

**Vocational Higher Secondary
Education (VHSE)**

Second Year

**GRAPHIC DESIGN AND PRINTING
TECHNOLOGY**

Reference Book - Teachers' Version



Government of Kerala
Department of Education

State Council of Educational Research and Training (SCERT),
KERALA
2016

Foreword

Dear Teachers

This reference book (**Teachers' Version**) is intended to serve as a transactional aid to facilitate classroom transaction and as a ready reference for teachers of Vocational Higher Secondary Schools. It offers some guidelines for the transaction of the course content and for undertaking the practical work listed in the course content. As the curriculum is activity based, process oriented and rooted in constructivism focusing on the realisation of learning outcomes, it demands higher level proficiency and dedication on the part of teachers for effective transaction.

In the context of the Right- based approach, quality education has to be ensured for all learners. The learner community of Vocational Higher Secondary Education in Kerala should be empowered by providing them with the best education that strengthens their competences to become innovative entrepreneurs who contribute to the knowledge society. The change of course names, modular approach adopted for the organisation of course content, work-based pedagogy and the outcome focused assessment approach paved the way for achieving the vision of Vocational Higher Secondary Education in Kerala. The revised curriculum helps to equip the learners with multiple skills matching technological advancements and to produce skilled workforce for meeting the demands of the emerging industries and service sectors with national and global orientation. The revised curriculum attempts to enhance knowledge, skills and attitudes by giving higher priority and space for the learners to make discussions in small groups, and activities requiring hands-on experience.

The SCERT appreciates the hard work and sincere co-operation of the contributors of this book that includes subject experts, industrialists and the teachers of Vocational Higher Secondary Schools. The development of the teachers' version of reference books has been a joint venture of the State Council of Educational Research and Training (SCERT) and the Directorate of Vocational Higher Secondary Education.

The SCERT welcomes constructive criticism and creative suggestions for the improvement of the book.

With regards,

Dr. J. Prasad
Director
SCERT, Kerala

ABOUT THE COURSE

Printing is indispensable for the modern man as every product he comes across in his day-to-day life is directly related to it. We can see printing on a tooth paste tube or tooth brush that he uses immediately after waking up. From that moment, almost everything he uses for any purpose bears a printed impression. This course provides in-depth coverage of electronic text generation, desktop publishing, computer-to-plate operations, computer-controlled inking and printing, digital image generation and electronic prepress. Printing has undergone a complete transformation with the application of electronics, computers and microprocessors and advanced science and technology. This technology has developed by incorporating the advancements from other disciplines and adopting the latest technical information from commercial art, photography, applied science, computer, mechanical and electronic engineering, nano technology etc.

The importance of Printing Technology is fast increasing in today's commercial world. It has wide usage and applications. The range of products vary from newspapers, books, labels, business cards, stationery, inserts, catalogues, pamphlets, advertisements, carton & foil printing etc. The related activities associated with printing technology are data imaging, book binding, plate making, prepress services etc.

Firms are finding it time saving and economical to print their own newsletters and reports. Hence on completion of this course, there is a wide scope of wage and self employment.

The information revolution and consumerism create an ever increasing demand for printed materials in every field. Printed material is the main medium of communication and dissemination of knowledge. But more than this, the medium of print is improving its position in today's multimedia society. Day by day, people are becoming more and more quality conscious and this in turn increases the demand for quality printed products. The methods of print production are also changing; in the direction of environment-friendly, highly automated and easily operated printing systems integrated in a digital data environment.

Packaging is an integral part of printing Industry. The printing and packaging industries in India have assumed growing significance during the last decade. This has become a dynamic and key area for manufactures and trading companies all over the country with the element of aesthetics, hygienic and cost effectiveness receiving increasing importance in commercial operations. The exterior looks and present ability of marketable goods leave a lasting impression on the minds of consumers and in this context packaging occupies the centre stage.

Since there is increasing demand for printed products there is always scope for those who are skilled in the operation of printing machines either as workers or entrepreneurs.

The course is designed in four modules of six month each as detailed below.

1. Graphic Designing and DTP
2. Digital Pre-press and Printing
3. Offset and Modern Printing Techniques
4. Binding and Packaging

On completion of every module the student will get a certificate for the skill he acquired. On successful completion of the course two certificates will be issued - a regular higher secondary certificate and a Skill certificate in the level 3 & 4. The students who pass the exams can apply for any engineering, degree or diploma course just like any another student who passed higher secondary exam with the mathematics group.

JOB ROLES

In the past five years the printing industry has undergone a fundamental restructuring. The entire job classification such as paste-up, striping has been replaced by graphic designing software and for digital workflow. This course is structured in such a way that the learner will get both theory and practical based knowledge so that he will be capable to fulfil the need of the industry for trained manpower in the field of graphic designing and Printing Technology.

This curriculum will enable the students to undertake different job roles in Government as well as Private sector. The production cum Training Centre (PTC) and On the Job Training (OJT) will provide hands on practical experience to the students; which will enable them to have entrepreneurship in the field of Graphic Designing and Printing Technology. This curriculum is suitable for career enhancement by joining various Print Media courses in various parts of the country.

Govt./Semi Govt. Sector	Private Sector	Self Employment
<ul style="list-style-type: none">• DTP Operator• Graphic Designer• Pre Press Operator• CTP Machine Operator• Plate maker• Offset Operator• Binder• Sales Executive<ul style="list-style-type: none">• Production Assistant• Store Keeper• Binder• Offset Operator• CTP Operator• DTP Operator		<ul style="list-style-type: none">• Trade Instructor• Graphic Designer<ul style="list-style-type: none">• Pre Press Operator• Digital Printer Operator• Cutting Machine Operator• Proof Reader• Flexo Machine Operator• Notebook making unit• Packaging Industry• Hologram Printing Unit• Xerox Unit• DTP Unit• Graphic Designing Unit• Proof Reading
<p>Printing Material Supply</p> <ul style="list-style-type: none">• Printing Chemicals and Ink supply• Paper supply• Offset Printing Unit• Screen Printing Unit• Binding Unit• Envelope making unit		
<ul style="list-style-type: none">• Folding Machine Operator• Perfect Binding machine Operator• Store keeper• Lab Technical Assistant• Tradesman		

MAJOR SKILLS

Identification of different types of paper

Paper calculation

Identification of different types of inks used in the printing industry

Identification of different chemicals used in printing industry

To operate single colour & multi colour offset machine

Work estimation

To operate a web offset press

Identify different problems during printing process

To handle different quality control devices used in printing industry

To prepare a flexographic printing plate

To operate flexo printing machine

To identify different security printing methods

To prepare a stencil for screen printing

To screen print images on various substrates

The use of safety equipments in printing press

Different type of binding, sewing, and covering operations

To operate a Cutting machine

To handle different modern post press machines

Identify different packaging materials

To design and prepare a package for different products

To prepare different carton styles and dies for packaging

To identify Mechanical, Electrical & Pneumatic parts of an offset machine

To get the basic concepts of Engineering drawing

LEARNING OUTCOMES

Module 3

Unit 1

3.1 Printing Materials

- 3.1.1 Summarise various steps involved in Paper making process
- 3.1.2 Identify the Physical properties of paper
- 3.1.3 Classify Paper according to its types, sizes & paper weight
- 3.1.4 Estimate the quantity of Paper required for printing a work
- 3.1.5 Understand Storage of paper / warehousing
- 3.1.6 List the Ingredients of ink, its Properties and the steps in manufacturing of ink
- 3.1.7 Categorise the methods of Ink drying
- 3.1.8 Categorise different types of Ink
- 3.1.9 Identify the chemicals used in Printing

