First Year First Semester

**Hum/T/A  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
5. Development - Conceptions of and approaches to development - The Roles of State and the Market in the Development  
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
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.  

**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: lithographic planning and applications, introduction to sheet and web fed machines, pre-make-ready concepts, ink and water balance in lithography.  
Gravure: introduction to gravure printing process.  
Flexography: introduction to flexography printing process.  
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

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,
5. Macroscopic and microscopic description, Thermal equilibrium, Zeroth law of thermodynamics, Concept of international practical temperture scale, Heat and Work, First law of thermodynamics and some applications, Reversible and irreversible processes, Carnot cycle, Second law of thermodynamics, 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.

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.

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. Preparation of line and halftone block for letter press process.
5. Composition and page make-up using digital type setting technique.
6. Study of the offset printing unit.
7. Study of the gravure printing unit.
8. Study of the flexography printing unit.
9. 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

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**


**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/IEE/T/124**  
**ELECTRONICS**

Passive circuits elements, resonance, network theorem, terminal characteristics of P-N junctions, Use of diode as clamper, clipper, rectifier filters. Terminal characteristics of bipolar 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.

**PRN/CSE/T/125 COMPUTER 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/126 PRINTING MATERIAL SCIENCE-I**


**PRN/CSE/S/121 NUMERICAL ANALYSIS AND C PROGRAMMING LABORATORY**

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

**PRN/S/122 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 trouble shooting

PRN/PE/S/123        ELECTRICAL TECHNOLOGY LABORATORY

To supplement the theoretical course on "Electrical Technology".

PRN/PE/S/124        MACHINE SHOP

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

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


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; Geneval 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/T/214 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:
* 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/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 DIGITAL TYPESETTING**

Storage media: Types of storage media. Magnetic memories, Semiconductor memories, Optical memories. Comparison and evaluation of various storage media.
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
* Bate, J. St. J. & Wilson-Davies K., Desktop Publishing, BSP Professional Books
* Bluhm A., Photo Composing, Pergamon, London.
* Encyclopedia of Contemporary Typesetting, GATF.
* Health, Les & Faux, Ian, Phototypesetting, SITA Ltd.
PRN/IEE/S/211   ELECTRONICS LABORATORY

1. Familiarization with Electronic Components like R, L, C and active devices.
5. Study of a CE Amplifier.
6. Studies on the applications of operation amplifier - voltage follower, summer, integrator, differentiator, astable multivibrator.

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
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 Guides, Setting Web Page Properties, Number Pages, Linking Text with Master Pages
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/S/213 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/214**  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 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.
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   CONTROL APPLICATION IN PRINTING**

Basic control concepts. Types of control systems, sequential modulating and feedback control. Benefits from feedback control, examples.
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/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:
* Handbook of Package Design Research, Walter Stern Wiley Intascience.
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, eccentric cam, Mate 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.
7. Study of double eccentric 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.
9. Some study on the quality control devices used for quality control purpose.

PRN/S/224    BOOK PRINTING LABORATORY

1. Analysis of existing book works and planning for a new.
3. Page composition: Typesetting and pagination control
4. Graphic elements.
5. Indexing
6. House style
8. Proofing.
9. Plate making.
Third Year First Semester

PRN/CSE/T/311 DATABASE MANAGEMENT SYSTEM


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/Gen/T/312 ENGINEERING ECONOMICS


Banking - role of commercial banks - credit and its importance in industrial financing - source of financing; Reserve bank and its functions.

Business organizations - Proprietorship - Partnership -Jointstock companies, insurance; Business combinations.

Markets: monopoly, duopoly, oligopoly, monopolistic competition, perfect competition.

Industrial record keeping; double entry system - journal - ledger - trial balance;

Cashbook. Preparation of final accounts, trading, profit and loss accounts and balance sheets. Simple study of balance.

Service industries and international trade.

