles, accelerated testing method, half value period method some case studies. Application of computers in packaging. Safety and maintenance.

PRN/T/316 FLEXO AND GRAVURE

Flexographic principle, Flexographic printing surfaces and generation and their materials and processes. Inking system, Ink composition, Flexographic presses, Floxographic printing problems. Gravure principle, Gravure cylinder making processes and materials used, Gravure ink and their properties, Gravure presses, Gravure printing problems, use of these processes in packaging industry, Trends and the future.

References : * Flexography primer, GATF * Kasunich Cheryl L., Gravure primer, GATF * Adams J. Michael, Faux D. David, Rieber J. Lloyd, Printing Technology, Delmar Publishers * Eldred Nelson R., Chemistry for the Graphic Arts, GATF * Eldred Nelson R. & Scarlett Terry, What the Printer should know about Ink, GATF

PRN/CSE/S/311 DATABASE MANAGEMENT SYSTEM LABORATORY

To supplement the theoretical course on "Database Management System".

PRN/S/312 SHEETFED OFFSET PRINTING MACHINES LABORATORY

1. Study of drive system of offset machine (both mechanical and electrical). 2. Study of feeding unit of the sheet fed machine (including sheet separation, feed board control, registration, etc.). 3. Blanket fixing and adjustment, plate fixing, cylinder adjustment, impression pressure setting, etc. 4. Roller setting (both inking and dampening systems), measurements of nip pressure, roller hardness, etc . 5. Measurements of surface temperature of rollers, and stresses induced in the rollers. 6. Study of the delivery unit (including sheet control, gripper setting, bay setting). 7. Study of the control unit of offset machine. 8. Study of the lubrication system of offset machine.

9. Study of the pneumatic system of offset machine. 10. Single colour printing and multicolour printing.

PRN/S/313 COLOR AND TONE REPRODUCTION LABORATORY

1. Introduction to editing and retouching softwares like Photoshop 2. Process Color separation using color charts 3. Color adjustment of images and densitometric measurements 4. Tonal adjustment of Images and densitometric measurement: Tone Reproduction Curve analysis 5. Histogram analysis and equalization 6. Gray Component Replacement and black separation 7. Unsharp masking and other masking, special effects 8. Color Management: calibration and characterization of monitor, scanner and digital

camera 9. Calibration and characterization of printer using Color Management profiling softwares 10. Integrating Color Management 11. Visual Color Evaluation

References: * Adams and Weisburg, GATF Practical Guide of Color Management, GATF * John A. C. Yule,Principles of Color Reproduction: Applied to photomechanical reproduction, color photography, and the ink, paper, and other related industries , GATF

PRN/S/314 PACKAGING TECHNIQUES LABORATORY

1. Pattern design of folding carton. 2. Folding carton design using AUTOCAD. 3. Die-cutting of folded carton. 4. Testing of glass container. 5. Hydrostatic pressure testing of plastic container. 6. Impact resistance test of LDPE/HDPE film. 7. Study of properties of different types of packaging materials like polymer films, foil, board, etc. 8. Use of lamination in packaging. 9. Drop testing and vibration testing of the folding carton using accelerometer. 10. Air and water permeability testing of packages. 11. Uses of hermetically sealing equipments. 12. Uses of filling machine, making of pouches, etc.

Third Year Second Semester

PRN/CSE/T/321 MICROPROCESSORS

Introduction to microprocessors and microcomputers. Microprocessor architecture. Addressing modes. Instruction set; instruction cycle and state transition diagrams. Machine language and assembly language programming. Supervisory systems for microprocessors. Data transfer operations - programme controlled, synchronous, asynchronous and interrupt handling. Direct memory access. Interfacing devices for parallel and serial devices. Asynchronous and synchronous communications, DMA; interrupt controller, timer, etc. Applications of microprocessors, philosophy of microprocessors based system design with examples. System evaluation, development and debugging aids.

PRN/T/322 ESTIMATING AND COSTING

Definition of estimation and costing and their relationship, Different costing methods, Determination of direct and indirect cost of a printing job, Budgeting, Establishment of

budget centers, Cost of productive department, Budgeted hour cost rates, Estimating paper, ink, film and other chemicals, Job specifications, Estimation form, Depreciation, Working capital, Expense control and budgetary control.