Unit 2

3.2 Sheetfed Offset Press

- 3.2.1 Classify presses based on various aspects
- 3.2.2 Operate different units of an Offset machine
- 3.2.3 Understand the structure and properties of offset blankets

Unit 3

3.3 Offset Press Operations

- 3.3.1 Demonstrate the Make ready Procedure
- 3.3.2 List the leading manufacturers of Offset machines
- 3.3.3 Estimate the cost of production of a printing job in offset printing

Unit 4

3.4 Web Offset Press

- 3.4.1 Categorise web offset presses based on its design
- 3.4.2 Demonstrate the operation of a web offset machine
- 3.4.3 Understand the Inline finishing methods in a web offset machine
- 3.4.4 Identify different types of printing papers used in a Web offset press
- 3.4.5 Understand the working of a press console

Unit 5

3.5 Press maintenance and Troubleshooting

- 3.5.1 Identify Paper problems and suggest remedies
- 3.5.2 Identify Ink problems and suggest remedies
- 3.5.3 Identify printing problems and suggest remedies

- 3.5.4 Identify problems due to blanket and rollers and suggest remedies
- 3.5.5 Identify problems due to incorrect cylinder pressure and suggest remedies
- 3.5.6 Understand the importance of preventive maintenance
- 3.5.7 Demonstrate cleaning and caring the press
- 3.5.8 Understand the importance of Quality Control Devices in quality printing

Unit 6

3.6 Flexo and Gravure

- 3.6.1 Understand the process of Flexography
- 3.6.2 List out the advantages of flexography
- 3.6.3 Identify the Basic units of a flexo printing machine
- 3.6.4 Classify Flexographic plates
- 3.6.5 Demonstrate Plate making process in flexography
- 3.6.6 Categorise different types of flexo Press
- 3.6.7 List out various types of ink & substrate used in flexography
- 3.6.8 Understand the process of Gravure Printing
- 3.6.9 List out the advantages and disadvantages of gravure printing process
- 3.6.10 Understand the working of the printing unit of a gravure press
- 3.6.11 Understand the methods of preparation of gravure cylinders
- 3.6.12 Discuss the different types of Ink and substrates used in gravure process
- 3.6.13 Understand the importance and advantages of Security Printing

Unit 7

3.7 Screen Printing

- 3.7.1 Understand the applications of Screen Printing
- 3.7.2 Demonstrate the Screen Printing Process
- 3.7.3 Understand various types of Screen frames and Fabrics
- 3.7.4 Demonstrate the preparation of Stencil for screen printing
- 3.7.5 List out the substrates for screen printing
- 3.7.6 Understand the automation in screen printing process
- 3.7.7 Understand the special applications of screen printing process

Module 4

Unit 1

4.1 Safety and Health

- 4.1.1 Understand the Safety regulations related to printing industry
- 4.1.2 Understand the importance of Safety guards in an offset machine
- 4.1.3 Understand the safety measures for operating a cutting machine
- 4.1.4 Choose personal protective devices
- 4.1.5 Classify Fire & choose appropriate fire extinguishers
- 4.1.6 Understand the importance of Green printing

Unit 2

4.2 Conventional Binding

- 4.2.1 Understand and define binding
- 4.2.2 Classify different methods of binding
- 4.2.3 Understand the styles of binding
- 4.2.4 List the different steps involved in the binding process
- 4.2.5 Understand different Covering and finishing operations

Unit 3

4.3 Modern Finishing Operations

- 4.3.1 Understand and demonstrate the operation of a paper cutting machine
- 4.3.2 Categorise Folding operations
- 4.3.3 Understand Other finishing operations
- 4.3.4 List out various methods of binding

Unit 4

4.4 Packaging

- 4.4.1 Define and understand the importance of packaging
- 4.4.3 Understand the fundamentals of Packaging design
- 4.4.4 List out the different materials used in the packaging industry
- 4.4.5 Classify Cartons based on its style and construct a Packaging Die

Unit 5

4.5 Basic Engineering

- 4.5.1 Distinguish between Direct Current and Alternating Current
- 4.5.2 Understand the working of motors and transformers

- 4.5.3 Understand a Basic Electronic Circuit
- 4.5.4 Understand Mechanical components
- 4.5.5 Understand the principle of hydraulics and pneumatics
- 4.5.6 Categorise the Mechanical, Electrical, Electronic and Pneumatic parts of a printing machine

Unit 6

4.6 Engineering Graphics

- 4.6.1 Handle drawing instruments and understand its uses
 - 4.6.2 Distinguish between different types of lines and understand its applications
 - 4.6.3 Do proper lettering and numbering while preparing drawing sheets
 - 4.6.4 Use proper dimensioning method
 - 4.6.6 Understand the projection of points, lines, planes
 - 4.6.8 Draw basic sectional view of an object
 - 4.6.9 Draw auxilliary views
 - 4.6.10 Draw isometric views
 - 4.6.11 Understand machine drawing
- Module I : Graphic Designing and DTP (Theory)



Course structure

The course is designed in four modules of six month each as detailed below.

1. Graphic Designing and DTP
2. Digital Pre-press and Printing
3. Offset and Modern Printing Techniques
4. Binding and Packaging

Module 3 Name of Module : Offset and Modern Printing Techniques

<i>Unit No.</i>	<i>Name of Units</i>	<i>Period</i>
3.1	Printing Materials	22
3.2	Sheetfed Offset Press	25
3.3	Offset Press Operations	20
3.4	Web Offset Press	13
3.5	Press maintenance and Troubleshooting	20
3.6	Flexo and Gravure	28
3.7	Screen Printing	18

Module 4 Name of Module : Binding and Packaging

<i>Unit No.</i>	<i>Name of Units</i>	<i>Period</i>
4.1	Safety and Health	15
4.2	Conventional Binding	13
4.3	Modern Finishing Operations	10
4.4	Packaging	13
4.5	Basic Engineering	15
4.6	Engineering Graphics	28

SYLLUBUS

MODULE 3

Offset and Modern Printing Techniques Syllabus

Unit 1

3.1 Printing Materials

3.1.1 Paper - Brief history of Paper

Origin of paper from papyrus

Handmade paper

Machine made paper

3.1.1 Paper making process

Raw materials for paper making

Pulping, Treating the pulp, Manufacturing paper using Fordrinier Paper Machine

3.1.2 Physical properties of paper

Grain, Dimensional stability, fiber strength, finishing, pick resistance, whiteness and brightness, substance weight, flatness, squareness, ink drying, moisture absorbancy, opacity

3.1.3 Paper classification, paper sizes & paper weight

Coated paper, Card, board

Business paper (Bond paper, carbon paper)

Book paper (offset paper - uncoated, coated, text paper)

Cover paper, Bristol paper

Utility paper (Newsprint, label paper, synthetic paper, mineral paper)

ISO/International sizes

Conventional paper sizes

GSM

Basis weight

M-weight

Conversion of GSM to basis weight

3.1.4 Estimating Paper Quantity

Cancellation method for calculating the greatest no. of sheets that can be cut from a single, full size sheet

