<table>
<thead>
<tr>
<th>Course No.</th>
<th>Course Title</th>
<th>Internal Assessment</th>
<th>Exam Schedule</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>401</td>
<td>Gravure Technology</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td>402</td>
<td>Print Management &amp; Entrepreneurship</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>403</td>
<td>Printing Plant Layout &amp; Machinery</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Maintenance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>404</td>
<td>Printing Substrates and Ink Technology</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td>405</td>
<td>Print Finishing</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td>406</td>
<td>Digital Printing</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td>407</td>
<td>Costing and Estimating</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td>408</td>
<td>Quality Control in Printing and Packaging</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td>409</td>
<td>Elective</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Advance Printing Technology (Elective-I)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Advance Graphics Technology (Elective-II)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Advanced Packaging Technology (Elective-III)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>410</td>
<td>Gravure lab</td>
<td>25</td>
<td>50</td>
<td>75</td>
</tr>
<tr>
<td>411</td>
<td>Printing substrates and ink technology lab.</td>
<td>25</td>
<td>50</td>
<td>75</td>
</tr>
<tr>
<td>412</td>
<td>Print finishing lab.</td>
<td>25</td>
<td>50</td>
<td>75</td>
</tr>
<tr>
<td>413</td>
<td>Quality control lab.</td>
<td>25</td>
<td>50</td>
<td>75</td>
</tr>
<tr>
<td>414</td>
<td>Project</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1300</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Note: The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

**Time : 3 hours**  
**Max. Marks: 100**  

(25+75)

**UNIT-I**

**Gravure:**  

**UNIT-II**

**Gravure Doctor blade assembly** –  

**UNIT-III**

**Gravure Press and Its components:**  

**UNIT-IV**

**Gravure Substrates:**  

**Recommended Books :**  
Gravure process and technology - GAA.  
Printing Technology - Adams, Faux, Rieber.
Print Management & Entrepreneurship Development

**Note:** The Examiners will set 10 questions, taking 5 from each Section. The students are required to attempt five questions in all selecting at least 2 from each section. All questions will carry equal marks.

**Time : 3 hours**

**Max. Marks: 100**

(25+75)

**Section – A**

**PRINT MANAGEMENT**

3. Production and operations Management – Locations and Layout of plant, Maintenance management. Quality assurance, Total quality management (TQM), ISO.
9. Depreciation - Introduction to different methods and their comparison.

**Section-B**

**10. Entrepreneurship Development**

Entrepreneurship: A Perspective: Recognition of the need for entrepreneurship and self-employment development, Entrepreneurship spirits, Significance of entrepreneur in Economic Development, Scope and trends of small enterprises, Small business/enterprise-the driving force for national growth, Types of small enterprises, Economic, social and psychological need for entrepreneurship, characterization, qualities and pre-requisites of entrepreneur, Selection of a potential entrepreneur, Identifying & Evaluating Business opportunities.

**11. Quick Start Method**

Methods and Procedures to start and expand one’s own business, life cycle of new business, Franchises, creating your own franchise, Multilevel marketing schemes, Buying an existing business.

**12. Business Planning Process**

Why is a good business plan required? Business Plan-the major benefits, sub plan, Business plan-blue print to success and financing, Small manufactures business plan, Feasibility Study, Preparation of Feasibility Reports, Project Reports.
13. Forms of Ownership

Different forms of ownership—sole proprietorship, partnership, joint stock company, selling, selling your venture, planning for succession, Valuation of a business, Responsibility of a good employer, Risk management, What risks does your business face?

14. Instructional Models

Govt. support to new enterprise, incentives, sources of finance. Entrepreneurship Development Centre, Role of Govt. and promotional agencies in entrepreneurship development, Entrepreneurship development programmes, Role of various institutions in developing entrepreneurship in India.

Recommended Books :-

8. Operator’s Manually by GATF.
10. Entrepreneurship Development - Colombo Plan Staff College for Technician Education.
Printing Plant Layout & Machinery Maintenance

Note: The Examiners will set 10 questions, taking 5 from each Section. The students are required to attempt five questions in all selecting at least 2 from each section. All questions will carry equal marks.