References : * Ruggles Philip Kent, Printing Estimating, Delmar Publishers. * Adams J. Michael, Faux D. David, Rieber J. Lloyd, Printing Technology, Delmar Publishers

PRN/T/323 CONTROL APPLICATION IN PRINTING

Basic control concepts. Types of control systems, sequential modulating and feedback control. Benefits from feedback control, examples. Use of Laplace transforms for analysis liner systems. Modelling of dynamic systems (electric motors, springmass dashpot system, ovens). Dynamic behaviour of closed loop systems. Temperature control. Position and velocity control. Concept of stability and compensation. Control components. Transducers and sensors. Actuators (thyristor, controlled motors, stepper motors, pneumatic and hydraulic actuators). Control amplifiers, PID controller, relays and contactors. Motor control, control application in printing industry. Application of sequential for starting and interlocking of motors. Other application of sequential control for printing and packaging machinery. Programmable logic controllers.

PRN/T/324 DIGITAL IMAGING

Introduction To Digital Imaging: Conventional vs digital images. Image capturing and outputting devices. Hardware and software interfaces. Digital Images: Vector and bitmap graphics. Graphics adapters. Digital Tone Reproduction Techniques: Digital half toning. Dithering. Grayscale images. Resolution and image quality. Image file formats and file exchange. Optical Scanning and Digitizing Techniques: Types of Scanner. Scanner anatomy; Scanner characteristics; Optical Character Recognition techniques; Bar Codes; Scanner feature; Document imaging processor & it's recognition; CCD color Capture technique; image Enhancement technique; Image manipulation; Frame grabbing technique. Imagesetters and Platesetters: Mechanisms, calibration. Outputting. Raster Image Processor Technology (Rip): Raster: Glyph; Hardware & resolution dependency: Concept of BLIT; Stages of RIP; Imaging of a page, Data Compression/Decompression Technique: Character distribution; Character repetition; High usage pattern; Positional redundancy; Huffman coding; Run-length encoding; Programmed Compression; Adaptive Compression; Non-lossy Image Compression; Lossy Image Compression like JPEG, MPEG, Fractals group.

References: * Corrigan, J., Computer Graphics: Secrets and Solutions, BPB Publications, New Delhi. * Dougherty, Edward R & Giardina, Charles R., Image Processing-Continuous to Discrete, Vol.I: Geometric, Transform and Statistical Methods., Prentice Hall, NJ, USA * Eastman Kodak Co., The Colour Separation Scanner. * Giardina, Charles R. & Dougherty, Edward R., Morphological methods in image and signal processing, Prentice Hall, NJ, USA * Gonzalez, R.C. & Woods, R.E., Digital Image Processing, Pearson Education, Asia * Jensen, John R., Introductory Digital Imageprocessing: A Remote Sensing Perspective, Prentice Hall, NJ, USA. * Kang, Henry R., Digital Color Halftoning (SPIE PRESS Monograph Vol. PM68), SPIE--The International Society for Optical Engineering. * Lau, Daniel L. and Arce, Gonzalo R., Modern Digital Halftoning, Marcel Dekker. * Molla, Dr. R.K., Electronic Colour Separation, R.K.Printing and Publishing Co., West Virginia, USA * Pratt, William K., Digital Image Processing, John Wiley & Sons, Inc. * Sturge, J. & Walworth, V. & Shepp, A., Imaging Processes and Materials (Neblette's eighth edition), Van Nostrand Reinhold, NY, USA

PRN/T/325 PLANNING AND FINISHING

Review of Print processes, colour planning, Paper grain direction and its importance in planning, Imposition techniques, Introduction to Folding machines, Different folds and their selection, Knife folders and its settings, Buckle folders, Feeders exclusively for folding machines,

Problems and calculations on folding, Cutting and Trimming, Significance of planning for converting customer specification to finished material, Conditions and limitations of a planner, Planning for web machines, Introduction to Binding, Saddle-stitch binding and its use, Smyth sewing and its specifications, different Side stitches, Perfect binding & Spiral binding, Adhesive binding, Problem exercises on binding, Hard cover binding, Styles on Hard cover, Decorative works like Foil stamping, Gold-lining, etc.