Eg: Paper size - 11 X 17

Card size - 5 X 8

Cancellation method

11 X 17 11 X 17

5 X 8 8 X 5

2 X 2 = 4 1 X 3 = 3

Paper Calculation

3.1.5 Storage of paper / warehousing

Web offset roll storage

3.1.6 Ink - Ingredients, Properties and Manufacturing

Pigment, Vehicle, Additives

Ink body, viscosity, length, tack, opacity, colour strength, ink stability, drying time, abrasion resistance

Mixing, milling

3.1.7 Ink drying methods

Oxidation, evaporation, precipitation, penetration, polymerisation, radiation curing

3.1.8 Types of Ink

Sheetfed ink, rubberbased ink, web offset heatset inks, weboffset coldset inks, news inks,

non-porous inks, uv inks, magnetic inks, invisible inks, soy inks, opaque inks, waterless inks, fluorescent inks, metallic inks, overprint varnishes, toner ink, optically variable inks

3.1.9 Chemicals used in Printing

- Dampening solution
 - Water
 - Acid (measuring pH, conductivity)
 - Gum arabic
 - Wetting agents
 - Corrosion inhibitors
 - Anti foaming agents
 - Fungicides and drying stimulators
 - Alcohol dampening solution
- Dampening covers
- Other press room chemicals

Unit 2

3.2 Sheetfed Offset Press

3.2.1 Press classification

- Duplicators and Presses
- Sheetfed Presses
- Webfed Presses
- Multicolour Presses
- Perfecting Presses
- Waterless offset Presses
- Digital Offset Presses

3.2.2 Working Principle and Operating Units of an Offset machine

Feeder Unit

- Successive sheet feeding, Continuous feeding, stream feeding
- Parts of feeding unit
(Pile feeder, pile board, pile height governor, blower, sucker, sheet separator)

Registration Unit

- Functions of registration unit
- Parts
(Double sheet detector, front lay, side lay, conveyor tape, running in wheels, two point guide system, three point guide system, transfer cylinder system)

Printing Unit

- Cylinder structure - undercut, bearer, gutter, cylinder body, drive gears, cylinder gap
- Cylinders - The plate cylinder - function
- Blanket cylinder - function
- Impression cylinder - function
- Grippers

Inking system

- Parts - Ink fountain, fountain tray, fountain roller, fountain blade, form roller, ink agitator, distributing roller, oscillating roller, ink feed control, remote ink control

Dampening system

- Parts of dampening unit
- Conventional dampening system, continuous dampening system, alcohol dampening system (advantages), roller covers
- Waterless offset, Advantages of waterless offset

Delivery Unit

Gravity delivery
Chain delivery
Parts of delivery unit
(Delivery pile, delivery chains, skeleton wheels, joggers, ancillary units - anti set off spray
etc.)

Ancillary units

3.2.3 Offset Blanket

Structure of an offset blanket

Conventional blankets

Compressible blankets

Under blankets

Hardness of blanket (shore hardness, shoredurometer)

Types of blanket

a) based on hardness (hard, soft, medium, sandwich, special)

b) 1 Ply, 2 Ply, 3 Ply, 4 Ply blankets

Properties of a blanket

Storage of blanket

Unit 3

3.3 Offset Press Operations

3.3.1 Pre-make ready and Make ready Procedure

Preparing the inking unit

Preparing the dampening unit

Attaching the plate

Semi auto plate loading

Auto plate loading

Preparing the feeding unit and registration unit

(Feeding steps)

Setting the delivery unit

Feeding the test sheets

Checking the test sheets

3.3.2 Cylinder and roller pressure

3.3.3 Multi colour printing

3.3.4 Sequence of printing

3.3.5 Leading Offset machine manufacturers

International

Heidelberg, Komori, Mitsubishi, Ryobi, Fuji, AB Dick

Indian

HMT, Manugraph, Orient, Optima, Autoprint

3.3.6 Automation in print production

Automatic wash-up, auto plate loading

3.3.7 Estimation procedure in offset printing

Calculating Production cost

Quotations

Job ticket / work order

Unit 4

3.4 Web Offset Press

3.4.1 Types of web offset press designs

Perfecting / blanket to blanket
Inline presses
Stack / Tower Presses
Common impression cylinder presses (Satellite units)

3.4.2 Web operations

Roll stand, Splicer, Festoon, Tension control, Web guide, Dryer, Chill roller, Flying paster, Zero speed paster, Web break detectors, Image alignment and register, Printing unit, Adjustment, Ink drying systems, Filtration system, Dampening system

3.4.3 Inline finishing

Combination folding, inline stitching, single knife rotary die cutter, three knife trimmer, numbering tower, pattern perforators, pattern gluer

3.4.4 Web offset printing papers

3.4.5 Press console

Unit 5

3.5 Press maintenance and Troubleshooting

3.5.1 Paper problems

Electrostatic charge on paper, Crease formation, Picking

3.5.2 Ink problems

Emulsification, Slow ink drying, chalking, Hickies, Piling

3.5.3 Printing problems

Blinding, Ghosting, Mis-registration, Mottling, Plate ware, Scum, Sett-off, Sluring, Tinting

3.5.4 Problems due to blanket and rollers

Glazing, Swelling, Paper sticking,

3.5.6 Preventive maintenance

3.5.7 Cleaning and caring the press

3.5.8 Quality Control in offset

Remote control press console, Plate image scanners, Magnifying glass, Colour viewer, Densitometer, Spectrophotometer, Colourimeter, Colour bar, Dot gain scale, Slur gauge, Register marks, Star Target, Gray balance patch

Unit 6

3.6 Flexo and Gravure

3.6.1 Flexography - Introduction

3.6.2 Advantages

Cylinder make ready, packaging application

3.6.3 Basic units

Infeed unit and unwinding unit

Printing unit

Components : Plate, fountain roller, anilox roller, printing and impression cylinder, reverse angle doctor blade, two roller and three roller inking system

Outfeed unit and rewinding unit

3.6.4 Flexographic plates

Rubber stereo plates

Photopolymer plates (sheet, liquid)

3.6.5 Plate making process

Laser plates

3.6.6 Press types

Stack press

Central impression cylinder

Inline press

3.6.7 Flexographic ink & substrates

3.6.8 Gravure Printing - Introduction

3.6.9 Advantages and disadvantages

3.6.10 Gravure printing units

Gravure printing cylinder

Impression cylinder

Ink duct

Doctor blade

Electrostatic assist

3.6.11 Cylinder preparation methods

Chemical engraving method

Electromechanical method

Laser beam engraving

3.6.12 Ink and substrates

3.6.13 Security Printing

Introduction to security printing -
definition, goal of security printing, various printing methods used for security printing

Security features

Watermark, security thread, latent image, micro lettering, see through register

Security ink, Numbering with MICR ink, Security paper

Currency printing, Cheque printing

Holograms

Hologram types

Holographic patterned foils

Three dimensional holograms

Multiple plane holograms

Stereograms

Bar codes, QR codes

Unit 7

3.7 Screen Printing

3.7.1 Applications of Screen Printing

3.7.2 Screen Printing Process

Squeegee, screen printing inks, solvents, drying system

3.7.3 Screen frames and Fabrics

Frame materials, print size

Fabric strength, mesh count, types of fabrics

3.7.4 Stencil preparation

Hand cut stencils, Tusche and glue stencils, photographic stencils

3.7.5 Substrates for screen printing

3.7.6 Automation in screen printing

Lever action hand operated presses

Semi automatic presses

Fully automatic presses

3.7.7 Special screen printing applications

Cylindrical screens

Screen printing on cylindrical surfaces

MODULE 4

Binding and Packaging

Unit 1

4.1 Safety and Health

4.1.1 Safety regulations

- Mechanical hazards
- Chemical hazards
- Noise hazards
- Fire hazards
- Light hazards

