

**Ahmednagar Jilha Maratha Vidya Prasarak Samaj's
New Arts, Commerce, and Science College, Ahmednagar
(Autonomous)
(Affiliated to Savitribai Phule Pune University, Pune)**



**National Education Policy (NEP)
Choice Based Credit System (CBCS)**

**Programme Skeleton and Syllabus of
B.Voc.Printing Technology (Major)**

**Implemented from
Academic Year 2023-24**

Credit Distribution: B.Voc Printing Technology (Major) including Minor and OE and other courses.

	Type of Courses	III Yr	IV Yrs (Honours)	IV Yrs Research
Major Printing Technology	Discipline-Specific Courses (DSC)	46	74	66
	Discipline Specific Elective (DSE)	08	16	16
	Skill Enhancement Courses (SEC)	06	06	06
	Vocational Skill Courses (VSC)	08	08	08
	On-Job Training (OJT)	04	08	04
	Field Project (FP)	04	04	04
	Community Engagement and Service (CEP)	02	02	02
	Research project	00	00	12
	Research Methodology	00	04	04
	Total (I, II and III Year)	78	122	122
Minor	Minor	20	20	20
Other Courses	Open Elective (OE)/ Multidisciplinary Courses	12	12	12
	Indian Knowledge System	02	02	02
	Co-Curricular Courses	08	08	08
	Ability Enhancement Courses	08	08	08
	Value Education Courses	04	04	04
	Total	132	176	176

Programme Framework (Course Distribution): B.Voc. Printing Technology (Major)

Year	Semester	Level	Major											Total	
			DSC		DSE		SEC		VSC		FP/OJT /IN/CEP/PR		IKS		
			T	P	T	P	T	P	T	P	T	P	T	T	P/PR
I	I	4.5	2	1	-	-	-	1	-	-	-	-	01	03	02
I	II	4.5	2	-	-	-	-	1	-	1	-	-		02	02
II	III	5.0	2	1	-	-	-	1	-	-	-	1		02	03
II	IV	5.0	2	1	-	-	-	-	-	1	-	1		02	03
III	V	5.5	2	1	1	1	-	-	-	1		1		03	04
III	VI	5.5	2	1	1	1	-	-	-	1		1		03	04

Programme Framework (Credit Distribution): B.Voc. Printing Technology (Major)

Year	Semester	Level	Major											Total
			DSC		DSE		SEC		VSC		FP/OJT /IN/CEP/RP		IKS	
			T	P	T	P	T	P	T	P	T	P	T	
I	I	4.5	4	2	-	-	-	2	-	-	-	-	02	10
I	II	4.5	6	-	-	-	-	2	-	2	-	-		10
II	III	5.0	6	2	-	-	-	2	-	-	-	2		12
II	IV	5.0	6	2	-	-	-	-	-	2	-	2		12
III	V	5.5	8	2	2	2	-	-	-	2		2		18
III	VI	5.5	6	2	2	2	-	-	-	2		4		18

Programme Framework (Courses and Credits): B.Voc. Printing Technology (Major)

Sr. No.	Year	Sem ester	Level	Course Type	Course Code	Title	Credits
1.	I	I	4.5	DSC-1	BVOC-PT111T	Fundamentals of Printing Technology	02
2.	I	I	4.5	DSC-2	BVOC-PT112T	Screen Printing Technology	02
3.	I	I	4.5	DSC-3	BVOC-PT113P	Offset Machines	02
4.	I	I	4.5	SEC-1	BVOC-PT114P	Screen Printing	02
5.	I	I	4.5	IKS-1	BVOC-PT115T	Science and Technology in Ancient India	02
6.	I	II	4.5	DSC-4	BVOC-PT121T	Sheet-fed Offset Printing Process	03
7.	I	II	4.5	DSC-5	BVOC-PT122T	Ink Technology	03
8.	I	II	4.5	SEC-2	BVOC-PT123P	Sheet-fed Offset Printing	02
9.	I	II	4.5	VSC-1	BVOC-PT124P	Ink Mixing and Shade Matching	02
10.	II	III	5.0	DSC-6	BVOC-PT231T	Gravure and Flexography Printing Process	03
11.	II	III	5.0	DSC-7	BVOC-PT232T	Web Offset Printing Process	03
12.	II	III	5.0	DSC-8	BVOC-PT233P	Gravure Printing Process	02