References:
* Bhattacharyya, Asish K., Financial Accounting for Business Managers, Prentice Hall

PRN/T/313 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

**PRN/T/314 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.  
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/315 COLOUR SCIENCE AND ENGINEERING**


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/316  PACKAGING TECHNIQUES-II


PRN/CSE/S/311  DATABASE MANAGEMENT SYSTEM LABORATORY

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

PRN/S/312  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.
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**

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:
* Adams J. Michael, Faux D. David, Rieber J. Lloyd, Printing Technology, Delmar Publishers

**PRN/T/323  DIGITAL IMAGING**


Optical Scanning and Digitizing Techniques: Types of Scanner. Scanner anatomy; Scanner characteristics; Optical Character Recognition techniques; Bar Codes; Scanner feature; Document imaging processor & its 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:
* Eastman Kodak Co., The Colour Separation Scanner.
* Giardina, Charles R. & Dougherty, Edward R., Morphological methods in image and signal processing, Prentice Hall, NJ, USA
* 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
FLEXO AND GRAVURE

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

PLANNING AND FINISHING

Review of Print processes, colour planning, Paper grain direction and its impodance 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

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.

Ink Testing


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

Fourth Year First Semester

**PRN/CSE/T/411**  COMPUTER GRAPHICS


**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, TESI, electro-graphic colour processes.
Photoelectric materials, Applications of electro-photography.
References:
* Lane, Earle, Electrophotography, And/or Pr.
* Scharfe, Merlin E., Electrophotography Principles and Optimization, John Wiley & Sons.
* Shaffert, R.M., Electrophotography, Focal Press, London
* Springer Verlag, Electrophotography and Development Physics,

**PRN/T/414 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, Colour & 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.
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.

References:
* Card, M., Interfacing wordprocessors and phototypesetters, Blueprint, London.
* Goldfarb, Charles F & Rubinsky, Yuri (Contributor) The SGML Handbook, Clarendon Pr

**PRN/T/415 ELECTIVE-I**

1. COLOR VISION AND COLORIMETRY
2. DIGITAL IMAGE PROCESSING
3. PUBLICATION PRINTING
4. SPECIALITY PRINTING TECHNIQUES

PRN/T/415A  COLOR VISION AND COLORIMETRY


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/415B  DIGITAL IMAGE PROCESSING

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

PRN/T/415C         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/415D         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:
2. Saxby Graham, Practical Holography, Prentice-Hall

PRN/CSE/S/411          COMPUTER GRAPHICS LABORATORY

To supplement the theoretical course on "Computer Graphics".

PRN/S/412            SEMINAR
Two seminar presentations on the current topics in Printing Industry is required for each student.

**PRN/S/413 INDUSTRIAL TRAINING**

A report to be submitted by the students at the end of training as per directive given by the assigned teacher.

**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 standardisation. Production planning and control, production forecasting and scheduling; network techniques. Gantt chart, CPM, PERT etc.


Marketing as an integrative 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    ENVIRONMENTAL SCIENCE

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:

PRN/T/424    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

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

**PRN/T/425 ELECTIVE-II**

1. ADVERTISING
2. COLOR MANAGEMENT SYSTEMS
3. LASER TECHNOLOGY
4. PACKAGE PRINTING

**PRN/T/425A 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:
* Schiffman, Leon G. & Konark, Leslie Lajar, Consumer Behavior, Prentice Hall Inc.
**COLOR MANAGEMENT SYSTEMS**


References:
* Phil Green, Color Engineering, GATF

**LASER TECHNOLOGY**

Holography:
Holograms in color. Embossed holograms.
Lasers and safety. The Fourier approach to image formation.

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

**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

**GENERAL VIVA-VOCE**

Based on all the theoretical and sessional subjects.
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.
7. Long term ink testing - Drying time and setting time.
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:

Electronic Publishing System Laboratory
1. An introduction to electronic publishing environments: equipment, software used.
2. Mark-up languages and their utilities.
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.
PRN/S/424 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.