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SCHEME & SYLLABUS FOR

Bachelor of Vocational Studies (B. Voc.) Printing Technology

NAAC GRADE B+ Accredited University | nirf RANKING 2024 Ranked in Top 151-200 Universities

Kalinga University, Naya Raipur, Chhattisgarh

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BACHELOR OF VOCATIONAL STUDIES (B. VOC.) PRINTING TECHNOLOGY

Semester I							
Code No.	**Paper**	**L**	**T/P**	**Credits**	**Internal Marks**	**End Semester Exam**	**Total Marks**
BVPT101	Communication Skills	3	0	3	30	70	100
BVPT102	Fundamentals of Information Technology	3	0	3	30	70	100
BVPT103	Offset Printing Technology	3	0	3	30	70	100
BVPT104	Ink Technology	3	0	3	30	70	100
BVPT105P	**On Job Training/ Internship/ Workshop**	0	36	18	50	150	200
Total		**12**	**36**	**30**	**170**	**430**	**600**

Semester II							
Code No.	**Paper**	**L**	**T/P**	**Credits**	**Internal Marks**	**End Semester Exam**	**Total Marks**
BVPT201	Basic Knowledge of Glass	3	0	3	30	70	100
BVPT202	Environmental Studies	3	0	3	30	70	100
BVPT203	Printing Material Science	3	0	3	30	70	100
BVPT204	Packaging Technology-I	3	0	3	30	70	100
BVPT205P	**On Job Training/ Internship/ Workshop**	0	36	18	50	150	200
Total		**12**	**36**	**30**	**170**	**430**	**600**

Semester III							
Code No.	**Paper**	**L**	**T/P**	**Credits**	**Internal Marks**	**End Semester Exam**	**Total Marks**
BVPT301	Digital Pre-press Technology	3	0	3	30	70	100
BVPT303	Gravure Printing Technology	3	0	3	30	70	100
BVPT303	Soft Skills and Personality Enhancement	3	0	3	30	70	100
BVPT304	Packaging Technology-II	3	0	3	30	70	100
BVPT305P	**On Job Training/ Internship/Workshop**	0	36	18	50	150	200
Total		**12**	**36**	**30**	**170**	**430**	**600**

Semester IV							
Code No.	**Paper**	**L**	**T/P**	**Credits**	**Internal Marks**	**End Semester Exam**	**Total Marks**
BVPT401	Flexography and Screen Printing Technology	3	0	3	30	70	100
BVPT402	Digital Printing Technology	3	0	3	30	70	100
BVPT403	Packaging Technology-III	3	0	3	30	70	100
BVPT404	Graphic Design and Reproduction	3	0	3	30	70	100
BVPT405P	**On Job Training/ Internship/ Workshop**	0	36	18	50	150	200
Total		**12**	**36**	**30**	**170**	**430**	**600**

Semester V							
Code No.	**Paper**	**L**	**T/P**	**Credits**	**Internal Marks**	**End Semester Exam**	**Total Marks**
BVPT501	Colour Science and Management System	3	0	3	30	70	100
BVPT502	Printing Ink Technology	3	0	3	30	70	100
BVPT503	Print Production Management	3	0	3	30	70	100
BVPT504	Print Finishing and Converting	3	0	3	30	70	100
BVPT505P	**On Job Training/Internship/ Workshop**	0	36	18	50	150	200
Total		**12**	**36**	**30**	**170**	**430**	**600**

Semester VI							
Code No.	**Paper**	**L**	**T/P**	**Credits**	**Internal Marks**	**End Semester Exam**	**Total Marks**
BVPT601	Printing Machine Maintenance	3	0	3	30	70	100
BVPT602	Green Printing and Quality Management in Graphic Arts	3	0	3	30	70	100
-	**Elective-I Choose Any one**	3	0	3	30	70	100
BVPT603A	Marketing Management						
BVPT603B	Fundamentals of Advertising						
-	**Elective-II Choose Any one**	3	0	3	30	70	100
BVPT604A	Book Publishing						
BVPT604B	E-Publishing						
BVPT605P	**On Job Training/ Internship/ Workshop**	0	36	18	50	150	200
Total		**12**	**36**	**30**	**170**	**430**	**600**

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SEMESTER - I

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BVPT101
COMMUNICATION SKILLS

Course Objective

The purpose of this course is to introduce students to the theory, fundamentals and tools of communication and to develop in them vital communication skills which should be integral to personal, social and professional interactions. One of the critical links among human beings and an important thread that binds society together is the ability to share thoughts, emotions and ideas through various means of communication: both verbal and non-verbal. In the context of rapid globalization and increasing recognition of social and cultural pluralities, the significance of clear and effective communication has substantially enhanced.

Course outcome:

1. The purpose of this course is to introduce students to the theory, fundamentals and tools of communication
2. To develop vital communication skills which should be integral to personal, social and professional interactions.
3. One of the critical links between human beings.
4. An important thread that binds society together is the ability to share thoughts, emotions and ideas through various means of communication: both verbal and non-verbal.
5. In the context of rapid globalization and increasing recognition of social and cultural pluralities, the significance of clear and effective communication has substantially enhanced.

Unit - I: Introduction: **06**

Theory of Communication, Types and modes of Communication, Mediums and channels of communication, barriers to communication, English as a Global language, the Lingua Franca, Social influences on English

Unit - I: Language of Communication: **06**

Verbal and Non-verbal (Spoken and Written) Personal, Social and Business Barriers and Strategies Intra-personal, Inter-personal and Group communication, Varieties of English, Language, Accent, Dialect, Colloquialism, Historical influences on English

Unit - I: Speaking Skills: **06**

Monologue Dialogue Group Discussion Effective Communication/ Mis- Communication Interview Public Speech, Regional influences on English, Convergence and divergence, Linguistic Imperialism,

Unit - I: Reading and Understanding- **06**

Close Reading, Reading analysis of a text - Audience and purpose, Content and theme, Tone and Mood, stylistic devices, structure Comprehension- Analysis and Interpretation Translation(from Indian language to English and vice-versa) Literary/Knowledge Texts

Unit - I: Writing Skills **06**

Documenting Report Writing Making notes Letter writing, Writing tabloids, diary entry, open letters, essays, newsletter and magazine articles, skits, short stories, impersonating characters

It will enhance Language of communication, various speaking skills such as personal communication, social interactions and communication in professional situations such as interviews, group discussions and office environments, important reading skills as well as writing skills such as report writing, notetaking etc. While, to an extent, the art of communication is natural to all living beings, intoday's world of complexities, it has also acquired some elements of science. It is hoped that after studying this course, students will find a difference in their personal and professional interactions.