References: * Binding and Finishing,; Geoff Potter, Blue Print * Printing Technology; Adams, Faux and Rieber * Lithographers Manual, GATF

PRN/T/326 INK TECHNOLOGY

Nature of printing ink - visual characteristics, drying characteristics, adhesive nature, resistance properties. Raw materials of printing inks: Pigments and dyestuffs, oils, solvents, resin, plasticisers, driers, waxes, surfactants, antioxidants and other additives, Letterpress inks. Lithographic inks, Flexographic inks, Gravure inks, Screen inks - General characteristics, Physical properties, drying mechanism, formulation, inks for specific end-use application (ink for different types of plastics, paper, metallic ink, fluorescent inks, stamp inks), ink related problems and possible solutions, fugitive ink. Future trends.

Radiation curable systems - Infra-red curing, ultra-violet curing, micro-wave and radio-frequency drying, electron-beam curing Radiation curable equipments, future trends. Manufacturing of inks - Manufacturing process - mixing and milling equipments, manufacture of news inks. Handling, transportion and storage, future trends. Health and safety aspects. Ink Testing

References: R.H. Leach, Printing Ink Manual, Kluwer Academic Publishers

PRN/CSE/S/321 MICROPROCESSORS AND CONTROL LABORATORY

To supplement the theoretical course on "Microprocessors".

PRN/S/322 DIGITAL IMAGING LABORATORY

1. An introduction to digital imaging environments: Equipment and softwares used. 2. Vector and bitmap graphics. 3. Digital tone reproduction techniques. 4. Inputting and analyzing reflection and transmission originals through flatbed scanner. 5. Inputting and analyzing images through digital camera. 6. Image file formats and file exchange. 7. Optical character recognition systems. 8. Programming in Page Description Languages to various output devices for imaging control. 9. Imaging through computer to film/plate systems. 10. Optical and other controls in scanner and digital camera.

PRN/S/323 FLEXO AND GRAVURE LABORATORY

1. Preparation of flexographic stereo 2. Preparation of Gravure cylinder 3. Study of different parts of the flexographic machine 4. Study of different parts of the gravure machine 5. Setting different parts of the machines 6. Printing on different types of substrate 7. Study of different running on problems and trouble shooting 8. Machine maintenance

PRN/S/324 PLANNING AND FINISHING LABORATORY

1. Imposition scheme: Half-sheet works. 2. Imposition scheme: Sheet works. 3. Cutting and trimming. 4. Wire stitching. 5. Sewing 6. Spiral binding.

7. Comb binding. 8. Adhesive binding 9. Laminating 10. Case binding

Fourth Year First Semester

PRN/CSE/T/411 COMPUTER GRAPHICS

Analysis and synthesis of graphical information -pixel and vector graphic. Discussion of display devices, graphical and data structures, transformations. Interactive techniques. Characteristics of interactive input devices, light pens, tablets and scanners. Computer manipulation of two dimensional forms, three dimensional graphics, hidden lines, surface, perspective and shedding.

PRN/T/412 NEWS PAPER PRINTING TECHNIQUES

Work flow of a news paper house, Front-End Systems: Collection of text, pictures and graphics into the computer, pagination systems, colour systems, library systems (storage). Introduction to telecommunications, Output devices: PTS, Laser printer, Image setter, and CTP. Web Offset Machines: Basic configuration of web offset presses, different types of reel stand and their elements, web tension control, web detector devices, web turner, web registration control, different types of web folder and ancillary systems such as mail room delivery, bundling, etc. Handling of printing materials in news paper house.

References: * Latest developments in newspaper technology, PIRA. * Advances in Web Offset, PIRA. * Web Offset Operating, GATF. * Printing Technology, Adams, Faux and Rieber.