Max. Marks: 100

Time: 3 hours

Section – A

Plant layout

Site Selection:

Plant Layout:
Objectives of good plant layout, principles of plant layout, importance of plant layout, situations in which layout problem may arise, factors on plant layout, Methods of plant and factory layout-operation process chart, flow process chart, flow diagrams, string diagrams, machine data cards, templates three dimensional models, correlation chart, travel chart, load path matrix method. Introduction to Types of plant layout and suitable layouts for various printing industry.

Plant layout procedure:
Accumulate basic data, Analysis and coordinate basic data, decide the equipment and machinery required, Select material handling system, sketch plan of the plot for making factory building. Determine a general flow pattern, Design the individual workstation. Assemble the individual layout into the total layout calculate storage space required, Make flow diagrams In work stations and allocate them to areas on plot plan, Plan and locate service areas, make master layout. Check final layout.

Factory Building (Press Building):

Section-B

Machinery Maintenance

1. Drive and Control Systems
Transmission systems such as AC and DC motors, belt, chain, gear, cranks, connecting rods, Paul and ratchet mechanisms, Hydraulic, Pneumatic, Electrical, Electronics and mechanical controls.

2. Erecting and Testing
Equipment needed for erection - selection of location and environmental conditions - erection procedure for various prepress printing and finishing equipments and machinery -loading and transport of raw materials and printed product with respect to layout design commissioning.

3. Repairs and Reconditioning
Principles of reconditioning -repair methods for various parts - Roller comprising and Re - rubberizing - ebonite covering damping and inking systems - paper transport systems and feeder head.

4. Cylinders, Bushes and Bearings
Cylinder constructions - testing run out and taper - cylinder bearing supports - eccentric bushes - removal and fixing of bushes - changing of oil seals maintenance of bushes and bearings.

5. Maintenance procedures
Need and importance of maintenance - Definition, types, Maintenance policies - Maintenance organization – Maintenance of pumps and compressor - Lubricants, their types and Characteristics, Lubricating methods - Central lubrication with return oil Manual lubricating Greases, oils, Greases, oils, grades - preventive maintenance, break down maintenance.

6 Identification & rectification of faults. Maintaining different types of Letterpress, Offset, Gravure & Flexo Machine.

Recommended Books :
- Facility layout and location- Richard L.Francis, John A. White.
- Computer Aided Production Management - Mahapatra
- Production and Operations Management - Michelmann Oakland, Lockyer
- Practical Plant Layout - Herold B.Maynard
- Industrial Engineering Management System- Dr. S. Dalela, Dr. Mansoor Ali
- Industrial Engineering & Management - O. P. Khanna
- Industrial Engineering and Production Management-M. Mahajan.

Electrical Engg. By B.L. Thareja Part I & II
Theory of Machines By Khurmi & Gupta S.Chand Publisher New Delhi
Note: The Examiners will set 10 questions, taking 5 from each Section. The students are required to attempt five questions in all selecting at least 2 from each section. All questions will carry equal marks.

Time : 3 hours

Max. Marks: 100

( 25+75)

Section- A

Paper:

Recycled paper:

Choosing a suitable paper:

Introduction to Non Paper substrates
Section- B

Printing Inks


Radiation curing

Introduction, radiation curing inks, ink cure considerations, chemistry of uv curing-photo initiation, propagation, termination. Cationic curing, electron beam curing.

Security Inks

Range of security inks, special security features - fluorescence, phosphorescence, reflected by improved filters, magnetism, security printing inks for cheques-penetrating L/p inks, water fugetive inks, inks reacting with pen evadicators, red-ox reagents, inks reacting with solvents, invisible reactive inks, carbonizing inks. Security inks conformity tests and Q.C. tests for chemical resistance, light fastness, rub resistance test, crumpling resistance test, grinding control, colour control, control of the rheological properties, control of drying time, control of various specific properties. Environmental considerations in security printing.

Recommended Books :-

Printing materials science & technology - Bob Thompson-PIRA

Advances in printing science & technology Vol.24 - J. Anthony Bristow

Hand book of Print & Production - Micheal Barnard, John Peacock

Introduction to Printing Production - Hugh M.Speirs.