REFERENCE BOOKS:

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Language, Literature and Creativity, Orient Blackswan, 2013.
4. Language through Literature (forthcoming) ed. Dr. Gauri Mishra, Dr. RanjanaKaul, Dr. Brati Biswas

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BVPT102
FUNDAMENTALS OF INFORMATION TECHNOLOGY

Unit - I

Computer characteristics: Speed, storage, accuracy, diligence; Digital signals, Binary System, ASCII; Historic Evolution of Computers; Classification of computers: Microcomputer, Minicomputer, mainframes, Supercomputers; Personal computers: Desktop, Laptops, Palmtop, Tablet; Hardware & Software; Von Neumann model.

Unit - II

Hardware: CPU, Memory, Input devices, output devices. Memory units: RAM (SDRAM, DDR RAM, RDRAM etc. feature wise comparison only); ROM-different types: Flash memory; Auxiliary storage: Magnetic devices, Optical Devices; Floppy, Hard disk, Memory stick, CD, DVD, CD/DVD-Writer; Input devices - keyboard, mouse, scanner, speech input devices, digital camera, Touch screen Voice Input, Joystick, Optical readers, bar code reader; Output devices: Display device, size and resolution; CRT, LCD, LED; Printers: Dot-matrix, Inkjet, Laser; Plotters, Sound cards & speaker.

Unit - III

Software: System software, Application software; concepts of files and folders, Introduction to Operating systems, Different types of operating systems: single user, multitasking, time-sharing multi-user; Booting, POST; Basic features of two GUI operating systems: Windows & Linux (Basic desk top management); Programming Languages, Compiler, Interpreter, Databases; Application software: Generic Features of Word processors, Spread sheets and Presentation software; Generic Introduction to Latex for scientific typesetting; Utilities and their use; Computer Viruses & Protection, Free software, open source.

Unit - IV

Computer Networks and Internet: Connecting computers, Requirements for a network: Server, Workstation, switch, router, network operating systems; Internet: brief history, World Wide Web, Websites, URL, browsers, search engines, search tips; Internet connections: ISP, Dial-up, cable modem, WLL, DSL, leased line Wireless and Wi-Fi connectivity ; email, email software features (send receive, filter, attach, forward, copy, blind copy); characteristics of web-based systems, Web pages, Web Programming Languages.

Unit - V

Information Technology And Society: Indian IT Act, Intellectual Property Rights, issues. Application of information Technology in Railways, Airlines, Banking, Insurance, Inventory Control, Financial systems, Hotel management, Education, Video games, Telephone exchanges, Mobile phones, Information kiosks, special effects in Movies.

Programming Concepts & Techniques: Program Concept, Characteristics of Programme, Stages in Program Development, Tips for Program Designing, Programming Aids, Algorithms, Pseudo code, Notations, Design, Flowcharts, Symbols, Rules, compiler & Interpreter. Introduction to programming techniques, Top-down & Bottom-up approach, Unstructured, & Modular programming, Cohesion, Coupling, Debugging, Syntax & Logical Errors, Linking and Loading, Testing and Debugging, Documentation.

Reference Books:

1. Programming in C, R.S. Salaria, Khanna Publishing House
2. Computer Concepts and Programming in C, R.S. Salaria, Khanna Publishing House
3. Handbook of Computer Fundamentals, N.S. Gill, Khanna Publishing House

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BVPT103
OFFSET PRINTING TECHNOLOGY

Objective and pre-requisite:
Working in printing industry is required to deal with different offset printing machines. These machines have different operational units. Students are required to have a good knowledge and skills of operating these machines, and image carrier preparation. The subject deals with the sheet-fed offset printing machines, web offset printing machines, their operational units. Knowledge of Offset printing process, its principle, consumables are pre-requisite for the subject.

Learning outcome:
Students after attaining the above subject knowledge will be able to know the offset printing process with the skill to print on sheet fed and web fed offset machine.

Unit - I

1. Sheet- fed offset printing machines; Basic principle, configuration, three cylinder, five cylinder,classification, Sizes, speed, suitability of single colour, multicolour, and perfecting machine, their mechanical and operational features.
2. Sheet feeding systems; types, single sheet feeder, stream feeder, sheet controls, sheet insertion devices, registration devices.
3. Printing cylinders; plate, blanket and impression cylinders, setting, cylinder bearers, gauge rings,preparation of image carrier and mounting of it and rubber blanket on cylinders.
4. Rubber blanket; kinds, grades, structure, properties, care and storage.

Unit - II

1. Inking system; types, Design, care/ maintenance and storage.
2. Dampening system; types, fountain solution and its purpose, different elements of conventional system.
3. Delivery system; types, chute delivery to extended delivery, elements of delivery system, setting and operational features.
4. Pre Make-ready, Make -ready and printing of single colour and multi colour jobs, make-ready book, colour sequence, colour mixing and matching.
5. Running Defects; picking, fluffing, show through, ghosting, Hickies, trapping, Mis- register, Doubling, Set off, Glazing, Static electricity, catch up, damper marks, Scuffing.

Unit - III

1. Web offset machines; their technical specification, various configuration, blanket to blanket, four-highunit, arch type, satellite type, twin satellite, three quarter satellite, combi- satellite.
2. Infeed unit, different elements, reel stand, AGV transport, splicing, web tension control, dancer roller, auto web up.

Unit - IV

1. Printing units, inking, RCI inking and dampening systems, contacting and non- contacting, printregister and control, web control, web viewing system.
2. Dryer and chill roll, silicon applicator and folding unit, folding of web folder and folder super structure, open sheet delivery, turner bars, ancillary operations, numbering, punching, etc.
3. Safety precautions, noise protection encapsulation, automatic wash-up procedure, plate changing, ink and dampening solution supply.

Text Books:

1. Printing Technology, 3rd edition, By Adams, Faux and Rieber published by Delmer Publishers Inc. New York.
2. Advanced Pressmanship By Charles W Latham, Published by GATF Inc.

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BVPT104
INK TECHNOLOGY

Unit - I

- General Introduction of Inks.
- History of Inks.
- Definition of Inks.
- Classifications of Inks.

Unit - II

- Inks Ingredients and their functions..
- Types of Inks.
- a) Letter Press Inks. b) Offset Inks. c) Gravure Inks d) Flexographic Inks. d) Screen Inks. e) Metal Decorating Inks. f) Ink Jet Inks. g) UV Cured Inks. h) Writing Inks i) Other Inks.
- Colour Theory.
- Inks manufacturing Process.

Unit - III

- Principles of Ink formulations.
- Chemistry and Rheology of Inks.
- Drying of Inks.
- Typical formulation of Inks.

Unit - IV

- Inks manufacturing Process.
- Machinery used in Inks manufacturing
- Testing of Inks (wet paint and dry film)
- General hazards in Ink Industries.

Unit - V

- Ink Storage precautions
- Safety measure and protection during Ink handling.