PRN/T/413 NONIMPACT PRINTING

Electrophotography: Introduction to electrophotography, alternative powder marking technologies, electrophotographic processes & subsystems. Related physics, development steps, two component development system, cascade development, magnetic brush development both insulative & conductive systems, monocomponent & liquid development, xerographic sensitometry, TESl, electro-graphic colour processes. photoelectric materials, Applications of electro-photography. Inkjet Printing: Introduction to inkjet printing. Types of inkjet technologies. Continuous and drop on demand inkjets printers, Printhead design considerations, Inkjet inks: non-aqueous, aqueous, hot-melt inks, substrates: plain paper, coatings Thermal Printing: Introduction to thermal printing technologies. Direct thermal and Dye-diffusion thermal transfer. Chemistry of thermal papers.

References: * Lane, Earle, Electrophotography, And/or Pr. * Scharfe, Merlin E., Electrophotography Principles and Optimization, John Wiley & Sons. * Schein, L.B., Electrophotography, Laplacian Press; rev. 2nd edition. * Shaffert, R.M., Electrophotography, Focal Press, London * Springer Verlag, Electrophotography and Development Physics, * Sturge, J. & Walworth, V. & Shepp, A., Imaging Processes and Materials (Neblette's eighth edition), Van Nostrand Reinhold, NY, USA

PRN/T/414 ELECTIVE-I

1. COLOR VISION AND COLORIMETRY

PRN/T/414A COLOR VISION AND COLORIMETRY

The Eye, Colorimetry, Visual Equivalence and Visual Matching, Uniform Color Scales, Visual Thresholds, Theories and Models of Color Vision. Psychophysics: Hierarchy of Scales, Threshold Techniques, Matching Techniques, One-Dimensional Scaling, Multidimensional Scaling, Importance in Color Appearance Modeling, Munsell color, The Swedish Natural Color System (NCS), The Colorcurve System, Other Color Order Systems, Uses of Color Order Systems Color-Appearance Phenomena: Simultaneous Contrast and Spreading, Color Constancy Viewing Conditions: Configuration of the Viewing Field, Stimulus, Proximal Field Colorimetric Specification of the Viewing Field, Modes of Viewing, Illuminant and Illumination Chromatic Adaptation, Computational Color Constancy Color Appearance Models: CIELAB, Wrong von Kries Transform, ATD Model, LLAB Model, CIECAM97s, CIECAM02 Scattering and Absorption of Light (Phenomenological Theory) : Phenomenological Theory and Its Significance, Four-Flux Theory, Kubelka-Munk Theory, Hiding Power, Transparency, Principle of Spectral Evaluation Light Scattering and Absorption Depending on the Content of Coloring Material (Beer's Law, Scattering Interaction) Scattering and Pigment Content, Systematic Treatment of Pigment/ Achromatic Paste Mixing, Kubelka-Munk Functions of Pigment/Paste Mixture, Tinting Strength (Corpuscular Theory), Mie Theory Determination of Hiding Power, Tinting Strength and Lightening Power

References: * Günther Wyszecki, W. S. Stiles, Color Science * Billmeyer and Saltzman's Principles of Color Technology, * Hunt, Measuring Colour * Volz H.G.,Industrial Color Testing

PRN/T/414B DIGITAL IMAGE PROCESSING

Digital Image Fundamentals: Digital image representation, elements of digital image processing systems. Sampling and quantization. Basic relationships between pixels. Imaging geometry. Image Transform: Fourier transform, Two dimensional Fourier Transform, FFT, other separable image transform. Image Enhancement: Spatial domain model, Frequency domain model, Enhancement by point processing, spatial filtering, enhancement in frequency domain. Colour image processing. Image Restoration: Degradation model, Diagonalization of circulant and block-circulant matrices. Algebraic approach to restoration. Inverse filtering. Least mean square filter. Image Segmentation: Detection of discontinuities, Edge linking and boundary detection. Thresholding. Region-oriented segmentation.

Restoration and Description: Representation schemes, Boundary descriptors, Regional descriptors. Recognition and Interpretation: Elements of image analysis. Pattern and pattern classes.