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13.	II	III	5.0	SEC-3	BVOC-PT234P	Advanced Screen Printing	02
14.	II	III	5.0	FP-01	BVOC-PT235P	Field Project-1	02
15.	II	IV	5.0	DSC-9	BVOC-PT242T	Digital Printing and Basics of Color	03
16.	II	IV	5.0	DSC-10	BVOC-PT242T	Basics Packaging Technology	03
17.	II	IV	5.0	DSC-11	BVOC-PT243P	Digital Printing	02
18.	II	IV	5.0	VSC-2	BVOC-PT244P	Basics Packaging Technology	02
19.	II	IV	5.0	CEP-01	BVOC-PT245P	Community Engagement and Services	02
20.	III	V	5.5	DSC-12	BVOC-PT351T	Print Finishing	04
21.	III	V	5.5	DSC-13	BVOC-PT352T	Color Science and Measurement	04
22.	III	V	5.5	DSC-14	BVOC-PT353P	Print Finishing	02
23.	III	V	5.5	DSE-01	BVOC-PT355T (A)	Security Printing	02
24.	III	V	5.5	DSE-02	BVOC-PT356P (A)	Seminar and Technical Communication	02
25.	III	V	5.5	DSE-01	BVOC-PT355T (B)	Advertising and Multimedia	02
26.	III	V	5.5	DSE-02	BVOC-PT356P (B)	Advertising and Multimedia	02
27.	III	V	5.5	VSC-3	BVOC-PT357P	Trouble Shooting and Maintenance	02
28.	III	V	5.5	FP-02	BVOC-PT358P	Field Project -2	02
29.	III	VI	5.5	DSC-15	BVOC-PT361T	Material Science	03
30.	III	VI	5.5	DSC-16	BVOC-PT362T	Package Design and Development	03
31.	III	VI	5.5	DSC-17	BVOC-PT363P	Paper and Ink Testing	02
32.	III	VI	5.5	DSE-03	BVOC-PT364T (A)	Copyright and Ethics	02
33.	III	VI	5.5	DSE-04	BVOC-PT365P (A)	Cost Estimation	02
34.	III	VI	5.5	DSE-03	BVOC-PT364T (B)	Electronic Publishing	02
35.	III	VI	5.5	DSE-04	BVOC-PT365P (B)	Electronic Publishing	02
36.	III	VI	5.5	VSC-4	BVOC-PT366P	Package Design and Development	02
37.	III	VI	5.5	OJT-01	BVOC-PT367P	On Job Training	04

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Board of Studies in Printing Technology

Sr. No.	Name	Designation
1.	Prof.Priyamvada U. Patil	Chairman
2.	Hon.Prof.A.D.Gangarde	Member
3.	Hon.Prof.Abhijeet Jadhav	Member
4.	Hon. Dr.Kamal Chopra	Academic Council Nominee
5.	Hon.Prof.Parag Hase	Academic Council Nominee
6.	Hon.Prof.Madhura Mahajan	Vice-Chancellor Nominee
7.	Hon.Mr.Vineet Chahajed	Alumni
8.	Hon.Mr.Narendra Firodia	Industry Expert
9.	Prof. A.P.Gadhawe	Member (co-opt)
10.	Prof. Neha Kulkarni	Member (co-opt)
11.	Prof. S.V. Pekhale	Invitee
12.	Prof.V.R.Ekshinge	Invitee

1. Introduction of the programme

The B. Voc. program is of three-year duration. It has a specific feature of multi point entry and multi point exit provision. Hence a student, who completes one year, shall be awarded Certificate in Diploma subject to the condition of earning the required credit points. Similarly, after completing the second year, Advance Diploma shall be awarded. On successful completion of third year, candidate shall be awarded the degree of Bachelor in Vocational (Printing Technology). If any student desire to take admission to other university at any other stage i.e., on completing first year, he/she may be permitted to take admission to second year in same branch. Similarly, on completing the second year, one can be admitted to the third year of the program. This program aims to :