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BVPT105P
ON JOB TRAINING/INTERNSHIP/WORKSHOP

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SEMESTER – II

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BVPT201
BASIC KNOWLEDGE OF GLASS

Objectives:
After completion of the course, students will be able to :
1. Know various types of raw materials for glass making and formulating batch composition.
2. Understand general ideas about glass melting furnace and glass melting process.
3. Understand about various process of glass forming methods.
4. Know about strain in glass and its elimination.
5. Understand general idea about the quality of glass.
6. Understand different glass defects and their remedies.
7. Know decoration of glass and special glass making.
8. Understand the layout of modern glass plant.

SI NO.	Major Topics	Periods
1.	Raw Material and Batch Composition	10
2.	Glass Melting Process	05
3.	Manufacturing & Forming of Glass Wares	05
4.	Annealing and Toughening of Glass	05
5.	Properties of Glass	10
6.	Testing of Glass	05
7.	Glass Decoration	05
8.	Special Glass	05

COURSE CONTENT

1.0. RAW MATERIAL AND BATCH COMPOSITION

1.1 Define Glass & Glassy state
1.2 Historical background of Glass
1.3 Glass Industries in India and the present status.
1.4 Describe the major ingredients for glass making
1.5 Describe the minor ingredients used for glass making
1.6 Define Cullet and its use in glass making.
1.7 Describe selection of glass composition for various types of glasses.
1.8 Properties of glass sand for glass making.
1.9 Impurities in glass raw materials and their influence in glass making.

2.0 GLASS MELTING PROCESS: EXPLAIN THE FOLLOWING IN BRIEF

2.1 Calculation of batch of raw materials for making glass.
2.2 Process of glass formation
2.3 Refining of glass
2.4 De-colorization of glass
2.5 Role of viscosity in glass melting.
2.6 Glass melting furnaces.
2.7 Glass Tank Furnace & Glass pot furnace.
2.8 De-vitrification of Glass

3.0 MANUFACTURING & FORMATION OF GLASS WARE

3.1 Various methods used for making glass products.
3.2 Manufacture of glass by blowing process .
3.3 Float process
3.4 Various moulds for glass making.
3.5 Manufacturing of glass bottle, sheet glass, thermo flask, electric bulb.
3.6 Manufacturing of fiber glass, glass wool.
3.7 Layout of modern glass plant.

4.0 ANNEALING & TOUGHENING OF GLASS

4.1 Define Annealing and Toughening of Glass & Aim of annealing.
4.2 Describe the process of annealing in details.
4.3 Explain tempering of glass by various methods.
4.4 State and explain Chemical & mechanical toughening of glass.

5.0 PROPERTIES OF GLASS

5.1 Describe the following properties of glass in detail.

a) Viscosity.
b) Thermal expansion.
c) Density.
d) Optical properties.
e) Chemical durability.

6.0 TESTING OF GLASS : Describe in brief

6.1 Testing of defects of glass by visual observation.
6.2 Blistering, cords, stones in glass.
6.3 Determination and observation of strain in glass.
6.4 Measurement of thermal shock resistance of glass.
6.5 Testing of viscosity of glass.
6.6 Testing of density of glass.
6.7 Testing of strength of glass.
6.8 Durability of glass

7.0 GLASS DECORATION

a) Describe the following methods of glass decoration in brief.	Polishing	b)	Grinding
c)	Etching	d)	Sand Blasting
e)	Engraving	f)	Cutting

8.0 SPECIAL GLASSES

8.1 Define special glass.
8.2 Describe the characteristics and application of the following glasses:-

a) Borosillicate glass
b) Pyrex glass
c) Heat resisting glass
d) Coloured glass
e) Ruby glass
f) Laminated glass

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BVPT202
ENVIRONMENTAL STUDIES

Unit - I : Introduction to Environmental Studies

- Multidisciplinary nature of environmental studies;
- Scope and importance; Concept of sustainability and sustainable development.

Ecosystems

What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems :

a) Forest ecosystem
b) Grassland ecosystem
c) Desert ecosystem
d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit - II : Natural Resources : Renewable and Non--renewable Resources

Land resources and landuse change; Land degradation, soil erosion and desertification.

Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.

Water : Use and over--exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter--state).a

Energy resources : Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Unit - III : Biodiversity and Conservation

Levels of biological diversity : genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots
India as a mega--biodiversity nation; Endangered and endemic species of India
Threats to biodiversity : Habitat loss, poaching of wildlife, man--wildlife conflicts, biological invasions; Conservation of biodiversity : In--situ and Ex--situ conservation of biodiversity.
Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

Unit- IV : Environmental Pollution

Environmental pollution : types, causes, effects and controls; Air, water, soil and noise pollution Nuclear hazards and human health risks
Solid waste management : Control measures of urban and industrial waste.
Pollution case studies.

Environmental Policies & Practices

Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).
Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

Unit - V : Human Communities and the Environment

Human population growth: Impacts on environment, human health and welfare.
Resettlement and rehabilitation of project affected persons; case studies.
Disaster management : floods, earthquake, cyclones and landslides.
Environmental movements : Chipko, Silent valley, Bishnois of Rajasthan.
Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.
Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

Suggested Readings:

1. Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt.

2. Gadgil, M., & Guha, R.1993. This Fissured Land: An Ecological History of India. Univ. of California Press.

3. Gleeson, B. and Low, N. (eds.) 1999.Global Ethics and Environment, London, Routledge.

4. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.

5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll.Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.

6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36--37.

7. McCully, P. 1996. Rivers no more: the environmental effects of dams(pp. 29--64). Zed Books.

8. McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.

9. Odum, E.P., Odum, H.T. & Andrews, J. 1971.Fundamentals of Ecology. Philadelphia: Saunders.

10. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.

11. Rao, M.N. & Datta, A.K. 1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt. Ltd.

12. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012.Environment. 8th edition. John Wiley & Sons.

13. Rosencranz, A., Divan, S., & Noble, M. L. 2001. Environmental law and policy in India. Tripathi 1992.

14. Sengupta, R. 2003. Ecology and economics: An approach to sustainable development. OUP.

15. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.

16. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons.

17. Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent.

18. Warren, C. E. 1971. Biology and Water Pollution Control. WB Saunders.

19. Wilson, E. O. 2006.The Creation: An appeal to save life on earth. New York: Norton.

20. World Commission on Environment and Development. 1987.Our Common Future. Oxford University Press.

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BVPT203
PRINTING MATERIAL SCIENCE

Objective and pre-requisite:
Working in printing industry are required to deal with different printing materials like substrates-paper, polymer, foils etc. ink, consumables etc. These materials have different characteristics and properties. Students are required to have a good knowledge and skills of using these materials according to suitability and applicability. The subject deals with the materials and its science involved in testing and application. The knowledge of printing process and basic knowledge of science of secondary level will suffice the understanding.

Learning outcome:
Students after attaining the above subject knowledge will be able to know the different printing materials, its process of making, properties, characteristics, testing and suitability for particular print application.