References: * Giardina, Charles R. & Dougherty, Edward R., Morphological methods in image and signal processing, Prentice Hall, NJ, USA * Gonzalez, R.C. & Woods, R.E., Digital Image

Processing, Pearson Education, Asia * Jensen, John R., Introductory Digital Image processing: A Remote Sensing Perspective, Prentice Hall, NJ, USA.

PRN/T/414C PUBLICATION PRINTING

References: Standard and non-standard format of a book, copy preparation, Typography, Designing the text, Preparing illustrations, Preparing covers and jackets, Typesetting the text, originating and making up the illustrations, Arranging for final films and CRC, Proofing the cover or jacket, Choosing and using paper, Printing the book (printing processes and print quality control), Inks, Binding styles, Finishing operations, ISBN standards, Bar code, Organizing packing, Dispatch and distribution. Magazines: Definition, Types. Business plan for starting a magazine, Developing the magazine, Editorial concepts, Article editing, Selection of write-ups, photographs and arts, Production planning, Wraps, Inserts and tip-ins, Different types of cover, Layout, Printing, Binding and finishing, Magazine circulation, Copyright act.

References : * Peacock John, Book Production, Blueprint publishing. * Click J. William and Baird Russell N., Magazine Editing and Production * Wharton John, Managing Magazine Publishing, Blueprint Publishing * Baird Russell N., Magazine Production

PRN/T/414D SPECIALITY PRINTING TECHNIQUES

Different types of speciality printing, Functions, Anti-counterfeiting features, Currency printing, Stamp printing, Cheque printing, Map printing, MICR, Hologram, PCB, Semiconductor lithography, Advance printing techniques References : 1. Moreau Wayne M., Semiconductor lithography : Principles, practices and materials, Plenum Press 2. Saxby Graham, Practical Holography, Prentice-Hall 3. Boss hart C. Walter, Printed Circuit Boards, Tata McGraw-Hill Publishing

PRN/T/414E ELECTRONIC PUBLISHING SYSTEM

Fundamental Of Publishing: Computer assisted Publishing; Electronic Publishing; Database Publishing; Web publishing Readability & Legibility of text on screen & paper regarding Character, Formatting, Color & Contrast, Dynamic text presentation.

Page Construction: Concepts of BOX & GLUES; Rules for breaking paragraph into lines; List of lines into pages; Basic principle of justification and Hyphenation procedures; Typographic markup languages as publishing standards like ASPIC, SGML system, other extension of SGML like html, xml, Javascript.

Document Development System: Direct Manipulation interfaces; Source language model; Task domain like Direct manipulation graphics editing, Graphics programming, Formatting & layout, Pre & Post processing, Imaging Files and interchanges, Annotations/ Narration & dynamic reading; Basic structure of a document development system and its application in the latest document imaging software.

Styles In Document Editing System: Static functionality & Dynamic functionality; Styles; Style rules; Style design issue; Document structure like Consistency of style, Caption Selection of fonts, Heading & Subheading with text matter; house style.

Publishing Management System: Publication representation; Publication environments; Publication node structure; Version management; Content objects & processing objects; Publication naming; Information sharing Hypertext and its principle.

Electronic publishing formats: Postscript: pdf, epub, lit etc

Multimedia System: Application of multimedia in web publishing. Multimedia tools. Multimedia presentation and editing.

References:

* Card, M., Interfacing wordprocessors and phototypesetters, Blueprint, London.

* Goldfarb, Charles F & Rubinsky, Yuri (Contributor) The SGML Handbook, Clarendon Pr

* Musciano, C. & Kennedy, B., HTML and XHTML: The Definitive Guide, Shroff Publishers & Distributors Pvt. Ltd., Kolkata

* Steinmetz, Ralf & Nahrstedt, Klara, Multimedia: Computing, Communications, and applications, Pearson Education, Asia.

PRN/CSE/S/411 COMPUTER GRAPHICS LABORATORY

To supplement the theoretical course on "Computer Graphics".

PRN/S/412 SEMINAR

At least two seminar presentations on the current topics in Printing Industry is required for each students.