4.1.2 Safety guards in an offset machine

Mechanisms that cause serious physical injury in a printing machine (spinning rollers, rotary chains and sprockets, turning gear, running belt)
Emergency stop buttons, feeder guards, registration board guard, cylinder guards, delivery guards

4.1.3 Safety measures for operating a cutting machine

4.1.4 Personal protective devices

Ear protection devices, eye protection devices, respiratory protection devices, skin protective devices

4.1.5 Fire classifications & Fire extinguishers

Class A, Class B, Class C, Class D

4.1.6 Green printing

- Eco-friendly paper
 - Recycled paper (Steps in recycled paper production)
 - Logos of recyclable and recycled paper
 - Paper made with alternative chemicals (Acid free paper, Alkaline paper, ECF bleaching, TCF bleaching, Oxygen delignification)
 - Wood free paper
- Bio degradable substrates
- Low VOC inks - Vegetable inks (soy ink)
- Re-manufactured cartridges
- Soft proofs
- Use of renewable energy resources in printing

Unit 2

4.2 Conventional binding

4.2.1 Introduction & Definition

4.2.2 Classification of binding

- Letterpress binding
 - Publishers, Library, Miscellaneous binding, Extra letterpress binding
- Stationery binding
 - Office stationery, Manifold, Account book binding, Exercise note book binding

4.2.3 Styles of binding

Paper board, Cut flesh, Quarter cloth turned in, Half cloth, Full cloth, Quarter leather, Half

leather, Full leather

4.2.4 Materials for Book binding

Board, Adhesives

4.2.5 Steps in Binding

Warehousing

Counting, Jogging, Pressing, Folding (signature), Smashing and Bundling, Gathering, Collating, Stitching, Sewing (types of sewing - Ordinary, Flexible sewing, Machine sewing, Hand sewing, Double flexible sewing- kettle stitch, tape sewing, sawn in sewing) Overcasting

Forwarding

End papers, Glueing, Edge cutting, Rounding, Backing, Edge decoration, Head banding and lining the back.

4.2.6 Covering and finishing

Paring leather, Pasting the cover, Drawing on, Turning in, Setting the joints, Setting the caps, Nipping up, Tying up, Opening up, Filling in, Siding, Pasting down open, Library

Unit 3

4.3 Modern Finishing Operations

4.3.1 Cutting (paper cutting machine)

Guillotine cutter, Three knife cutter

4.3.2 Folding operations

Types of foldres

4.3.3 Other finishing operations

Perforation, Slitting, Creasing and scoring, Die cutting, Embossing, Stamping, Numbering, Punching and drilling, Varnishing, Lamination, Foil stamping, Thermography

4.3.4 Binding

Pamphlet binding, Edition binding, Perfect binding, Mechanical binding, Plastic comb binding, Spiral Binding.

Unit 4

4.4 Packaging

4.4.1 Defenition and functions of packaging

Packaging for communication

Objectives of packaging

4.4.2 Design fundamentals of Packaging

Packaging design principles

Typography and packaging design

Packaging design and colour

Images for packaging

4.4.3 Materials for packaging

Metal- Aluminium, Tin

Paper- Paper board, Corrugated paper board, Set up box

Plastic- Low density poly ethylene (LDPE), High density poly ethylene (HDPE), Poly ethylene terephthalate (PET), Poly propylene, Poly styrene (PS), Blister packs, Glass, Metal, Cans, Tubes, Flexible packing, Labels, Closures, Stock packaging

Glass

Special Packages- Blister packs, Bubble wrap, Shrink wrap,

4.4.4 Carton styles and Packaging Die

Four pannel style box, Folding cartons, Straight tuck end , Reverse tuck end, Full seal

end, Automatic lock bottom, Snap lock bottom, Tray style boxes, Seal end, Set-up boxes
Die making process

4.4.4 Packaging Die

Unit 5

4.5 Basic Engineering

4.5.1 Direct current and Alternating current

4.5.2 Motors and Transformers

4.5.3 Basic Electronic Circuit

4.5.4 Mechanical components

4.5.5 Hydraulics and Pneumatics

4.5.6 Mechanical, Electrical, Electronic and Pneumatic parts of a printing machine

Unit 6

4.6 Engineering Graphics

4.6.1 Drawing instruments and uses

4.6.2 Lines - Different types and its applications

4.6.3 Lettering and numbering

4.6.4 Dimensioning

4.6.5 Construction of basic shapes - polygon, conic section, spiral curve

4.6.6 Introduction of projection of points, lines, planes

4.6.7 Quadrants and objects in different quadrants

4.6.8 Basic section views

4.6.9 Auxilliary views

4.6.10 Isometric views

4.6.11 Introduction to machine drawing

LEARNING OUTCOMES

Module 3

Unit 1

3.1 Printing Materials

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3.1.8 Categorise different types of Ink

3.1.9 Identify the chemicals used in Printing

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Unit 4

3.4 Web Offset Press

- 3.4.1 Categorise web offset presses based on its design
- 3.4.2 Demonstrate the operation of a web offset machine
- 3.4.3 Understand the Inline finishing methods in a web offset machine
- 3.4.4 Identify different types of printing papers used in a Web offset press
- 3.4.5 Understand the working of a press console

Unit 5

3.5 Press maintenance and Troubleshooting

- 3.5.1 Identify Paper problems and suggest remedies
- 3.5.2 Identify Ink problems and suggest remedies
- 3.5.3 Identify printing problems and suggest remedies
- 3.5.4 Identify problems due to blanket and rollers and suggest remedies
- 3.5.5 Identify problems due to incorrect cylinder pressure and suggest remedies
- 3.5.6 Understand the importance of preventive maintenance
- 3.5.7 Demonstrate cleaning and caring the press
- 3.5.8 Understand the importance of Quality Control Devices in quality printing

Unit 6

3.6 Flexo and Gravure

- 3.6.1 Understand the process of Flexography
- 3.6.2 List out the advantages of flexography
- 3.6.3 Identify the Basic units of a flexo printing machine
- 3.6.4 Classify Flexographic plates

- 3.6.5 Demonstrate Plate making process in flexography
- 3.6.6 Categorise different types of flexo Press
- 3.6.7 List out various types of ink & substrate used in flexography
- 3.6.8 Understand the process of Gravure Printing
- 3.6.9 List out the advantages and disadvantages of gravure printing process
- 3.6.10 Understand the working of the printing unit of a gravure press
- 3.6.11 Understand the methods of preparation of gravure cylinders
- 3.6.12 Discuss the different types of Ink and substrates used in gravure process
- 3.6.13 Understand the importance and advantages of Security Printing

Unit 7

3.7 Screen Printing

- 3.7.1 Understand the applications of Screen Printing
- 3.7.2 Demonstrate the Screen Printing Process
- 3.7.3 Understand various types of Screen frames and Fabrics
- 3.7.4 Demonstrate the preparation of Stencil for screen printing
- 3.7.5 List out the substrates for screen printing
- 3.7.6 Understand the automation in screen printing process
- 3.7.7 Understand the special applications of screen printing process