Unit - I
Polymers: Monomer and Polymer, Homopolymer and Copolymers Classification of polymer – linear, branched, cross-linked Polymerization- Addition, Condensation and Copolymerization Types of Polymers—Plastic, Thermoplastic, Thermosetting plastic, Rubber-natural, Vulcanized rubber, Synthetic rubber, Fibers, Physical, Chemical and Mechanical properties and characteristics of polymer Application of polymer in printing—printing ink, resin, vehicles, adhesive, film base, cellulose, and gelatin- its Composition and characteristics.

Unit - II
Colloids: Kinds, characteristics and properties, Colloid materials and application in printing industry Surface tension, Contact angle, capillary action Acidity and Alkalinity: pH, pH Scale, ionic concentration and pH value Measurement of pH using indicator, comparator, digital meter. Principle of digital meter Significance of pH control in printing

Unit - III
Substrates: Fibrous and non-fibrous raw material used in paper and board, their relative properties, Introduction to pulping process-Mechanical, Chemical, sheet formation in machine (Fourdrinier machine), Fillers and loaders addition, Sizing, Calendering, coating and materials required. Paper reinforcement by Polymer addition, Varieties of paper and board, classification and characteristics
Testing of Physical, mechanical and optical properties of paper and its significance.
Other substrate—metal foil, plastic, cellulose synthetics.

Unit - IV

Printing ink: Constituents of printing ink, role of constituents, Manufacturing of ink- mixing and milling equipments, General characteristics and properties of printing ink-Tack, viscosity, Rheology etc., Printing ink for various printing processes, four colour process ink, Natural drying methods and radiation curing—Infra Red, UV, Electron Beam, Microwave. Special inks: Heat set, quick set, fugitive, metallic, gloss, moisture set, magnetic, inks for ultra violet and infra red, florescent and their suitability in different applications, Eco-friendly inks, Ink Testing.

Text Books:

1. Materials in Printing Process: L.C. Young
2. Engineering Chemistry: Jain & Jain
3. Science and Technology of Printing Materials: Prakash Shetty (MJP Publisher)

Reference Books:

1. Printing ink Manual
2. Hand Book of Paper Technology

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BVPT204
PACKAGING TECHNOLOGY - I

Objective and pre-requisite:
Packaging is an important aspect of modern printing and packaging business. A bulk Printing is done for packaging in the Printing Industry. Printing for packaging has emerged as an area of specialization. Hence this course has been included in the curriculum to impart basic knowledge of packaging technology to enable the student to apply the same in his professional career. Knowledge of graphic design, layout preparation and printing process are pre-requisite for the subject.

Learning outcome: :
Students after attaining the above subject knowledge, will be able to know the basics of packaging, the properties of paper and board, paper based package production, finishing operation.

Unit - I
1. Definition and function of Packaging
2. Packaging criteria and packaging development
3. Product properties influencing packaging development
4. Shelf life of product and packaging material
5. Types of packaging material and printing techniques for different materials
6. Theory on testing's available for paper and their significance

Unit - II
1. Definition and History of paper
2. Defects of paper and their detections
3. Manufacturing processes for paper and board
4. Application of paper in packaging
5. Types of paper and their selection criteria

Unit - III
1. Definition and types of folding board cartons
2. Relevant properties of paper board for carton
3. Manufacturing process and flow chart for carton
4. Type of laminations and special effects for ornamentation available in market
5. Definition of Composite containers and its application
6. Types of composite containers and their manufacturing process

Unit - IV

1. Definition and types of CFB's
2. Board construction – Liners and Flutes
3. Manufacturing Joints, Coatings, Design and flute selection
4. Box style and their economics
5. Manufacturing process with diagrams
6. Advantages and limitations

Text Books:

1. Modern Food Packaging – By Indian Institute of Packaging
2. Packaging Technology Educational Volume – 1 – By Indian Institute of Packaging
3. Packaging Technology Educational Volume – 2 – By Indian Institute of Packaging

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ON JOB TRAINING/INTERNSHIP/WORKSHOP

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SEMESTER - III

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BVPT301
DIGITAL PRE-PRESS TECHNOLOGY

Objective and pre-requisite:
Every printed product is consisting of graphics and text. The composition of text and graphics are created, processed, designing work are done mostly in electronic digital environment now a days. This subject will cover the input systems, software involved, digital work flow, outputting and equipments used for the process.

Learning outcome:
After completing this subject student will be able to know the process of text and graphics creation in a electronic digital environment, the system required for the process. Students shall be able to know specific application of various pre-press software, output the final pages, various intermediate conversion required for the process and its output through different equipments.

Unit - I
Introduction to Digital Pre-press; Overview of the printing press workflow, Role and importance of pre-press in the printing organizations. Evolution of pre-press technology. Steps involved in pre-press section. Traditional pre-press technology. Digital pre-press technology. Traditional pre-press vs. digital pre-press. **Image Capture and Processing**; Image sources: Digital cameras, scanners, stock images, Types of scanners and their working principles (flatbed, drum, etc.). Basics of image resolution, DPI, PPI, and file formats. Color modes: RGB, CMYK, LAB, grayscale. Image correction and retouching techniques using software (e.g., Adobe Photoshop). **Typography and Text Preparation**; Typesetting principles for digital workflows. Brief introduction of text layout software (e.g., Adobe InDesign, QuarkXPress).

Unit - II
Page Layout and Design; Page layout principles and composition. Working with grids, guides, and templates. Integration of text, images, and graphics in layouts. Desktop publishing (DTP) systems, steps involved, software tools and their features. **Color Management in Pre-press;** Basics of color theory and color spaces. Importance of color calibration and profiling. Tools for color management (colorimeters, spectrophotometers). ICC profiles and their role in digital workflows. Soft proofing and its importance in pre-press. **File Formats and Pre-press Standards;** Common file formats in pre-press: PDF, TIFF, EPS, PSD, AI. Understanding PDF/X standards for print workflows. File preparation for digital and offset printing. Importance of preflight checks and tools (e.g., Enfocus PitStop).

Unit - III

Plate Making and Computer-to-Plate (CtP) Technology; Basic principles of plate making for offset, flexography, and gravure printing techniques. CtP workflow and advantages over traditional methods. Types of plates: Thermal, UV, and process-less plates. Laser imaging and plate calibration. **Digital Proofing Techniques;** Concept and importance of proofing in pre-press. Types of proofing: Soft proof, hard proof, and contract proof.

Unit - IV

Pre-press Workflow Automation; Overview of pre-press automation and its benefits. Workflow management systems (e.g., Esko, Kodak Prinergy, Heidelberg Prinect). Job definition formats (JDF) and their integration. Challenges and solutions in workflow automation. **Quality Control in Pre-press;** Pre-press quality checkpoints and troubleshooting. Ensuring print readiness through quality checks. Common issues in pre-press and their resolutions.