SIGPA – 1987
Print Finishing

Note: The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

Time: 3 hours
Max. Marks: 100

UNIT-I

Introduction:

UNIT-II

Structure Of A Book:

UNIT-III

Securing Methods:

UNIT-IV

End Papers:
**Finishing Processes:**

**Numbering**

**Binding & Finishing Machines:**

**Recommended Books :-**
Binding And Finishing - Ralph Lyman Binding And Finishing Part-I - B.D.Mendiratta
Binding Finishing Mailing - T.J.Tedesco Introduction to Printing & Finishing - Hugh Speirs
Digital Printing

Note: The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

Time: 3 hours
Max. Marks: 100

UNIT-I

Digital Documents

UNIT-II

Digital Printing Processes
Silver faldire, Phernal, INkjet, electrostatic processes. Rendering Typeline Art and images.
Colour management Introduction and future, Characterizing input and output device use of CIELAB, CMS Market & Applications:

UNIT-III

Database Marketing's Role:

UNIT-IV

Networking:

Recommended Books:
Digital Printing -
On Demand Printing - Howard M. Fenten, Frank J. Romano
COSTING AND ESTIMATING

Note: The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

Time : 3 hours                  Max. Marks: 100

UNIT-I

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

UNIT-II

Human Resource Management Concepts:
HRM for printing, employment policy, evaluation of skills requirements for printing occupations, recruitment, job evaluation, staff appraisal, motivation training, human resources factors that limit productivity, staff flexibility. Manning and training requirements, States of industry, Analysis and development of human resources strategy. Management personal skills and development, job satisfaction through involvement.

UNIT-III

Estimating:

UNIT-IV

Costing:

Recommended Books :
Principles of Accounting - B. S. Raman
Cost Accounting - B. R. Bhar
Print Management - Derek Porter
Printer’s Costing & Estimating - B. D. Mendiratta
Management Aspect of Printing Industry - T. A. Saifuddin.
Printing Estimating Principle & Practice - Philip Kent Ruggles
Print Production Management - Gray G. Field
Principles of Applied Costing for Printing Industry - K. S. Venkataraman.
Quality Control in Printing and Packaging

Note: The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

Time : 3 hours
Max. Marks: 100

UNIT-I

Introduction
Definition of Quality, Quality control, its meaning and purpose setting up a Quality Control Programme, and establishing necessary System and procedures, economic consideration.

UNIT-II

Management Consideration
Quality Control as an attitude and management tool, management's responsibility, organization and personnel functions, getting everybody involved. Total Quality Control. Quality Control procedures and methods. Different shapes of quality control.

UNIT-III

Materials Control
Establishing clear specifications and standardization of materials to be purchased - particularly paper, ink, plates, blankets and rollers, Inspection and testing of incoming materials as part of quality control; importance of proper handling and maintaining records of performance of materials Sampling and sampling plans. Establishing Quality control programme in different departments of Printing organization.

UNIT-IV

Quality Control Instrumentation
Paper and paper board testing instruments for testing printability, print quality and end-use requirements, Ink testing instruments for testing optical and working properties and end-use requirements Process control instruments, devices and aids used in the galley and dark-room, striping department, plateroom and press room for specific processes and for general purposes Press sheet control devices used for production of multicolour printing jobs Basic principles of these instruments and devices how they function and what they measure, minimum instrumentation necessary to produce a product consistent with the appropriate quality level.


Recommended Books:
1. W.H. Banks, Inks, Plates and Print Quality, Pergamon Press
ADVANCE PRINTING TECHNOLOGY

Note: The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

Time: 3 hours  Max. Marks: 100 (25+75)

UNIT-I

Modern Trend in Printing
1) Digital offset Colour Printing
2) Security Printing
3) Laser using in Pre-Press
4) Printing on un-even surfaces.
5) Bar-coding
6) Facsimile printing

UNIT-II

Pre-Press Techniques
1) Image setter Technology-Type, Working, Principal, Advantages, Limitation & applications
2) Scanner-Types, Techniques, Advantages, Limitation & applications
3) CTP Machines-Type, Working, Principal, Advantages, Limitation & applications.
4) Proofing Techniques and devices

UNIT-III

Print job planning and Stock control
1) Study of job and its work flow.
2) Choosing stable technique/device and material.
3) Maximum utility of equipment and manpower by alternative scheme.
4) Procurement material for printing.
5) Store-keeping, Purchase, Size and variety of stock, stock room conditions
6) Keeping record monitoring stock.