Module 4

Unit 1

4.1 Safety and Health

- 4.1.1 Understand the Safety regulations related to printing industry
- 4.1.2 Understand the importance of Safety guards in an offset machine
- 4.1.3 Understand the safety measures for operating a cutting machine
- 4.1.4 Choose personal protective devices
- 4.1.5 Classify Fire & choose appropriate fire extinguishers
- 4.1.6 Understand the importance of Green printing

Unit 2

4.2 Conventional Binding

- 4.2.1 Understand and define binding

- 4.2.2 Classify different methods of binding
- 4.2.3 Understand the styles of binding
- 4.2.4 List the different steps involved in the binding process
- 4.2.5 Understand different Covering and finishing operations

Unit 3

4.3 Modern Finishing Operations

- 4.3.1 Understand and demonstrate the operation of a paper cutting machine
- 4.3.2 Categorise Folding operations
- 4.3.3 Understand Other finishing operations
- 4.3.4 List out various methods of binding

Unit 4

4.4 Packaging

- 4.4.1 Define and understand the importance of packaging
- 4.4.3 Understand the fundamentals of Packaging design
- 4.4.4 List out the different materials used in the packaging industry
- 4.4.5 Classify Cartons based on its style and construct a Packaging Die

Unit 5

4.5 Basic Engineering

- 4.5.1 Distinguish between Direct Current and Alternating Current
- 4.5.2 Understand the working of motors and transformers
- 4.5.3 Understand a Basic Electronic Circuit
- 4.5.4 Understand Mechanical components
- 4.5.5 Understand the principle of hydraulics and pneumatics
- 4.5.6 Categorise the Mechanical, Electrical, Electronic and Pneumatic parts of a printing machine

Unit 6

4.6 Engineering Graphics

- 4.6.1 Handle drawing instruments and understand its uses
- 4.6.2 Distinguish between different types of lines and understand its applications
- 4.6.3 Do proper lettering and numbering while preparing drawing sheets
- 4.6.4 Use proper dimensioning method
- 4.6.6 Understand the projection of points, lines, planes
- 4.6.8 Draw basic sectional view of an object
- 4.6.9 Draw auxilliary views

Scheme of Works

Sl. No.	Month	Units Covered in the Month	Periods
1	June	Printing Materials	22
2	July	Sheetfed Offset Press	25
3	August	Offset Press Operations	20
4	September	Web Offset Press	13
5	October	Press maintenance and Troubleshooting	20
6		Flexo and Gravure	33
7		Screen Printing	18
		TOTAL	105

Module I : Graphic Designing and DTP (Practical)

Sl. No.	Month	Units Covered in the Month	Periods
1	June/July		
2	July		
3	July/August /September		
4	October		
		TOTAL	235

Module II: Digital Pre Press and Printing (Theory)

Sl. No.	Month	Units Covered in the Month	Periods
1	November	Safety and Health	15
2	November	Conventional Binding	13
3	December	Modern Finishing Operations	10
4	December	Packaging	13
5	January	Basic Engineering	15
6		Engineering Graphics	28
		TOTAL	105

Module II: Digital Pre Press and Printing (Practical)

Sl. No.	Month	Units Covered in the Month	Periods
1	November		
2	November		
3	November/ December		
4	December		
5	December/ January		
TOTAL			235

Structure of Module 3

Name of Module : Offset and Modern Printing Techniques

<i>Unit No.</i>	<i>Name of Units</i>
3.1	Printing Materials
3.2	Sheetfed Offset Press
3.3	Offset Press Operations
3.4	Web Offset Press
3.5	Press maintenance and Troubleshooting
3.6	Flexo and Gravure
3.7	Screen Printing

Structure of Module 4

Name of Module : Binding and Packaging

<i>Unit No.</i>	<i>Name of Units</i>
4.1	Safety and Health
4.2	Conventional Binding
4.3	Modern Finishing Operations
4.4	Packaging
4.5	Basic Engineering
4.6	Engineering Graphics

Classroom Activities

Module 3

1. Student should make a presentation about different press room chemicals and its contents.
2. Prepare a chart showing the list of major paper mills in India and abroad along with the names of their popular bands.
3. Make a drawing of plate, blanket and impression cylinders as well as form rollers ink and dampening system in the practical record. Label these components and add arrows showing the direction of rotation.
4. Draw a schematic diagram of the inking unit of an offset press and label the different rollers in the practical record.
5. Draw a schematic diagram of Conventional dampening unit and mark its parts in the practical record.
6. Calculate the press cost to print 18000 posters of 11'x17" size printed in two colours on one side on 100 GSM art paper which costs Rs. 2500 per ream of 23" x 18" basic sheet size. The print area of the machine is 24" x 18.5". (Assume cost for one exposed plate is Rs 350 and Printing cost for 1000 impressions for one colour is Rs. 250).
7. Draw a schematic diagram of web-offset machine and mark its parts.
8. Different quality control devices and its applications.
9. Collect samples of plastic bags that have been printed by flexographic process colour method and check the colour register. Write your observation.
10. Select 10 major magazines and determine if any of them are printed by the gravure process.
11. Identify 5 products that have been printed by gravure process.
12. List out and compare the security features provided in different currency notes and bank cheques.
13. Collect different samples of holograms which are used in day-to-day life.
14. In your lab record draw diagrams of flexographic inking system (two roller & three roller) and mark its parts.
15. Prepare a diagrammatic representation of different steps in producing a flexographic rubber plate.
16. List out the security presses in India.
17. Assignment on latest developments in screen printing.
18. Project work - single colour and two colour screen printing on various substrates.

Module4

1. Assignment: Prepare a presentation on different classes of fire that is likely to occur in an offset press.
2. Prepare a chart on different personal protective devices used in the printing industry.
3. Collect samples of recycled paper.
4. Prepare a chart showing various renewable energy resources in printing.
5. Prepare a Notebook using flexible sewing method.
6. Prepare an Account book using cord sewing method in half cloth style binding.
7. Prepare a file board and a writing board.
8. Prepare a note pad in A5 size with paper back cover.

9. Prepare a chart showing different types of end papers.
10. Collect samples of printed products processed with
 - a) embossing
 - b) die cutting
 - c) foil stamping
 - d) lamination
 - e) numbering
 - f) slitting
11. Identify male and female dies used for embossing
12. Distinguish between creasing rule and cutting rule.
13. Collect samples for different styles of cartons.
14. Prepare a carton for the given product.
15. Collect samples for special packages like a blister pack, a shrink wrapper, a bubble wrap etc.
16. Prepare a set up box for a Necklace.
17. Collect ten types of packages made of different materials.
18. Collect various electronic components like resistors, capacitors, diodes, transistors, IC chips.
19. Prepare a chart of various kinds of mechanical, electrical, electronic and pneumatic parts of an offset machine.
20. Collect any four types of gears from your old toys.
21. Identify various types of DC and AC motors used in your home or printing lab.

Practical Activity

3.1 Printing Materials

Paper

1. Collect different kinds of paper.
2. Find out the GSM of a given paper sample.
3. Collect different size of paper (Conventional and International paper sizes).
4. Collect different types of cover paper.
5. Identify various kinds of paper and boards used for different printing jobs such as notice, cover printing, visiting card, envelope and packaging industry
6. Paper calculation method for sheets, boards and reel.
7. Different paper testing methods
 - Curl test
 - Grain direction test
 - GSM test
 - Moisture content test of paper
 - Paper smoothness test
 - Roughness test
 - Gloss test
8. List out the paper warehousing methods.