PRN/S/413 WEB OFFSET LABORATORY

1. Study of drive system of web offset machine (both mechanical and electrical). 2. Study of feeding unit of the web fed machine (including web tension, web path etc.). 3. Blanket fixing and adjustment, plate fixing, cylinder adjustment, impression pressure setting, etc. 4. Roller setting (both inking and dampening systems), measurements of nip pressure, roller hardness, etc . 5. Measurements of surface temperature of rollers, and stresses induced in the rollers. 6. Study of the delivery unit (including folder unit). 7. Study of the control unit of offset machine. 8. Study of the lubrication system of offset machine. 9. Study of the pneumatic system of offset machine. 10. Single colour printing and multicolour printing.

PRN/S/414 PROJECT-I

Topic of project to be selected jointly by the assigned teacher and the student. A typed project report in duplicate is due at the end of the semester.

Fourth Year Second Semester

PRN/CSE/T/421 DATA COMMUNICATIONS & NETWORKING

Introduction to the concepts and principles of computer networks. The nature of communications media and signaling methods, analog and digital transmission; data link protocols, protocol proof techniques; routing, broadcasting, multicasting; connection, disconnection and crash recovery protocols; internetworking and security; and network analysis and design using graph theory and queuing theory.

PRN/T/422 INDUSTRIAL MANAGEMENT

Introduction to management problem, types of manufacture, planning, analysis and control aspects in industries. Types of business ownerships, means of financing and business combinations. Organisation structures. committee, authority, responsibility, duty and span of control. Plant location, building and physical facilities. Plant layout, machineries and materials. Product development and standarisation. Production planning and control, production forecasting and scheduling; network techniques. Gantt chart, CPM, PERT etc. Workstudy, job evaluation and merit rating. Purchase system and inventory control. Maintenance and replacement policies for machines and equipment. Decision making theories. Break even analysis; cost benefit analysis, evaluation of financial and managerial efficiencies. introduction to operation research techniques. Industrial humanics and labour compensation. Personnel management provisions of industrial legislations in India; wage, salary. Welfare; safety provisions and trade union acts. Marketing as an intergrative discipline; Market planning (theory X and Y). Methods of market segmentations, Introduction to reasons of buying and effects on market strategies. Consumer Vs. Industrial marketing. Suitable use of market research in printing industries. Management techniques and abilities; General management analysis and decision making. Corporate planning and control: corporate objectives, planning, organisations and applications. Analysis of companies in the printing and packaging industries. Change of company policy with change of technology. Reproduction work, approval and

modification of design; drawing of material schedule. Production planning; routing, interrelation of routing; route sheets; master schedule, machine loads and load charts. Laws, rules and regulations. Contracts of different nature. Effect on packaging on marketing. Understanding the relationship between marketing and the industries. Market planning, understanding the market, the consumer and the market, marketing processes, the concept of marketing mix, new product development, distribution, productional mix, sales promotion, selling, pricing.

PRN/T/423 QUALITY CONTROL IN PRINTING INDUSTRY

Conceptual aspect of quality and quality printing, defect detection versus defect prevention, establishment of the process capability via sampling and statistics, the use of statistical process control (SPC) tools, Overview of Six Sigma, control charts for variables, additional SPC techniques for variables, fundamentals of probability, control charts for attributes, lot-by-lot acceptance sampling by attributes, acceptance sampling systems, reliability, and management and planning. The substantial use of probability and statistical techniques is reduced to simple mathematics or is developed in the form of tables and charts. Management role in creating quality environment, densitometry for measurement, ANSI standards on color printing, use of quality control devices for process control, and case studies on planning and implementing quality improvement programs in various printing environments. Quality Assurance of Print Materials-ink testing, Short term, Long term, press performance and dry print performance tests for ink,, paper and other substrate testing. Optimizing the Press Process Control Digital Workflow: Advantages of Digital Technology , Film vs. Digital File , Standards

in Graphic Arts Open vs. Proprietary Systems, Types of Standards : ISO, ANSI, CGATS, CIE, ICC, Published Characterizations of Print ProcessesSWOP ,SNAP GRACoLProofing in the Graphic Arts, The Proofing Cycle , Traditional Proofs, Digital Proofs, Dye-Sublimation & Thermal Wax Proofers, Toner Proofers, Ink-Jet Proofers, Halftone Digital Proofers, Soft Proofing, Remote Proofing Document Management, , Job Tickets and Tracking, Press and Post-Press Control, Tasks in a Digital Production Workflow, Creation, Preflight, Image Capture, Page

Preparation, File Repair, Image Swapping , Imposition, Trapping, Proofing, Hold for Approval, Raster Image Processing, Output/Imaging , Backup/Archiving , Information Systems Create Logic Blocks That Fit Your Structure, Task Integration and Location.

