

TAMIL NADU PUBLIC SERVICE COMMISSION**Printing Technology (Degree Standard) - Syllabus****UNIT I: Imaging Technology**

Design – Concept, Typography, Graphic Design. Layout – Stages in Preparing a Layout; Marking-up; Dummy. Designing for Newspapers, Booklets, Magazines, Business publications, Banners & Posters, Advertising, Transit, Interactive, Web and in Maps. Conventional Pre Press – Word Processing and Typesetting – Procedure, Manuscript – Type of Inputs, Font – Types, Text Output - Film / Plate, Image Setters, Planning Layout – Information, Type of Work, Preparing the Layout; Imposition Schemes; Book Work – Margin Calculations, Methods, Positive and Negative Assembly; Step and Repeat. Digital Pre Press - Image Acquisition – Digital Camera – Principles, Mechanisms, Types, Resolution, Memory, Scanner Types – Flatbed and Drum, Screening Frequency, DOT Structure AM and FM Screening, Comparison, Resolution, Storage, File Formats – Workflow – Automated Workflow – Components, File Preparation, Colour Management, Preflighting, Digital Imposition – PreRIP, PostRIP, OPI, Trapping, Postscript, PDF, CIP4 – JDF, JMF – RIP (Raster Image Processing), Resolution – Input, Output, Image Setters and Plate Setters – Types, Digital Proofing – Need, Proofing Technologies – Inkjet, Dye sublimation, Thermal Wax, Electro Photography. Inks, Dyes, Toners, Quality and Relative Merits.

UNIT II: Image Preparation

Conventional Methods: Positive, Negative plates - Base materials & properties – Aluminium, Stainless steel, Copper, Chromium, Nickel, Poly masters and paper masters; Graining – types; Contact angle and wettability; Anodisation – Process; Plate chemistry – Light source – Types – advantages, disadvantages - Desensitizing process, gum, developing inks, lacquers and asphaltum, Quality Control Aids., Digital – Computer to Plate – Imaging for lithography: Computer to plate (CTP) and Computer to press systems, their architecture, workflow, equipments used, type of plate used – silver halide, thermal fuse, photopolymer plates and their structures and technique of imaging – laser, UV, thermal imaging. Computer to Polyester Plate (CTPP) and technique of imaging, quality control devices.

Imaging for gravure Process: electromechanical engraving of gravure cylinders, equipments used, engraving with single and multiple head engravers, digital workflow. Laser cutting of gravure cylinders, type of plastic material used for the laser cutting cylinder, system architecture and workflow, quality Control.

Imaging of flexography: Laser engraved design rolls for continuous patterns, plate types – Rubber and Polymer plates and production of design rolls, laser engraving techniques and quality aspects.

Imaging for screen printing: Imaging types, materials of cylindrical screens and quality aspects.

UNIT III: Press

Offset Printing: Principles of Offset, Sheet-fed – Feeding and Control, Printing Unit Configuration –Printing Blankets, Rollers and Fountain Solution, Web-fed Printing Presses: Types, Press Classification and Infeed Units, Printing Unit - Design Configuration and Types, Inking and Dampening Systems, Drying, Chilling, Folding and Sheeting Units and Mail Room Operation, Printing and Inline Operations – Make-ready operations, multi colour printing, automatic plate fixing, computer controls in printing, automatic blanket washing devices, roller washing solutions and accessories like chilling units and etc. Sheet coating systems, configuration spot coating and varnishing, numbering. Types of Dryers. Print problem identification and quality control.

Flexographic Printing: Mounting and Proofing procedure, Press types, narrow web, wide web; Variations of press – coating, lamination, corrugated postprinting; environment & safety aspects, web tension - control, guiding and viewing unit. Gravure and Screen Printing: Doctor blade – types, positioning, impression rollers – types and important, inking, dryer systems - types, in-feed, out-feed and converting operations. Screen Printing – Screen fabrics, frames, and squeegees – types, screen printing machine – types, maintenance. Digital Presses: computer to press, types, advantages and applications, Green Printing.

UNIT IV: Post Press and Converting Operations:

Production Flow in Print Finishing, Folding – Types of Fold for Sheet and Web, Methods of Feeding and Delivery, Cutting Machine – Parts, Types of Cutting Machine, Knife, Mechanism and maintenance of Guillotines, Gathering and Securing: Principles of Gathering and Types of Machines, Securing- Stitching, Sewing – Types; Perfect

binding, miscellaneous Operations – Edge Treatment, Case making, Embossing Foil Stamping, Dye Cutting, Indexing, Lamination Types, Shrink Wrapping, Automation in Finishing Operations.