Ink

1. Use of various types of inks on different types of paper.
2. Ink mixing processes.
3. Ink calculation method.
4. Ink testing methods.

Chemicals in Printing

1. Prepare an ideal dampening solution.
2. Measure the pH and conductivity of dampening solution.
3. Use of image removers on a printing plate.
4. Use of blanket lift in press room.

3.1 Printing Materials

1. Functioning of different units of a sheet-fed offset press.
2. Identify different parts of sheet-fed offset printing machine.
3. Dampening cover fixing.
4. Identify different types of blanket.
5. Blanket fixing

3.3 Offset Press Operations

1. Perform paper feeding steps
2. Control the registration
3. Plate loading
4. Setting of Inking and dampening units
5. Setting of delivery unit
6. Estimation for a printing job.

3.5 Press maintenance and Troubleshooting

1. Identify different paper problems, printing problems, blanket problems and ink problem and provide the solutions for each.
2. Press maintenance and clean up procedure.
3. Handling of different quality control devices.

3.6 Flexo and Gravure

1. Preparation of flexographic rubber plate in your plate making unit.
2. Distinguish between offset, flexographic and gravure ink from the collected samples.
3. Generate a barcode for a particular item in your computer and list out its features.
4. Generate and read a QR code for an address using smart phone QR code application.

3.7 Screen Printing

1. Stencil preparation using different photographic methods.
2. Prepare an invitation card using screen printing technique.
3. Identify basic shapes of squeegee blades available in your lab.
4. Identify the chemicals used in screen printing.

Module 4

Binding and Packaging

4.1 Safety and Health

1. Identify the different safety guards and safety button on the HMT offset printing machine in your lab.
2. Identify the possible circumstances of fire in your printing lab and take appropriate measures to prevent it.

4.2 Conventional Binding

1. Letterpress binding
2. Stationery binding.
3. Different types of sewing
 - a) Cord sewing (Sawn-in-sewing)
 - b) Tape sewing
 - c) Overcast sewing
 - d) Flexible and double flexible sewing
4. Case binding

4.3 Modern Finishing Operations

1. Perforation
2. Numbering
3. Spiral binding
4. Plastic comb binding
5. Case binding
6. Wire stitching

4.4 Packaging

1. Prepare a carton with the given measurements.
Length - 9 cm width- 5 cm depth - 5 cm.
2. Prepare the drawing for the carton die of the above project.
3. Draw the picture of a STE/ RTE/ FSE carton and label the various parts of it in your practical record book.

4.5 Basic Engineering

1. List out the different mechanical parts in an offset machine.

4.6 Engineering Graphics

1. Drawing an equilateral triangle (given the length of one side)
2. Draw a triangle with T-square and set-square only
3. Draw a rectangle of given length and breath as per the procedure.
4. Draw a pentagon of a given side (say a 35mm side)
5. Draw an ellipse of major axis 80 mm and minor axis 50mm in concentric circles method
6. Draw the isometric drawing of a rectangular prism

Overview of Module 3

Offset and Modern Printing Techniques

Printing industry has seen immense technological growth and changes in the past 20 years. Electronics and computers have completely changed the the complexion of the industry. Most manual process has been eleminated in the printing process. . The smallest offset duplicators to the largest web offset use computer technology to run, monitor, and adjust everything from ink density to web tension. The advances and improvements, along with the conventional methods, have made offset lithography a mature combination of process and techniques.

There are many career and business oppurtunities for those who have necessary skills and educational background. This module has been designed and organized to teach you about offset printing materials, offset printing methods and other modern printing methods such as flexography, gravure and security printing. The practical activities of this module integrates the academic concepts with technical applications and work place approach.

Unit 1- Printing Materials

About the unit

Paper, ink, and various chemicals are the major consumables used in the printing industry. In this unit a detailed study on paper manufacture, physical properties of paper, its classification and uses, ink manufacture, ingredients of ink, ink properties, ink drying methods and properties of various chemicals especially dampening solution are discussed.

Ideas/Concepts/ Skill	Learning Outcomes	Suggested Activities	Assessment
3.1.1 Brief history of Paper Paper making process	Summarise various steps involved in Paper making process	Assignment on history and origin of paper. Multi-media presentation on paper making.	Assignment (activity log) Skill in interpretation of multi-presentation
3.1.2 Physical properties of paper	Identify the Physical properties of paper	Charting the physical properties of paper.	Chart
3.1.3 Paper classification, paper sizes & paper weight	Classify Paper according to its types, sizes & paper weight	Data analysis.	Participation, discussion, sample collection
3.1.4 Estimating Paper Quantity	Estimate the quantity of Paper required for printing a work	Solving numerical problems in paper calculation.	Numerical problems
3.1.5 Storage of paper / warehousing	Understand Storage of paper / warehousing	Sample demonstration of stored paper in lab.	Report.
3.1.6 Ink - Ingredients, Properties and Manufacturing	List the Ingredients of ink, its Properties and the steps in manufacturing of ink	ICT presentation on ink.	Oral assesment
3.1.7 Ink drying methods	Categorise the methods of Ink drying	Seminar	Seminar report, presentation skill.
3.1.8 Types of Ink	Categorise different types of Ink	General dicussion on types of ink.	Chart.
3.1.9 Chemicals used in Printing	Identify the chemicals used in Printing	Demonstraion of press-room chemicals	Practical skill.

Unit 2 - Sheetfed Offset Press

About the unit

A printing press is a machine that transfers an image from some sort of plate or image carrier to a substrate such as paper. Basically the presses are classified as sheet-fed and Web-fed presses. Four units make a printing press. They are feeding unit, registration unit, printing unit, and delivery unit. To print an acceptable finished product, all of the units must be properly adjusted. In this unit we will discuss in detail about different units of sheet-fed offset press and its working.

Ideas/Concepts/ Skill	Learning Outcomes	Suggested Activities	Assessment
3.2.1 Press classification	Classify presses based on various aspects	General discussion	Short notes
3.2.2 Working Principle and Operating Units of an Offset machine Feeder Unit Registration Unit Printing Unit Inking system Dampening system Delivery Unit	Operate different units of an Offset machine	Demonstration of different units of offset machine, Charts illustrating different units.	Performance assesment, activity log`
3.2.3 Offset Blanket	Understand the structure and properties of offset blankets	Exhibit a sample blanket, General discussion	

Unit 3

Offset Press Operations

About the unit

The purpose of this unit is to deal with fundamental understandings that will enable the students to run any offset duplicator or sheet-fed press after a review of manufactures operating manual. The operating procedure for running a press include mounting the plate, achieving smooth paper feeding and delivery, controlling ink and dampening solution, adjusting the image as needed, and cleaning the press at the end of the run. This unit also provides information about leading press manufacturers. The last section of this unit deals with the factors affecting the cost of a printing job and estimation

Ideas/Concepts/ Skill	Learning Outcomes	Suggested Activities	Assessment
3.3.1 Pre-make ready and Make ready Procedure Feeding steps	Demonstrate the Make ready Procedure	Chart the operations	Chart
3.3.2 Cylinder and roller pressure	Identify problems due to incorrect cylinder pressure and suggest remedies	Discussion	Participation
3.3.3 Multi colour printing	To understand the working of a multi colour sheet fed offset machine	Domonstration	Participation
3.3.4 Sequence of printing	To understand about sequence of colours in multicolour printing	Discussion	Participation
3.3.5 Leading Offset machine manufacturers	List the leading manu- facturers of Offset machines	Chart preparation	Chart
3.3.6 Automation in print production		Multi-media presentation	Report and short notes
3.3.7 Estimation procedure in offset printing	Estimate the cost of production of a printing job in offset printing	Problem solving	Nuemerial prob- lems

Unit 4

Web Offset Press

About the unit

Web offset presses feed from roll or web of paper instead of individual sheet. The term webfed is commonly used to distinguish these presses from sheet fed presses. They are extremely fast. For this reason they are typically used for long run works. Large daily newspapers are printed on web press. An advantage of web press is that finishing operations can be performed inline. A variety of finishing operations like folding can be incorporated into the press run. Web presses produce medium run newspapers, magazines, business forms, mail order catalogues, gift wrappings, books, inserts, and all type of commercial printing.