UNIT-IV

Print Industry in India and Abroad
1) Commercial Jobs in Printing:
   Pamphlets, Folders, Danglors, Brouchers, Business cards, Prospectus.
2) Use of Computer in Production Planning.

References Books:
1) Operator manual –GATF
2) Colour scanning and imaging systems-Gary field, GATF
3) Production Planning and inventory control-Seetharama L.Narasimhan, Dennis W.Mcleavey, Peter J.Villington
4) Production Planning ,Control and management-K.C.Jain, L.N. Aggarwal
ADVANCE GRAPHICS TECHNOLOGY

Note: The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

Time : 3 hours  Max. Marks: 100  
(25+75)

unit-I

Display Devices: Refresh CRT, Random-Scan and Rester-Scan Monitor, Color CRT Monitors, DVST, Prasmapenel Displays, LED and LCD monitors. Hard copy devices. 
Scan conversion: Scan Converting a point, line, circle, ellipse and arcs. 
2-D graphics transformations (Rotations, Scaling, Translations, Reflecting, Shearing). Composition of 2-D transformation, 2-D viewing and clipping. Windowing concepts, clipping algorithms (Line, Area and Text-Sutherland-Cohen, Mid-point subdivision), Window-to-view port transformation, Primitive and attributes. Exterior and Interior clipping.

unit-II

Document Processing Language 

unit-III


unit-IV

Font Management

Interactive graphics: Concept of Positioning and Pointing. Interactive Graphic Devices (Key Boards, Touch Panels, Light Pens, Graphic Tablets, Joysticks, Mouse-Voice System) Interactive Graphical Techniques: Basic Positioning Methods, Constraints, Grids, Gravity field, Rubber-Bank Methods, Sketching, Dragging, Inking and Painting. 
Computer Graphic Software: Introduction, GKS (Primitive, attributes and Viewport, Display subroutines)

Introduction to 3-D Graphics

Publishing software: PageMaker, CorelDraw etc.

References:

7. PDF : Printing & Workflow, Frank J. Romano, GATF Publication
Note: The Examiners will set eight questions, taking two from each unit. The students are required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

Time : 3 hours                  Max. Marks: 100

( 25+75)

Unit-I
Packaging of Food Products
(a) Agriculture produce
(b) Processed and dehydrated food
(c) Milk and Milk Products
(d) Meat and poultry products
(e) Marine products-Shrimps
(f) Spices

Unit-II
Packaging of other specific items
(a) Pharmaceuticals
(b) Tea
(c) Cosmetics and perfumery
(d) Soaps, detergents and shampoos
(e) Chemicals and fertilizers
(f) Petroleum products
(g) Pesticides
(h) Light engineering goods and domestic appliances
(i) Heavy machinery and equipments
(j) Textiles and garments
(k) handicrafts

Unit-III
Method of storage
(a) Cold storage, and deep freezing method of storage, their design and usage
(b) Irradiation, preservation of perishables and semi perishables

Unit-IV
(a) For packaging material- physical, physico-chemical properties, resistance to light, insect and mould

(b) For packaged goods- Unit package : compatibility studies, shelflife studies-with reference to flexible, rigid packs, different types of seals, closure etc. Bulk packages-Evaluation of transport worthiness of filled packages-physical and climatic hazards.
LIST OF EXPERIMENTS

1. Study of various Gravure printing machine configurations.
2. Study of various components of a Gravure printing machine.
11. Check the practical problems in a Gravure printing process.