References: * Ric withers, Digital Workflow, 2000 * Apfelberg H.L. and Apfelberg M.J., Implementing Quality Management in the Graphic Arts, GATF

PRN/T/424 ELECTIVE-II

1. ADVERTISING
2. COLOR MANAGEMENT SYSTEMS
3. LASER TECHNOLOGY
4. PACKAGE PRINTING
5. ADVANCED DIGITAL IMAGE PROCESSING

PRN/T/424A ADVERTISING

Introduction to advertising: Advertising and other communication methods; Role of advertising in public relations. Types of advertising: Consumer product advertising; Industrial product advertising; Government advertising/ public service advertising; Financial advertising; Industrial or corporate advertising. Planning and Managing Advertising Campaign: Budgeting and campaign execution; copy testing; Evaluation of advertising. Advertising management: The publication advertising department; The Corporate advertising department; The advertising agency. Advertising Production: Copy concept, copy structure, essential 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 color, test of a good layout, production of print advertising.

References: * Rathore, B.S., Advertising Management, Animalaya Publishing, Howre. * Schiffman, Leon G. & Konark, Leslie Lajar, Consumer Behavior, Prentice Hall Inc. * Wright, John S.; Warner Daniel S.; Winter, Wills L.; Jr. & Zeiglc Sharilyn K., Advertising, Tata McGraw-Hill Publishing Co. Ltd., New Delhi.

PRN/T/424B COLOR MANAGEMENT SYSTEMS

The need for color management systems and their architectures, Closed-loop color, Color space conversion, Characterization and calibration of devices, Color Standards, Color notation systems, Calculations of Colorimetric Quality Factor, Color processing of digital photographs, Color gamut calculations and mapping, Color management in digital film post-production. Creating and evaluating device Profiles, Color Management Tools.

References: * Rich Adams and Joshua Weisberg, GATF Practical Guide to Color Management, GATF Press * Phil Green, Color Engineering, GATF

PRN/T/424C LASER TECHNOLOGY

Introduction to Laser: Light and laser. Application of laser in Printing and Packaging industry. Lasers: Types of lasers. Gas lasers, Solid state lasers, ruby laser and other kinds of lasers. Production of laser: Population inversion. High energy lasers. Laser applications: Laser machining: cutting, drilling, welding, marking. Exposure through laser. Usage in laser printer, imagesetter, drum scanner. Laser diecutting. Laser Gravure. Holography: Principles of

holography: Introduction to holography. Light sources for holography. Basic types of hologram. Color holography. Materials, exposure and processing. Practical display holography: Making a hologram. Single-beam techniques. 360 degree holograms. Introducing further beams and other holograms. Holographic stereograms. Holograms in color. Embossed holograms. Lasers and safety. The Fourier approach to image formation.

References: * Saxby, Graham, Practical Holography, Prentice Hall, New York.

PRN/T/424D PACKAGE PRINTING

Functions of the package, Different types of package, Package design, Packaging materials and how they are printed, Uses of different printing processes, Quality control in packages, Package inks and their properties, Finishing operations, Bar codes, Holograms, Troubleshooting, Trends and the future

References : * Eldred Nelson R., Package Printing, Jelmar Publishing Co., Inc., NY

PRN/T/424E ADVANCED DIGITAL IMAGE PROCESSING

Introduction, image definition and its representation, neighborhood. Orthogonal transformations like DFT, DCT, Wavelet.