Ideas/Concepts/ Skill	Learning Outcomes	Suggested Activities	Assessment
3.4.1 Types of web offset press designs	Categorise web offset presses based on its design	Group discussion	Participation
3.4.2 Web operations	Demonstrate the operation of a web offset machine	ICT presentation	Activiy log
3.4.3 Inline finishing	Understand the Inline finishing methods in a web offset machine	Feild visit	Report
3.4.4 Web offset printing papers	Identify different types of printing papers used in a Web offset press	Discussion and demonstration	Short note
3.4.5 Press console	Understand the working of a press console	Feild visit	Report

Unit 5

Press maintenance and Troubleshooting

About the unit

During offset press operation, when a problem arise the operators skill set includes the ability to examine the problem and methodically identify the cause-poor paper, excessive dampening solution, inadequate roller pressure, etc. What ever the cause the operator is counted on to systematically isolate and eliminate it. At this point the students learn about basic press maintenance methods and trouble shooting techniques.

Ideas/Concepts/ Skill	Learning Outcomes	Suggested Activities	Assessment
3.5.1 Paper problems	Identify Paper problems and suggest remedies	Sample collection	Portfolio
3.5.2 Ink problems	Identify Ink problems and suggest remedies	Sample collection	Portfolio
3.5.3 Printing problems	Identify printing problems and suggest remedies	Sample collection	Portfolio
3.5.4 Problems due to blanket and rollers	Identify problems due to blanket and rollers and suggest remedies	Sample collection	Portfolio
3.5.6 Preventive maintenance	Understand the importance of preventive maintenance	Demonstration and experimentation	Skill
3.5.7 Cleaning and caring the press	Demonstrate cleaning and caring the press	Demonstration and experimentation	Skill
3.5.8 Quality Control in offset	Understand the importance of Quality Control Devices in quality printing	Work sheet	Portfolio

Unit 6

Flexo and Gravure

About the unit

This unit introduces two printing processes which are being increasingly important in the printing industry. Flexography, the first process we will discuss, has long been a significant relief process used in packaging industry. Gravure, the second process is an intaglio printing process which is widely used for high quality long run jobs and for security printing purposes.

Ideas/Concepts/ Skill	Learning Outcomes	Suggested Activities	Assessment
3.6.1 Flexography - Introduction	Understand the process of Flexography	Discussion	Activity log
3.6.2 Advantages	List out the advantages of flexography	Assignment	Activity log
3.6.3 Basic units	Identify the Basic units of a flexo printing machine	Discussion	Activity log
3.6.4 Flexographic plates	Classify Flexographic plates	Demonstration	Short notes
3.6.5 Plate making process	Demonstrate Plate making process in flexography	Field visit	Report
3.6.6 Press types	Categorise different types of flexo Press	Short note	Short note
3.6.7 Flexographic ink & substrates	List out various types of ink & substrate used in flexography	Short note	Short note
3.6.8 Gravure Printing - Introduction	Understand the process of Gravure Printing	Discussion	Participation
3.6.9 Advantages and disadvantages	List out the advantages and disadvantages of gravure printing process	Data analysis	Participation
3.6.10 Gravure printing units	Understand the working of the printing unit of a gravure press	Demonstrate	Participation
3.6.11 Cylinder preparation methods	Understand the methods of preparation of gravure cylinders	Assignment	Activity log
3.6.12 Ink and substrates	Discuss the different types of Ink and substrates used in gravure process	Work sheet	Work sheet
3.6.13 Security Printing	Understand the importance and advantages of Security Printing	Sample presentation	Portfolio

Unit 7

Screen Printing

About the unit

Of the all major printing processes this porous printing process is undoubtedly the oldest, simplest and inexpensive. Modern screen printing developed in 1940's and 50's. Rapid technological advances continue to improve the process and lead to expanded market. In this unit we will discuss about this process in detail.

Ideas/Concepts/ Skill	Learning Outcomes	Suggested Activities	Assessment
3.7.1 Applications of Screen Printing	Understand the applications of Screen Printing	Making short notes	Short notes
3.7.2 Screen Printing Process	Demonstrate the Screen Printing Process	Demonstration	Skill
3.7.3 Screen frames and Fabrics	Understand various types of Screen frames and Fabrics	Sample presentation	Oral assesment
3.7.4 Stencil preparation	Demonstrate the preparation of Stencil for screen printing	Demonstration	Skill
3.7.5 Substrates for screen printing	List out the substrates for screen printing	Sample presentation	Participation
3.7.6 Automation in screen printing	Understand the automation in screen printing process	Model presentations	Model
3.7.7 Special screen printing applications	Understand the special applications of screen printing process	Short notes	Short notes

List of items in portfolio

- Printed ruled sheets for note book
- Printed inner pages for record book
- Multi color printed book cover
- Screen printed visiting cards
- Screen printed envelops
- Screen printed letter heads
- Screen printed carry bags
- Screen printed polythene bags

Assessment activities

- To cut the paper to different sizes
- To find the gsm of a particular paper
- To practice the ink mixing process
- To prepare dampening solution for printing
- To prepare the dampening unit and printing unit of a printing machine for printing
- To load a plate on a plate cylinder and to perform the makeready operations
- To print a given job
- To identify different printing, paper-related and ink-related problems
- To prepare a flexographic plate
- To prepare a stencil for screen printing and to print the given job

Overview of Module 4

Binding and Packaging

Once an image has been printed on a substrate, some form of binding and finishing is usually required. Binding is the process of joining together multiple pages of a printed product by various means including sewing, stapling, spiral wire and adhesives. Finishing includes various processes that enhance the final printed product. Some of the most common finishing operations include embossing, die-cutting, foil stamping, padding, lamination etc.

Packaging basically involves wrapping, strapping or boxing of various consumer products. In this module we go through various finishing operations and its application in our day-to-day life and about the importance of safety, health and eco-printing. In this module we have a unit that deals with basic engineering aspects of an offset machine and a unit that gives introduction to basic engineering drawing for the students.

Unit 1

Safety, Health and Green printing

About the Unit

Unsafe machines, work areas, and procedures are the cause of many accidents. Take time to inspect all equipments and work areas. When unsafe conditions exist, take immediate action to correct and eliminate them. Also manufacturers of printing supplies and equipment have to take the responsibility of developing new environmentally friendly technologies and materials. This unit acquaints the student with many issues and practices involved in advancing safety, health and Green printing in the work place.