Text/Reference Books:

1. Professional Pre-press, Printing & Publishing by Romano. Prentice Hall
2. Digital Colour Printing by B Chakravarty. Asian Books P Ltd

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BVPT302
GRAVURE PRINTING TECHNOLOGY

Objective and pre-requisite:
For faster printing works and jobs of huge quantities such as news-papers, magazines, package printing etc., web fed machines are required. These machines are also suitable for multi- colour works. This subject deals with the operational features of presses of gravure printing. An understanding of application of these machines/processes is very essential for a vocational student. Workings in printing industry are required to deal with different printing process and Gravure printing process is one of the important processes. Students are required to have a good knowledge and skills of operating these machines, and image carrier preparation. The subject deals with the different gravure printing machines, their operational units. Knowledge of recess printing process, its principle, consumables are pre-requisite for the subject.

Learning outcome:
Students after attaining the above subject knowledge will be able to know the gravure surface preparation, printing process with the skill to print on sheet fed and web fed machine.

Unit - I
History & Introduction: Evolution & History of Gravure, Gravure printed products & it's market. Types of Gravure Printing: Publication Gravure, Packaging Gravure, and Product Gravure. Characteristics of gravure printing. Advantages and limitations of gravure printing process. Areas of applications of gravure printing. Gravure printing industry in India and worldwide market. **Gravure Presses & Presswork:** Gravure printing process & basic Gravure Machine Designs. Rotogravure presses for Printing & Packaging application and their considerations.

Unit - II
Construction & Imaging of Cylinders: Gravure screens, Cylinder construction & Preparation -Thin layer method, Thick Layer method, Ballard Shell Treatment, Cylinder Design & its types, Gravure cylinder preparation, Sleeve & Solid cylinders, Considerations for Gravure Cylinder preparation. Chemical engraving methods & equipment's, Electronic engraving systems today. Image generation Methods for Gravure cylinders - Diffusion-etch method, direct transfer, Electro-mechanical process, Laser cutting, Cell configuration, advantages & disadvantages, Cylinder correction method. Well formation-Variables, Basic types, balancing the cylinder, copper plating & polishing, Reuse of cylinders. Sleeves & integral shafting of cylinder. Cylinder balancing systems - Static & Dynamic. **Doctor Blade:** Introduction to Doctor Blade assembly, Doctor Blade Materials, Blade angles, Blade distance from nip, blade edge, blade mounting. Doctor blade holder configurations, preparing blade for use of doctor blade, Doctor blade problems. Doctor blade wear - Fatigue, corrosion, abrasive, adhesive wear.

Unit - III

Impression Roller & Driers: Introduction to Impression roller, Function of Impression Roller, Roller covering, Roller pressure, Balance- static & dynamic., setting of impression roller on machines. Hardness of Impression roller for various application. Handling & Storage of impression roller. Impression mechanisms - mechanical, hydraulic, pneumatic. Impression roller problems. Gravure roller coating. New developments in this area. **Drying System in Gravure presses:** Gravure Ink dryers - Need for ink dryer, Dryers Functioning, Heat sources for driers- Steam, Electric and Gas, Combination gas/Oil, Thermal oil, and management of waste heat from incinerators.

Unit - IV

Gravure Substrates & Inks: Publication Printing Paper substrates, Packaging Paper Substrates. Non-paper substrates; Metalized Films & Foils. Characteristics of substrates for gravure printing. Preparation of substrates before printing operations. Gravure Inks; Constituents of Gravure Ink and their properties. Dilution of Gravure Printing Ink. Types of Gravure Ink; Water based, Solvent based, Polyurethane based, Vinyl based, Dye based, etc. Different additives used for respective inks and their properties. Ink and substrate interactions for gravure printing technique. Costing & Estimation of substrates, Inks & coatings, etc. for gravure press. Trouble shooting in gravure presses. Quality control aspects in gravure printing process.

Reference Books:

1. "**Gravure: Process and Technology"**, Gravure Education Foundation, 2003
2. **"A Guide to Graphic Print Production"** Kaj Johansson, Peter Lundberg, Robert Ruberg Wiley, 2002
3. **"Printing Technology"** Edition - 5E, by Adams
4. Printing Technology by Adam, Faux, Reiber
5. Hand Book of Print Media, Published by Heidelber

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BVPT304
PACKAGING TECHNOLOGY - II

Objective and pre-requisite:
Packaging is an important aspect of modern printing and packaging business. A bulk Printing is done for packaging in the Printing Industry. Printing for packaging has emerged as an area of specialization. Hence this course has been included in the curriculum to impart basic knowledge of packaging technology to enable the student to apply the same in his professional career. Knowledge packaging concept, various hazards involved, package elements, materials required are pre-requisite for the subject.

Learning outcome:
Students after attaining the above subject knowledge, will be able to know package design process, its testing, development, various packaging materials and its formation, packaging management concept.

Unit - I
Package Design and Testing: Elements of Package Design. Factors influencing design of a package, Packaging cycle, product package relationship, product life curve, Hazards on package. **Cushioning materials**: Functions, Properties and Classifications. **Introduction to Plastic Moulding**: Conversion Methods-Principles & Applications. Sheet Extrusion, Blown Film Extrusion & Co-extrusion, Blow Moulding, Injection Moulding, Injection Stretch Blow Moulding, Thermoforming, Compression Moulding, Transfer Moulding, Vacuum Forming, Pressure Forming.

Unit - II
Packaging Materials Properties; tensile strength, tear strength, impact strength, heat seal strength, coefficient of friction, haze and gloss, environmental stress crack resistance (ESCR), chemical properties, Oxygen Transmission Rate, Gas Transmission Rate, Water Vapor Transmission Rate, Moulding processes. **Adhesives and adhesive tapes** - types, properties and applications. **Flexible packaging laminates**: Purpose, properties of laminates structural, performance, barrier, aesthetics and other properties. Laminating processes wet bonding, dry bonding, hot-melt bonding.

Unit - III
Packaging Development; Packaging in modern society, Packaging and marketing, Package Designers role. Packaging specifications. Paper and paper board for packaging applications with their characteristics. **Folding cartons**; Types and applications. Corrugated containers, Designing and manufacturing, testing of corrugated containers. **Rigid packaging**: glass containers, aerosols, metal tubes, plastic tubes, and the aerosol can. **Environmental aspects**: Implications of packaging and Solid waste disposal. Packaging regulations; laws and regulations, recycling of packaging materials. **Latest trends in the areas of packaging**; Advancements in package designing tools, Smart packaging technologies, green packaging, Aseptic packaging, Advancements in packaging machineries.