Enhancement: contrast enhancement, smoothing and sharpening, filtering and restoration

Segmentation: pixel classification, global/local gray level thresholding, region growing, split/merge techniques, edge detection operators, Hough transform. Image feature/primitive extraction, component labeling, medial axis transform, skeletonization/thinning, shape properties, textural features – moments, gray level co occurrence matrix, structural features, Fourier descriptor, polygonal approximation. Compression: coding, quantization, spatial and transform domain based compression. Color image processing: color model, enhancement, and segmentation.

Mathematical morphology: basic concepts, erosion, dilation, opening, closing. Advanced applications like biomedical image processing, digital watermarking, etc

References:

1. R. C. Gonzalez and R. E. Woods, Digital Image Processing, Addison-Wesley, California, 1993.

2. Rosenfeld and A. C. Kak, Digital Picture Processing, Vol. 1 & 2, 2nd ed. Academic Press, Inc. 1982.

3. Chanda and D. Dutta Mazumdar, Digital Image Processing and Analysis, Prentice Hall of India, New Delhi, 2000.

PRN/S/421 GENERAL VIVA-VOCE

Based on all the theoretical and sessional subjects.

PRN/S/422 MATERIAL TESTING AND QUALITY CONTROL LABORATORY

Material Testing: 1. Analysis of ink - chemical and instrumental techniques. 2. Pigment testing - size analysis - by microscope and centrifuge, Grind gauge to measure dispersion, Resistance tests - Resistance against acid, alkali, wax, soap, plasticised bleed, deep freeze etc. 3. Resin testing - acid value, hydroxyl value, solubility, melting range, color 4. Varnish and oil - iodine number, saponification no., water content, refractive index, diene value. 5. Solvent - Boiling range, relative density, flash point, aromatic content. 6. Short term ink testing - dispersion, viscosity, flow, strength, hue, opacity gloss. 7. Long term ink testing - Drying time and setting time. 8. Press performance test and printability. 9. Dry Print Performance tests - resistance tests, adhesion flexibility, slip, blocking, set-off, strike-through 10. Paper testing - Physical testing - grammage, thickness, density, smoothness, porosity, sizing. Strength testing -tensile strength, bursting strength etc. 11. Polymer testing - instrumental and chemical tests for indentification and quantification. 12. Ink formulation using spectrophotometer Quality Control: Measurement and control of print quality viz. 1. Print Contrast 2. Solid Ink Density 3. Hue error 4. Greyness 5. Sequential priorities of multi-color print 6. Trapping, etc. using Densitometers

References: * R.H. Leach, Printing Ink Manual, Kluwer Academic Publishers

PRN/S/423 DIGITAL IMAGE PROCESSING LABORATORY

1. Introduction to image handling in Matlab
2. Basic gray level transformation – invert, log transform, power-law transform
3. Contrast stretching, histogram equalization
4. Logical operations – image subtraction, image averaging
5. Smoothing spatial filters Ie. Smoothing linear filter, order statistics filters
6. Sharpening spatial filters IE. First derivatives, second order derivatives – the Laplacian, unsharp masking, high boost filter, the gradient
7. Frequency domain operations – introduction to implementation of fast Fourier transform
8. Frequency domain filter designing – low-pass filters, high pass filter, band-pass filters
9. Basic image restoration filtering – median filter, max-min filter, mid-point filter, alpha-trimmed mean filter, adaptive filters, Notch filters
10. Edge detection algorithms – gray scale and color
11. Image morphing – dilation, erosion, opening, closing, boundary extraction, connected component extraction.

PRN/CSE/S/424 DATA COMMUNICATIONS & NETWORKING LABORATORY

Learning and using networking commands: IFCONFIG, PING, TRACEROUTE, FINGER, TELNET, FTP, NETSTAT, NMAP, TCDUMP, ROUTE, IPTABLE

Constructing a single LAN IP network containing 2/3 machines connected to a switch. Providing IP addresses and subnet masks to all machines. Determining the routes at each machine.

Writing socket programs using UDP/TCP sockets to perform the following tasks:

a. Echo server and echo client
b. Time server and time client
c. Measure the delay between two machines.

PRN/S/425 PROJECT-II

Topic of project to be selected jointly by the assigned teacher and the student. A typed project report in duplicate is due at the end of the semester.