- 1: To provide teaching/learning facilities in Printing Technology for easy adaptation to Printing industry and higher Education.
- 2: Provide a platform for self learning to meet the challenges of changing technology .
- 3: Inculcate Ethical values, Entrepreneur and Encourage innovation, team spirit and leadership qualities to succeed in professional career.
- 4: Comprehend the societal needs and environmental concerns in the field of Printing Technolog
- 5: Every student is exposed to the computer lab at the I & II Semesters itself in order to familiarize himself with skills required for keyboard/mouse operation, Internet usage and e-mailing.

2. Programme outcomes :

In first year students shall be equipped with the subject knowledge and required skills and training on pre-press technology, offset printing process, printing material science, packaging technology.

In second year students shall learn the subjects of digital pre-press technology, Gravure printing process, Packaging technology, software's in printing with the required practical's in these areas.

In third year, students shall learn the subjects of printing, finishing technology, flexographic printing process, digital and security printing, mechanical maintenance, cost estimation, entrepreneurship with the required practical knowledge in these areas. The practical exposure and training will be provided through a compulsory industrial training, project work, case studies etc. On completion of the Course students will :

- 1: Get Knowledge of pre-press technology, offset printing process, printing material science, packaging technology with the practical aspects involved with it.
- 2: Have the skill of Offset printing process and they will reach the level of Diploma in printing Technology.
- 3: Get knowledge about digital pre-press technology, Gravure printing process, screen, sublimation printing process, packaging technology, Computer science applicable to printing with the practical aspects involved with it.
- 4: Be involved in projects right from project planning to final outcome ready for client Delivery.
- 5: Develop Entrepreneurship skills. Student can gain the skills of setting up their own business.

**Ahmednagar Jilha Maratha Vidya Prasarak Samaj's
New Arts, Commerce and Science College, Ahmednagar
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Syllabus
B.Voc. Printing Technology (Major)**

Title of the Course: Fundamentals of Printing Technology								
Year: I				Semester: I				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
DSC-1	BVOC-PT111T	02	00	02	30	15	35	50

Learning Objectives:

1. The primary goal is to prepare students for a successful professional career in the Printing Technology.
2. To get good knowledge of printing process. During the course we can learn various types of printing process, methods of surface preparation, color theory, proofing techniques etc.
3. Also you can learn different types of new devices used in printing technology like image setter.

Course Outcomes (Cos)

- a) To learn and understand the basic concepts of the printing technology.
- b) Understand various basic printing principles with their applications.
- c) Understand basics of paper and ink technology.

Detailed Syllabus:

Unit 1	Introduction of Basic Elements	07 Hrs.
Printing – Definitions, Brief History and Introduction Pre-Press - Printing Workflow, Typography, 2D and 3D Typefaces, Family, Series of Type, Legibility and Readability of Type, Type Measurement, Type Alignment and Arrangement, DTP, Camera Processing, Types of Originals, Conversion to Film Output - Negative, Positive and Tracing, CTP Technology Press		
Unit 2	Printing Principals	08 Hrs.
Press: Study of working principle, (relief, planography, and intaglio), offset, gravure, flexography, screen printing, digital and letterpress printing etc. Construction Image carriers, advantages and disadvantages and Limitations.		

Post-Press - Binding Techniques, Hard Binding, Paperback Binding, Mechanical Loose Leaf Binding, Finishing Techniques such as Punching, Embossing, Foiling, Lamination, Varnishing, Spot UV

Unit 3	Offset & Screen Printing	09 Hrs.
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Offset: Introduction, Sheet fed machine units- feeding, inking, damping, printing and delivery unit. Definition of Web machine, Difference between sheet-fed and web-fed. Configuration- Blanket to Blanket, Common Impression Cylinder, Stack, Inline Applications and Limitations of offset process.