Unit - IV

Packaging Management; Packaging production planning and control: Production planning, scheduling and control, material purchasing, inventory and quality control. Work allocation, scheduling dynamics. Packaging management solution and workflow; JDF, PDF and CIP3/CIP4; advantages and limitations. Equipment planning, investing and management. **Packaging supply chain management**: Introduction, objectives, decision phases, performance drivers and management strategy. Demand forecasting, Judgment techniques, Inventory control types, reasons, inventory models and control. ERP. **Packaging Quality Management**: Introduction to quality and quality control, Scientific quality management tools, Packaging costing and work measurement: Costs associated with packaging design, production and transportation.

Text/ Reference Book(s): Packaging Design

1. Sudhir Gupta: Hand Book of Packaging Tech, Engineers India Research Institute, New Delhi
2. Brody Aaron L, The Wiley Encyclopaedia of packaging Tech, John Wiley & Sons Packaging Material
3. Natarajan S, Fundamentals of Packaging Tech, PHI, New Delhi Management
4. Martand T Telsang: Production Management, S Chand & Co. Packaging Design and Development
5. Hanlon Joseph F: hand Book of Package Engineering
6. Prakash Shetty: Science and Technology of Printing Materials, MJP Publisher

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SEMESTER - IV

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BVPT401
FLEXOGRAPHY AND SCREEN PRINTING TECHNOLOGY

Unit - I

Introduction to Flexography: Definition, history, market, applications. Flexography Image Carrier Preparation: Structure of Flexographic Plate, Plate Preparation Methods – Rubber Plates preparation, Sheet Photopolymer Plates preparation and Liquid Photopolymer Plates Preparation, care and handling, Defects in flexography plate making and remedy. Mounting of flexography plates. Latest trends in flexo surface preparation. **Flexography Inking Systems:** Ink Metering, Anilox Roller, Selection of Suitable Anilox Roller: Factors to be considered in selection of anilox roller. Types of Flexography Inking systems. Corona Treatment, Flexo Substrates – Paper and Paperboard stocks, Corrugated stocks, Plastic Films, Foils and Laminates.

Unit - II

Flexography Printing: Principle, kinds, configuration-stack, common impression, in-line, tension control, sizes of flexo machines. Basic parts of flexo machine, fountain, anilox inking, reverse angle doctor blade, plate cylinder, impression cylinder, registration control and drying system. Safety devices and quality control Trouble shooting printing defects with their causes and remedies like pin holing, halo, etc.

Unit - III

Introduction to Screen Printing: Introduction, screen print materials, creating a positive by hand, mesh preparation, preparing the stencil, exposing the stencil, preparing the screen for printing, printers, printing, stencil removal/ screen reclaiming. Cleaning the Screen: Introduction, screen cleaning devices, ball trays, top side screen cleaning methods, top side rotary brushes, top side necklace rings dams, top side wiper ring, water sprays, energizer.

Unit - IV

Tools & Equipment use in Screen Printing: Screen print pricing, chemicals, tools and equipment, creating the design, printing the transparency, applying emulsion, exposing the image, washing out the screen, screen registration, cleaning the screen, reclaiming the screen, cleanup. Preparing Colors: Objectives, classification of colours, characteristics of colour, colour schemes, factors influencing the use of colours in daily life. **Types of Screen Printing Machines**: Container Screen Printing machine, Flatbed Hinged frame (Automatic) Screen Press, Rotary Screen Printing Press and Carousal Screen Printing Machines. Screen Printing Inks – Types, Properties, Types of Screen Printing Inks for specific Application. Screen Printing Applications: Screen Printing on Flat surfaces and Screen Printing on Curved Surfaces. Latest trends in the areas of screen printing.

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BVPT402
DIGITAL PRINTING TECHNOLOGY

Unit - I

Introduction of Non Impact Printing Technology: Meaning and Application of Non Impact Printing technology, Advantages and Disadvantages of Non Impact Printing Technology, Workflow of Non Impact Printing Technology. Classification of Non Impact Printing Technology. **Electro Photography:** Meaning and its types, Construction of Machine, Inks used in Electro photography, Application of Elect photography, Advantages and Disadvantages of Electro Photography.

Unit - II

Ionography and magnetography: Introduction of Ionography and Magnetography, Construction of Ionography and Magnetography machine, Inks used in Ionography and Magnetography, Application of Ionography and Magnetography. **Inkjet Technology:** Introduction of Inkjet Process, Construction of Inkjet Machine, Inks used for Inkjet Proces, Application of Inkjet Process, Advantages and Disadvantages of Inkjet Process.

Unit - III

Thermography: Introduction of Thermography, Construction of Thermography Machine, Inks used for Thermography, Application of Thermography, Advantages and Disadvantages of Thermography. **DI (Direct Imaging) Presses;** Introduction of Process, Construction of machine, Application of process, Advantages and Disadvantages, Inks used.

Unit - IV

Photography: Introduction of photography, Construction of Photography machine, Application of Process, Advantages and Disadvantages. **Introduction of Different Workflow:** Introduction to work flow, Job flow and Workflow, compare between conventional and Digital workflow, Different types of Workflows used in Printing, Advantages of Digital Workflow.

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BVPT403
PACKAGING TECHNOLOGY-III

Unit - I

Introduction: Packaging design and development, Packaging specifications and standards, Package Design using computers. Food Bio deterioration and Methods of Preservation. Introduction, Agents of food bio deterioration, Enzymes, Microorganisms, Non-enzymic bio-deterioration. Food preservation methods, High temperatures, Low temperatures, Drying and water activity control, Chemical preservation, Fermentation.

Unit - II

Packaged Product Quality and Shelf Life: Introduction, Factors affecting product quality and shelf life, Chemical/biochemical processes, Oxidation, Enzyme activity. Microbiological processes, Examples where packaging is key to maintaining microbiological shelf life, Physical and physico-chemical processes, Physical damage, Insect damage, Moisture migration, Barrier to odour pick-up, Flavour scalping, Migration from packaging to foods, Migration from plastic packaging, Migration from other packaging materials, Factors affecting migration from food contact materials.

Unit - III

Metal Packaging: Overview of metal cans in packaging, Container performance requirements, Container designs, Raw materials for can-making, Steel, Aluminium, steel and aluminium applications in metal packaging. Can-making processes, Three-piece welded cans, Two-piece single drawn and multiple drawn (DRD) cans, Coatings, Processing of food and drinks in metal packages. **Plastics in Food Packaging**: Introduction, Use of plastics in food packaging, Types of plastics used in food packaging. Introduction to the manufacture of plastics packaging; Plastic film and sheet for packaging, Pack types based on use of plastic films, laminates, etc.