LIST OF EXPERIMENTS

1. Various samples of Paper and their study.
2. Different samples of Inks and their study.
3. Lightfastness test.
5. Effect of Humidity and Temperature on paper.
6. Ink tackiness Test.
7. Printed samples of different printing processes and their study.
8. Ink Viscosity Test.
9. Introduction to various chemicals used in printing.
10. Consumables and miscellaneous used in printing.
LIST OF EXPERIMENTS

2. Preparation of Writing board.
3. Preparation of Receipt books with numbers in duplicate.
4. Preparation of following type of Mechanical binding - Spiral wire binding, Wire ‘O’ binding, Ring binding.
5. Preparation of files of following designs - Loose leaf file - single piece, Loose leaf file - Two piece tab binder, Loose leaf guard file - Boards joined with spine strip, Court case file, Portfolio - Closed file to keep confidential loose sheets.
6. Preparation of these types of End papers - Single End paper, Double or Inserted End paper, Made end paper, Cloth joint end paper, Zig Zag end paper, Cloth joint Zig Zag end paper.
7. Preparation of telephone directory with Indexes and Tabs.
8. Study of various controls, operations and mechanisms of the following machines: Folding machine, Guillotine machine, Cutter and Creaser, Varnishing machine, Laminating machine, Sewing & Stitching machine, Miscellaneous machine.
9. Binding of case bound, publishers binding. Book-emphasis will be given on decoration.
10. Print finishing operation to be conducted - Gold blocking, Embossing, Edge decoration, Thermography, Marbling, Velvet printing, Rubber printing, Die printing, Pouch lamination.
11. Repairing of old books.
12. Study of Pen ruling, Disk ruling, UV curing processes.

LIST OF EXPERIMENTS

1. Paper testing checking grain direction.
2. Tensile strength of paper, burst strength of paper.
3. Substance, caliper, porosity test, cobb sizing value test.
4. Tearing testing of paper, brightness test of paper.
5. Operating test, gloss test, lighting color filter sensor.
6. G.S.M.testing, folding endurance.
7. Moisture contents test, ash contents test.
8. Hot air oven tester, absorbing test.
9. Pick strength, humidity control test, room temp testing.
10. Ink film thickness test.
11. Investigation of pigment properties.
12. Investigation of solvent properties.
14. Test a printed sheet - proof printing and measurement of colour using spectro photometer, resistance testing of prints.
Dissertation will consist the study of development/ modification/ improvement in Process or Equipment in Printing and Allied fields.

(MANDATORY PASS DEGREE PAPER)
ENVIRONMENTAL STUDIES

Note: The Examiners will set eight questions. The students are required to attempt any five questions. All questions will carry equal marks.

Time: 3 hours

Max. Marks: 75

(25+75)

Unit I:

The Multidisciplinary nature of environmental studies
Definition, scope and importance.
Need for public awareness.

Unit II:

Natural Resources

Renewable and non-renewable resources:
Natural resources and associated problems.
a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
c) Mineral resources: Use and exploitation, environmental effects of extracting and mineral resources, case studies.
d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.
f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
• Role of an individual in conservation of natural resources.
• Equitable use of resources for sustainable lifestyles.

Unit III

Ecosystems
• Concept of an ecosystem.
• Structure and function of an ecosystem.
• Producers, consumers and decomposers.
• Energy flow in the ecosystem.
• Ecological succession.
• Food chains, food webs and ecological pyramids.
• Introduction, types, characteristic features, structure and function of the following ecosystem:
a) Forest ecosystem
b) Grassland ecosystem
c) Desert ecosystem
d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit IV

Biodiversity and its conservation
• Introduction – Definition: genetic, species and ecosystem diversity.
• Biogeographical classification of India.
• Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
• Biodiversity at global, National and local levels.
• India as a mega-diversity nation.
• Hot-spots of biodiversity.
• Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
• Endangered and endemic species of India.
• Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

**Unit 5: Environmental Pollution**

**Definition**
- Causes, effects and control measures of:
  a) Air pollution
  b) Water pollution
  c) Soil pollution
  d) Marine pollution
  e) Noise pollution
  f) Thermal pollution
  g) Nuclear hazards
- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Disaster management: floods, earthquake, cyclone and landslides.

**Unit 6: Social Issues and the Environment**
- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and Control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation
- Public awareness.

**Unit 7: Human Population and the Environment**
- Population growth, variation among nations
- Population explosion – Family Welfare Programme
- Environment and human health.
- Human Rights.
- Value Education.
- HIV/AIDS
- Women and Child Welfare.
- Role of Information Technology in Environment and human health.
- Case Studies.

**Unit 8: Field Work**
- Visit to a local area to document environmental assets: river / forest / grassland / hill / mountain.
- Visit to a local polluted site – Urban / Rural / Industrial / Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems – pond, river, hill slopes, etc.