Screen Printing Process: Basics of Screen Printing –Introduction to Screen Printing, Important Elements Affecting the Process, Frames - Purpose and Requirements , Types of Materials, Types of Sections, Frame Size Selection Criteria, Squeeze – Purpose and Requirements, Types of Squeezes, Applications

Unit 4	Basics of Design, Layout and Color	06 Hrs.
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Design - Introduction to Graphic Design, Fundamentals of Design, Principles of Design Layout – Purpose and Advantages, Layout Styles, Layout Components, Stages in Preparing a Layout, Marking-Up, Dummy, Stages of Layout, Thumbnails, Rough Layout, Comprehensive Layout. Color - Definition of Color, Light, Electromagnetic Spectrum, Additive Color Theory, Subtractive Color Theory

Unit 5 Printing Materials

Page layout and margin, print area and type-setting, different publications. Paper; its different types and sizes available, gsm, suitability factors for printing process, ISO paper sizes. Imposition; definition, classification and general rules, regular schemes up to 16 page.

Suggested Readings/Material:

Sr. No	Title	Author	Publisher
1	Printing Technology	Adams, Faux and Rieber	Delmar publishers
2	Art and Production	N. N. Sarkar	Sagar publishers
3	Screen Printing B. D. Mendiratta	B. D. Mendiratta	

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Syllabus

B.Voc. Printing Technology (Major)

Title of the Course: Screen Printing Technology								
Year: I				Semester: I				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
DSC-2	BVOC-PT112T	02	00	02	30	15	35	50

Learning Objectives:

1. Screen printing is an effective technique for creating bold canvases, posters and artwork, but the method can also be used to print fabrics and textiles, so it's great for creating all sorts of custom clothing and products.
2. This course aims at learning about Screen Printing in theoretical way. In this work based on color of stock, fibers printing on T-shirts, Plastics with complete knowledge about printing.
3. In the course also work on Screen Printing, Textiles and other content.

Course Outcomes (Cos)

1. Demonstrate the ability to design, plan and create technically sound and conceptually related screen printed images.
2. Use creative and critical thinking to develop a body of work from a broad, unified concept or theme.
3. Reflect on the role of socially engaged practice within the discipline of print making.

Detailed Syllabus:

Unit 1	Introduction of Screen Printing	07 Hrs.
Screen Printing History, Need of Screen Printing, Types of printing process, Scope of Screen printing technology etc. Types of inks used for screen , importance of Screen in printing industry etc., its types importance.		
Unit 2	Screen Printing Principals	08 Hrs.
Study of working principle, (Grayscale Printing, Simulated Process Printing), Types of Mesh, Mesh Count, DPI, LPI, PPI, Flat printing etc. Construction and working of Screen Printing advantages and disadvantages and Limitations.		
Unit 3	Substrates and Techniques	09 Hrs.

Different types of substrates used to screen printing, Different inks used for screen printing, Glass Printing, Cup Printing, T-Shirt Printing. screen stretching, squeegee, off contact. Stencil-Direct, indirect Screen printing- Manual operation. Applications and limitations. Automation in Screen Printing.		
Unit 4	Machines in Screen Printing	06 Hrs.
Machines used for screen Printing , Substrate wise flexibility in Screen printing. Screen printing tools and techniques including printing on alternate materials, equipment and tool care, health and safety, image generation techniques: stencils, drawing fluid, masking, photo emulsion, drawing and painting on mylar, registration, color mixing, color theory, studio protocol, research and ideation, aesthetics etc.		

Suggested Readings/Material:

Sr. No	Title	Author	Publisher
1	Silkscreen Masters	Rieber	Kendar publishers
2	Art and Production	J.N. Noinda	Nitin publishers
3	Screen Printing B. D. Mendiratta	B. D. Mendiratta	

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Syllabus
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Title of the Course: Offset Machines								
Year: I				Semester: I				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
DSC-3	BVOC-PT113P	00	02	02	60	15	35	50

Learning Objectives:

1. Define the offset printing technique
2. Explain the importance of the services before printing
3. Explain the importance of graining plate surfaces
4. Explain important point about printing plate exposing system and printing plate exposing standardization
5. Explain the roles of printing fountain solution and water pH

Course Outcomes (Cos):

After Completion of the course student will gain knowledge in :