Unit - IV

Plastics in Food Packaging: Types of plastic used in packaging, Polyethylene (PE), Polypropylene (PP), Polyethylene Terephthalate (PET or PETE), Polyethylene naphthalene dicarboxylate (PEN), Polycarbonate (PC), Ionomers, Ethylene vinyl acetate (EVA), Polyamide (PA), Polyvinyl chloride (PVC), Polyvinylidene chloride (PVdC), Polystyrene (PS). **Coating of plastic films:** Types and properties, Introduction to coating, Acrylic coatings, PVdC coatings, PVOH coatings, Low-temperature sealing coatings (LTSCs), Metallising with aluminium, SiOx coatings, DLC (Diamond-like coating).

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BVPT404
GRAPHIC DESIGN AND REPRODUCTION PHOTOGRAPHY

Unit - I

Design and typographic Elements: Design terms; point, line, space, shape, mass, size and scale, colour, tone, texture pattern balance and contract, Typographic elements, copy preparation, including printing style, Type fundamentals, main groups of type face designs, type families, choosing type face suitable to the subject or product, relation between type face and printing processes, type face and paper surfaces. Type copy and art copy, manual image generation. Type measurements, copy fitting. Cropping, scaling art, tints, surprints reverses and bleeds. Basic principles of design. Design steps. Typography and design. Legibility and readability.

Unit - II

Colour Elements: Colour theory, terms used to describe colours: primary colour, Secondary colours, Tertiary colours, warm and cold colours; hue, shade and tint. Colour wheel; terms used to describe relationships between colours: Complementary, analogous, split, three or four colour jobs. Attributes and emotional appeal of colours. Selection of printing process for different job. Possibilities and limitations of binding and finishing operations.

Unit - III

Illustrative Elements: Types of originals for illustrations and reproduction, continuous tone copy, line drawing, black and white and colour originals, Requirements of art work and originals for reproduction, treatment of photographs; photo mechanical transfer material and their use, Black and white photographs; high contrast and low contrast; improving quality of photographic prints, marking, scaling, cropping of illustration, reduction care and protection, air brush and its use.

Unit - IV

Reproduction photography: Basic principles of reproduction photography. Process Camera; types, it's different parts, functions. Colour temperature, Illuminates classifications. Photographic emulsion, exposure, negative, positives. Difficult line originals. Contact photography. Line separation from black and white art work. Evaluation of line negative. Halftone photography. Half tone exposure. Contrast control. Auxiliary or supplementary exposures. Line and halftone combination. Evaluation of halftone negative. Colour Separation; Additive & subtractive, colour principles. Colour separation, filter factor, screen angles. Film Processing Developers Ingredients and their functions stop bath, fixing bath, Image density.

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SEMESTER - V

KALINGA UNIVERSITY
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BVPT 501
COLOUR SCIENCE AND MANAGEMENT SYSTEM

Unit - I

Fundamentals of Color: Definition of colour and its role in visual communication, Basics of light and vision: how the human eye perceives colour, Relevance in printing, packaging, imaging, and design. **Basic Colour Attributes**: Hue; Definition, Position of hue on the colour wheel, Primary, secondary, and tertiary hues, Influence of light source (illuminant) on hue perception. Brightness and Lightness; Definition, Factors affecting brightness/lightness: illumination level, surface reflectance, gloss/matte finish, Colourfulness and Saturation; Definition, Difference between chroma and saturation.

Principles of Color: Introduction to Colour Science, Colour Theory, Colour Harmony and Contrast, Practical Relevance in Printing. **Colour Reproduction:** Concept of Colour Reproduction, Colour Gamut and Limitations, Factors Affecting Reproduction Accuracy. **Colour separation:** Purpose of Colour Separation, Process Colour Separation (CMYK), Spot Colour Separation. **Color Measurement:** Importance of Colour Measurement in Printing, Visual vs. Instrumental Assessment, Practical Applications.

Unit - II

Colour Reproduction Principles: Colour Gamut and Device Limitations; RGB vs. CMYK gamut, Out-of-gamut colours. Colour in Printing and Imaging; Halftoning, screen angles, and moiré, Process colour vs. spot colour reproduction. Influencing Factors in Print Colour Accuracy; Paper properties (whiteness, gloss, coating), Ink formulation and drying characteristics, Press settings and environmental conditions. Digital Imaging and Colour; Bit depth, resolution, and file formats, Colour space conversions.

Unit - III

Introduction to Colour Management; Definition and purpose of colour management, Need for consistency across devices (camera, scanner, monitor, printer, press), Problems caused by lack of colour management, Device-dependent vs. device-independent colour, Overview of colour workflow in printing and imaging. **Fundamentals of Colour Science for Management;** Recap of colour theory, Human visual perception and its limitations, Colour spaces, Gamut concept (definition, visualisation, and device gamut), Out-of-gamut colours and handling strategies.

Device Calibration and Profiling: Calibration; establishing a stable, known device state **(**Monitor calibration tools and software**,** Printer calibration using standard targets)**, Profiling**: creating ICC profiles from measured data **(**Profiling monitors, printers, and scanners)**,** Special considerations for wide-gamut and multi-ink printers**,** Maintaining profiles and recalibration frequency.

Unit - IV

Proofing in Colour Management: Soft proofing: definition, setup, limitations**,** Hard proofing: types (digital contract proof, press proof)**,** Proof verification and approval workflows**,** Press characterisation for predictable results. **Troubleshooting in Colour Management:** Common problems; colour shifts, mismatch between proof and print, oversaturation, poor shadow detail, Diagnosing causes (profile errors, lighting issues, uncalibrated devices), Solutions; re-profiling, proper rendering intent, consistent viewing conditions, Role of environmental factors (temperature, humidity, ambient light).

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BVPT502
PRINTING INK-II

Unit - I

Letterpress ink: Introduction, Characteristics of Letterpress Inks, Ink Composition, Types of Letterpress Printing Inks (Oil-Based, Quickset, Rubber-Based, Magnetic and Specialty Inks), Drying Mechanisms in Letterpress Printing Inks, common letterpress ink-related problems, Quality Control Considerations. **Lithographic-Offset inks:** Definition and role of inks in lithographic printing, Difference between offset inks and inks used in other printing processes, Classification of offset inks. Composition of Offset Printing Inks, Properties of Lithography–Offset Inks, Setting and drying. Common Problems with Lithography–Offset Inks and Remedies: Scumming and toning; Emulsification issues, Set-off and blocking, Poor trapping, Ghosting, Ink drying delays, Colour variation during print run.

Unit - II

Flexography Inks: Characteristics of Flexo Printing vs. Other Processes, Composition and Formulation of Flexo Inks, Types of Flexographic Inks, Ink Properties and Their Measurement, Common Problems in Flexographic Inks and Troubleshooting. **Gravure inks:** Unique Requirements of Gravure Inks, Composition of Gravure Inks, Properties of Gravure Inks, Ink Types in Gravure Printing, Gravure Ink Problems and Troubleshooting, Environmental, Safety, and Regulatory Aspects.