UNIT V: Printing Materials:

Paper and Board – Raw materials and pulping, Pulping Methods, Bleaching Techniques, Stock Preparation, Paper and Board Manufacturing, Paper making machines, different sections and its functions, paper coatings – methods of coatings, Calendaring – Types, Board Manufacturing, Paper and Paper Board classifications and sizes, paper requirement for different printing processes, Paper and Board Properties and Paper related problems in printing. Printing Inks – Raw Materials – Colorants, oils, Binder – Types, their importance in printing ink formulations, Varnishes – Types, Additives – Properties and Applications, Printing Inks for different process, Ink Manufacturing, Ink Testing and Measurements. Specialty Inks – Water Based Inks, Radiation Curable inks, Inkjet Inks, Security Inks and Ink drying mechanism, ink related problems and remedies.

UNIT VI: Package Materials and Technology:

Packaging Materials – Wood, Textile, and Paper & board – Types and Properties and applications, Specialty Papers, corrugated boards - Types, Specification and applications. Plastics – Plastic in packaging, types and advantages, Flexible and Rigid Packaging, materials used – properties and applications. Recycling, Biobased Packaging Materials, Glass and Metals – Types, Properties and Uses, Metals – Tin, Aluminum and Steel, Properties and Uses, Foils and metallization Methods. Nano

composites and its applications in packaging; Label – Types, Additives used, Closures and Sealing; Cushioning materials, Lacquers and Special Additives, Materials testing – Mechanical, Optical and Chemical Test for packaging materials. Packaging Technology – Need, functions, types and selection of package, shelf life, package design – types, CAD applications in packaging, folding carton manufacturing, machineries, applications, collapsible tubes – manufacturing and applications, specialty packaging, package performance testing.

UNIT VII: Advertising, Scheduling and Cost Estimation:

Advertising – Introduction, Advertising planning, Media, Production and Co-ordination.

Scheduling – Concept of scheduling and its important, Sequencing, Inventory Management, Materials and Capacity requirement planning and network models in connection with printing industry. Cost Estimation – Basic concept of costing, Pricing, Estimation and Investment analysis – Cost estimation for printing materials and for different printing process in respect to various print jobs.

UNIT VIII: Publishing:

Newspaper and periodical publishing – operations of newspaper and magazine companies; organizational structure, management functions, editorial process, production workflows and legal issues. Book Publishing – Areas of publishing, editorial process, production management, distribution methods and legal aspects involved in book publishing. e-publishing - Internet, eBook, eJournals, eNewspaper, internet advertising, digital libraries, eReaders – e-Ink, e-paper, Crossmedia publishing, Advantages, Issues. Web publishing – Layout & Design, Accessibility, usability,

standards, publishing on handheld devices – Layout & Design, reference database – PUBMED etc. Index – author, volume, keyword. Workflow, Softwares & Tools and Emerging Trends.

UNIT IX: Printing Machinery Maintenance:

Maintenance Management Perspective – Functions, Maintenance Methods, Categorization, Emerging Trends; Total Planned Maintenance – System Components, Documentation, Spare parts management, Maintenance Schedules and control system, Inspection and lubrication, Lubricating systems; Total Production Maintenance – Six big losses, Pre press maintenance, Press maintenance, Printing and allied equipment maintenance, Electrical component maintenance, Mechanical component maintenance; Erection and Testing – Foundation requirements, Condition based maintenance: Condition monitoring, Techniques, Vibration analysis, Thermography, Non destructive testing methods and diagnostic instruments; Reconditioning and Replacement Theory – Repairs and reconditioning methods for various parts, Replacement models, Determination of average life.

UNIT X: Total Quality Management and Quality Control in Printing:

Concepts of TQM, TQM Framework, Barriers to TQM; TQM Principles – Customer focus, Customer orientation, customer satisfaction, customer complaints, customer retention; TQM Tools and Techniques – Traditional tools of quality, New management tools, Six-sigma: Concepts, methodology, Bench marking and its process; Quality Circles – Quality Function Deployment (QFD), Taguchi quality loss function, TPM; Quality Control in Printing - Definition of Quality, its purpose. Setting up a quality control

programme and establishing necessary procedures, economic consideration. Management responsibility. Quality Systems and ISO 9000, Statistical Quality Control, Materials, process control, ISO standards for process , Implementation and Guidelines, Quality Control Devices, Quality control aids – offset, flexo and gravure, print problems and remedies.