1. Offset Printing Production
2. Exposing system methods of plate, and plate exposing standardization
3. Paper of Offset printing and Types of offset printing inks
4. Web offset and sheet feed offset printing machines

Detailed Syllabus:

Assignment 1	Introduction of Offset Machine	12 Hrs.
a) Introduction to offset machine. b) Feeder setting for various stocks. c) Mounting of plate with packing. d) Mounting of blanket with packing.		
Assignment 2	Offset Printing Principles	16 Hrs.
a) Gripper setting of impression cylinder. b) Setting of dampening roller. c) Preparation of fountain solution. d) Cleaning & washing of Dampening and Inking system.		

Assignment 3	Machine Settings and Printing	12 Hrs.
a) Inking unit setting according to job. b) Setting – joggers, skeleton wheels, delivery anti set-off spray. c) Single Color printing.		
Assignment 4	Multicolor printing and Trouble shooting	10 Hrs.
a) Multicolor printing. b) Troubleshooting c) Registration		
Assignment 5	Skills On Offset	10 Hrs.
a) Printing on both sides of sheet. b) Maintenance of entire offset machine c) Registration for Multicolor printing.		

Suggested Readings/Material:

Sr. No	Title	Author	Publisher
1	Offset Masters	Sheinor	Sulekha publishers
2	Rides on Offset	C.D Onirona	Nitin publishers
3	Offset Printing B. D. Mendiratta	B. D. Mendiratta	

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Title of the Course: Screen Printing								
Year: I				Semester: I				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
SEC-1	BVOC-PT114P	00	02	02	60	15	35	50

Learning Objectives:

1. Screen printing is an effective technique for creating bold canvases, posters and artwork, but the method can also be used to print fabrics and textiles, so it's great for creating all sorts of custom clothing and products.
2. Prepare screen printing image carrier by direct, indirect photographic methods.
3. Demonstrate the use of different photographic films for mesh preparation according to image.
4. Produce different printed samples for various substrates like fabric, glass, acrylic, wood by selecting suitable inks & coatings for that material.
5. Produce & analyze a halftone dot image generated for four color printing and registration of color.
6. Analyze the common faults in Screen Printing Proces

Course Outcomes (Cos)

1. Demonstrate the ability to design, plan and create technically sound and conceptually related screen printed images.
2. Use creative and critical thinking to develop a body of work from a broad, unified concept or theme.
3. Reflect on the role of socially engaged practice within the discipline of print making.

Detailed Syllabus: Example

Assignment 1	Introduction of Screen Printing	12 Hrs.
a) Study of screen printing equipment and materials. b) Screen Frame Making c) Determining optimum exposure for various stencil methods.		
Assignment 2	Screen Printing Principals	16 Hrs.
a) Screen preparation and printing by direct method. b) Screen preparation and printing by indirect method.		

c) Manual Registration Method		
Assignment 3	Substrates and Techniques	12 Hrs.
a) To print single color image by screen printing on paper b) To print two color image by screen printing on paper		
Assignment 4	Different Substrate	10 Hrs.
a) Product printing: Visiting card, Letterhead, Office File, Pen, Envelope b) Textile - T-Shirt, Nonwoven. c) Glass Printing, Wood Printing		
Assignment 5	Machines in Screen Printing	10 Hrs.
a) Print On Flexiable Substrate b) Maintenance of allover Screen c) Four Colour Printing with proper Registration		

Suggested Readings/Material:

Sr. No	Title	Author	Publisher
1	Silkscreen Masters	Rieber	Kendar publishers
2	Art and Production	J.N. Noinda	Nitin publishers
3	Screen Printing B. D. Mendiratta	B. D. Mendiratta	

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Title of the Course: Science and Technology in Ancient India								
Year: I				Semester: I				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
IKS-1	BVOC-PT115T	02	00	02	30	15	35	50

Learning Objectives:

1. To introduce learners to the landscape of Vedic literature with broad taxonomy of Indic knowledge systems.
2. Creating awareness amongst the youths about the true history and rich culture of the country.
3. Understanding the scientific value of the traditional knowledge of India.
4. Promoting the youths to do research in the various fields of Indian knowledge system.