Unit - III

Screen inks: Overview of the screen-printing process and its unique ink requirements, Difference between screen inks and other printing process inks, Printing substrates used in screen printing, Importance of ink rheology and mesh compatibility, Classification of Screen-Printing Inks, Composition and Properties of Screen Inks, Drying and Curing Mechanisms, Troubleshooting Screen Printing Ink Problems. **Security printing inks:** Purpose of security inks in preventing forgery and counterfeiting, Applications in banknotes, passports, tax stamps, brand protection, Importance in authentication and anti-tampering measures, Early use of special inks in currency printing, Security Printing Methods and Integration with Inks, Classification of Security Inks, Raw Materials and Composition, Printing Processes for Security Inks, Testing and Quality Control of Security Inks, Environmental and Safety Considerations, Recent Trends and Future Developments.

Unit - IV

Inks and Toners for Digital Printing: Overview of digital printing processes and ink requirements (Inkjet (continuous, drop-on-demand), Electrophotographic (toner-based), Other emerging digital printing systems (nanographic, liquid electrophotography, etc.), Key differences between conventional printing inks and digital printing inks/toners. **Classification of Digital Printing Inks;** Aqueous-based inks, Solvent-based inks, UV-curable inks, Latex inks, Specialty inks for digital printing. Toners for Digital Printing; Dry toner, Liquid toner. Properties and Performance Parameters. Ink–Substrate Interaction and Compatibility. Environmental and Safety Aspects.

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BVPT503
PRINT PRODUCTION MANAGEMENT

Unit - I

Introduction, Organization Structure–Sole Proprietor, Partnership, Limited Company, Administrative office routine, Forms used Processing orders. Business Environment–Printing Industry in India & Abroad. Impact of globalization & IT. Management–Nature scope and importance of Management, Functions of Management–Scientific, Management. Pre-Press Production Management, Printing Processes and Press Management, Post-Press and Finishing Operations, Quality Control and Troubleshooting in Print Production.

Unit - II

Production and operations Management–Locations and Layout of plant, Maintenance management. Quality assurance, Total quality management (TQM), Inventory Management-Definition & purpose, Inventory classification, EOQ, Materials handling & Warehousing. Work flow and organizational structure in a printing press. Network Models - Introduction, PERT & CPM models, Network construction, Problems, Resource analysis & allocation, Replacement analysis, Application & case studies. Human resource management: Manpower planning–recruitment, selection, Training performance appraisal Wage and salary administration.

Unit - III

Production Planning, Costing, and Resource Management**:** Job Estimation and Costing **(**Calculating material, labour, overhead costs, Quotation preparation), Production Scheduling **(**Time management, capacity planning), Inventory Management **(**Raw material sourcing and storage), Waste Reduction and Sustainability **(**Eco-friendly inks, paper recycling, energy efficiency).

Unit - IV

Printing Production Standards: Need for standardization in the printing industry, Role of standards in quality control and global competitiveness. Types of standards**:** product, process, test, safety, and environmental. Benefits of using standards in printing. Overview of Internation Organizations for Standardization **(**ISO) and Bureau of Indian Standards (BIS)**.** Introduction to IS key standards for: Graphic technology (IS 15963: Part 1, IS 15963: Part 2, IS 15963: Part 3, IS 15963 Part 4, IS 15963: Part 5, IS 15963: Part 6, IS 15963: Part 7, IS 15963: Part 8, IS 15963: Part 9), Paper and board (IS 1848, IS 1060, IS 4661, etc.), Printing inks (IS 15495, IS 17349, IS 15495-2), etc.

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BVPT504
PRINT FINISHING AND CONVERTING

Unit - I

Introduction: Binding, Print Finishing, book binding, importance of Book Binding. Book binding: Parts of book, Operations during bookbinding: pre-forwarding operations, forwarding operations, finishing operations. Book Binders Tools: forwarding tools, finishing tools. Binding Room Equipment's: Laying Press, Standing Press, Sewing Frame, Glue Pot, Board Cutting. Print Finishing Materials: Board - kinds of boards, Reinforcing Materials. Securing Materials, Covering Materials, Adhesives- factors governing the choice of adhesives, use of adhesives in print finishing, effect of wet adhesives, theories of adhesion, principles of adhesives, solvent-based adhesives, water-based adhesives, pressure sensitive adhesives, Miscellaneous Materials.

Unit - II

Pre-Forwarding Operations: Jogging, Counting, Cutting, Slitting, Trimming. Single knife guillotine machine: Paper cutting machine. Folding: Hand folding - folding to paper, folding to print, lump folding, style of folding, Binders Aids, Puckering, Folding Schemes, Machine Folding - knife principles, buckle principle, combination of knife & buckle, folding & machine direction, advancements & developments on folding machine, folding machine paper feeders, tips for smoother folding. Tipping- in, Attachment of Plates. Gathering - Single Sheet Gathering, In-setting, Collating - Collating Marks.

Unit - III

Securing Methods: Wire Stitching, wire stitching machine, Thread Sewing. Letterpress binding & Stationery binding, saddle sewing, side/flat sewing, French sewing, sewing on tapes, sewing on cords, sewing two sections on, whip sewing, stub-binding. Adhesive Binding/Perfect Binding: advantages, quality control in adhesive binding. Mechanical Binding: Loose leaf binding - traditional styles used, spiral binding, wire "o" binding, plastic comb binding, case binding. End Papers: Purposes, Kinds of end Papers, Quality of Paper Required for Pasting End Papers. Pressing, Gluing the Spine, Smashing the Spine, trimming the Book Edges, Rounding- Advantages, Rounding Machine. Backing - Backing Machine. Lining - Advantages. Head-Tail Bands, Caps, Book Marker. Method of Attaching Head & Tail Bands. Covering - Covering Styles, Pasting Down, Pressing, Inspection.

Unit - IV

Finishing Processes: Cover Decoration, Print Finishing Operations: embossing, debossing, blind embossing, gold blocking (foil stamping), die printing, thermography, velvet printing, marbling, varnishing, graining, laminating, gumming, gluing, punching, perforating, applique, Indexing, Edge Decoration: requirement, colouring the edges, marbling edges, edge guilding, round corner cutting. Numbering: folio numbering, double numbering, duplicate numbering, principle of rotary numbering, skip numbering, automatic numbering. Binding & Finishing Machines: Study of Various Modern Machines, Modern Guillotines - Single Knife Guillotines, Three Knife Trimmers, Knife Grinding Machine. Gold Blocking/Foil Stamping Machine. Wire Stitching Machine. Laminating Machine, Smashing Machine. Back Gluing Machine. Roller Gliding Machine. Inline Rounding Machine. Lining Machine. Modern Lining Machine. Casing in Machine. Case Making Machine.

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KALINGA UNIVERSITY, KOTNI , NEAR MANTRALAYA, NAYA RAIPUR - 492101, CHHATTISGARH

CALL: +91-9907252100