Ideas/Concepts/ Skill	Learning Outcomes	Suggested Activities	Assessment
4.1.1 Safety regulations and hazards	Understand the Safety regulations related to printing industry	Discussion	Short notes
4.1.2 Safety guards in an offset machine	Understand the importance of Safety guards in an offset machine	Demonstration	Oral assessment
4.1.3 Safety measures for operating a cutting machine	Understand the safety measures for operating a cutting machine	Demonstration	Oral assessment
4.1.4 Personal protective devices	Choose personal protective devices	Demonstration	Activity log
4.1.5 Fire classifications & Fire extinguishers	Classify Fire & choose appropriate fire extinguishers	Assignment	Assignment
4.1.6 Green printing	Understand the importance of Green printing	Assignment	Short note

Unit 2

Conventional binding

About the Unit

The process of book binding has been a slow specialised craft until the 18th century. Modern book binding is mechanised for the most part. Paper back and threadless binding have suppressed the old fashion. Any way the conventional manual binding method is still relevant in the industry. Also it is important for our students to get a basic knowledge about this manual binding methods. This unit covers all the major aspects in binding that are conventionally followed.

Ideas/Concepts/ Skill	Learning Outcomes	Suggested Activities	Assessment
4.2.1 Introduction & Definition	Understand and define binding	Discussion	Participation
4.2.2 Classification of binding	Classify different methods of binding	Exhibition	Oral assesment
4.2.3 Styles of binding	Understand the styles of binding	Exhibition	Oral assesment
4.2.4 Materials for Book binding	Listing of different metials used for binding	Demonstration	Participation
4.2.5 Steps in binding	List the different steps involved in the binding process	Flow chart	Portfolio
4.2.6 Covering and finishing	Understand differ-ent covering and finishing operations	Demonstration	Short note

Unit 3

Modern Finishing Operations

About the Unit

After printing the product needs further operation to be finished. Two most common type of classification are finishing and binding. In the previous unit we have learnt about the binding operations. In this unit we study about all other operations that enhance the appearance of the printed products.

Ideas/Concepts/ Skill	Learning Outcomes	Suggested Activities	Assessment
4.3.1 Cutting (paper cutting machine)	Understand and demonstrate the operation of a paper cutting machine	Demonstration	Work sheet
4.3.2 Folding operations	Categorise Folding operations	Data analysis	Portfolio
4.3.3 Other finishing operations	Understand Other finishing operations	Album preparation	Activity log
4.3.4 Binding	List out various methods of binding	Demonstration	Presentation skill

Unit 4

Packaging

About the Unit

Packaging is a branch of printing industry which includes the production of hand made card boxes, machine made cartons manufacturing or flexible bags and craft paper bags, polythene and plastic bags, collapsible tubes for tooth pastes and balms, tin containers for powders and similar materials. The main purpose of packaging is protection of the contents. Packaging plays an important role in advertising. Packaging basically involves wrapping, strapping, or boxing various consumer products for delivery to the customer. This is highly specialised branch of printing profession which requires special equipments and highly skilled technicians. In this unit, you'll learn about the functions of packaging, including different materials used in the packaging industry.

Ideas/Concepts/ Skill	Learning Outcomes	Suggested Activities	Assessment
4.4.1 Defenition and functions of packaging	Define and understand the importance of packaging	Group discussion	Presentation skill
4.4.2 Design fundamentals of packaging	Understand the fundamentals of packaging design	Sample collection	Activity log
4.4.3 Materials for packaging	List out the different materials used in the packaging industry	Work sheet	Work sheet
4.4.4 Carton styles	Classify Cartons based on its style	Sample collection	Portfolio
4.4.5 Packaging Die	Construct a packaging die	Sketch	Portfolio

Unit 5

Basic Engineering

About the Unit

An understanding of simple electrical, electronic, mechanical and pneumatic components provides the background necessary to explore more complex system of components used in various equipment and machineries used in the printing industry.

Ideas/Concepts/ Skill	Learning Outcomes	Suggested Activities	Assessment
4.5.1 Direct current and Alternating current	Distinguish between Direct Current and Alternating Current	Data analysis	Portfolio
4.5.2 Motors and Transformers	Understand the working of motors and transformers	Demonstration	Skill
4.5.3 Basic Electronic Circuit	Understand a Basic Electronic Circuit	Chart presentation	Activity log
4.5.4 Mechanical components	Understand Mechanical components	Chart presentation	portfolio
4.5.5 Hydraulics and Pneumatics	Understand the principle of hydraulics and pneumatics	Assignment	Assignment
4.5.6 Mechanical, Electrical, Electronic and Pneumatic parts of a printing machine	Categorise the Mechanical, Electrical, Electronic and Pneumatic parts of a printing machine	Data analysis	Short note

Unit 6

Engineering Graphics

About the Unit

It is a graphical language that communicate ideas and information from one mind to another. One of the best way to communicate one's ideas is through some form of picture or drawing. This is especially true for an engineer. The purpose of this unit is to give you the basics of engineering sketching and drawing. We will treat "sketching" and "drawing" as one. "Sketching" generally means freehand drawing. "Drawing" usually means using drawing instruments from compasses to computers to bring precision to the drawings`

Ideas/Concepts/ Skill	Learning Outcomes	Suggested Activities	Assessment
4.6.1 Drawing instruments and uses	Handle drawing instruments and understand its uses	Demonstration	Participation
4.6.2 Lines - Different types and its applications	Distinguish between different types of lines and understand its applications	Analyse	Selection
4.6.3 Lettering and numbering	Do proper lettering and numbering while preparing drawing sheets	Sketch	Portfolio
4.6.4 Dimensioning	Use proper dimensioning method	Experimentation	Skill
4.6.5 Construction of basic shapes - polygon, conic section, spiral curve	Understand the projection of points, lines, planes	Model making	Models
4.6.6 Introduction of projection of points, lines, planes	Draw basic sectional view of an object	Sketch	Sketch
4.6.7 Quadrants and objects in different quadrants	Draw auxilliary views	Sketch	Sketch
4.6.8 Basic section views	Draw isometric views	Sketch	Sketch
4.6.9 Auxilliary views	Draw auxilliary views	Sketch	Sketch
4.6.10 Isometric views	Draw Isometric views	Sketch	Sketch
4.6.11 Introduction to	Discussion on 44	Project	Performance

List of items in portfolio

- Binded paper back note books
- Binded quater cloth note books
- Binded half cloth record books
- Prepare receipt books with numbering, perforation and stitching binding
- Prepare brochures with different types of folding
- Prepare saddle stitched, side stitched and spirral bound books
- Prepare a die drawing for a paper carton of specific size
- Prepare carton boxes of various styles.

Assessment activities

- To bind a note book
- To do quarter cloth, half cloth and full cloth binding
- To do flexible sewing, hand sewing, double flexible sewing, tape sewing and sawn in sewing
- To draw die for a carton with given specifications using coreldraw software
- To prepare different types of carton boxes

On Job Training

OJT or On the Job Training Programme forms an integral part of the vocational curriculum of VHSE in Kerala. It gives a good platform for students to learn the working condition and work culture. OJT help the learners to identify the skill needs of the industry. It is the place where the students acquire and polish their vocational skill. The students will be able to get familiarized with the administrative background of the institution where they undergo training, which will contribute the managerial skill in feature.

There are eleven govt. press, cooperative presses like KPBS, more than twenty leading newspaper publishers, and a numerous commercial offset printers all around kerala. VHSE schools with GDPT course can depend on these schools for conducting the OJT program.

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