Course Outcomes (Cos)

1. youth will be aware about the true history and rich culture of the country,also the history of printing and publusing in India.
2. Youths can do reaserah in various interdisciplinary couoses of Indian knowledge system

Detailed Syllabus: Example

Unit I: Importance of Study of History of Science (15)

- 1.1 Indian Knowledge System and overview.
- 1.2 Importance of Ancient Knlowledge
- 1.3 Defining Indian Knoelwdgw system.
- 1.4 The IKS corpos-a classification framework
- 1.5 The vedic corpos –Introduction to vedas and four vedas
- 1.6 vedic life features

Unit II: History of Printing and Publishing in Ancient India (15)

- 2.1 Print Revolution in India
- 2.2 The history of the printing press in India
- 2.3 Impact of Print Revolution in India

Suggested Readings/Material:

- 1.<https://ndl.iitkgp.ac.in>
- 2.<https://www.doabooks.org/>
- 3.Printing in ancient India, by B. Ch. Chhabra, East and West, 1959.
<http://www.jstor.org/stable/29754139>
4. Printing Industry In India, Wikipedia.
https://en.wikipedia.org/wiki/Printing_industry_in_India
5. History of Printing, Printing India.
<http://printingindia.com/history/indianhistory.html>

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Title of the Course: Sheet-fed Offset Printing Process								
Year: I				Semester: II				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
DSC-4	BVOC-PT121T	03	00	03	45	30	70	100

Learning Objectives:

1. Learn cylinder configurations and importance of packing
2. Learn Computer to Plate techniques
3. Understand Ink flow techniques
4. Understand working of dampening systems and importance of dampening solutions
5. Understand operation of feeder and delivery
6. Understand printability responses and green printing initiatives

Course Outcomes (Cos)

On successful completion of the course the student will be able to:

1. Identify blanket types and demonstrate packing requirements
2. Understand various plate imaging technologies and distinguish the plate types
3. Solve troubleshooting related to inking and dampening systems
4. Describe sheet transfer and drying techniques
5. Interpret print results and compare with standard conditions

Detailed Syllabus:

Unit 1	Basics of Offset Workflow and Cylinder geometry and configurations	10 Hrs.
Introduction to Offset Printing used for commercial and packaging, Sheet fed Process Flow diagram, construction of printing units, 5 and 7 o'clock cylinder geometry, packing requirements for plate and blanket cylinders, blanket types and blanket structure, automatic		

plate changing		
Unit 2	CTP technologies	10 Hrs.
Surface preparation for Offset, layout preparation, CTP –thermal and violet, CTCP and other technologies, Role of Silver halide layer, Digital Plate Surface preparation, thermal plate and Violet plate processing and developing		
Unit 3	Inking Systems in Sheet-fed Offset Process	09 Hrs.
Study of different inking systems, principle of ink transfer in inking system – hydrodynamic thrust and ink splitting, different metering systems of ink duct, roller materials for conventional and hybrid UV Offset machines, UV sheetfed for packaging printing, integrated color measurement, inking unit temperature control		
Unit 4	Dampening Systems in Sheet-fed Offset Process	08 Hrs.
Construction of Dampening System, Developments and modifications in dampening system construction, Dampening Roller materials, fountain solutions & their characteristics, continuous flow dampening in sheetfed presses, Role of different constituents used in fountain solutions, Effective use of IPA and IPA substitutes in fountain solution.		
Unit 5	Feeder and Delivery Unit	08 Hrs.
Feeders – study of all parts of feeders, mechanisms of sheet transfer- double diameter and triple diameter impression cylinders and transfer drums, shaft less feeders, suction belts sheet guiding, grippers, mechanism in delivery system, IR dryers and UV, LED-UV, LEC-UV dryers, powder spray systems, pressure regulated chambered doctor blade system for inline coating		

Suggested Readings/Material:

Sr. No	Title	Author	Publisher
1	Offset Masters	Sheinor	Sulekha publishers
2	Rides on Offset	C.D Onirona	Nitin publishers
3	Offset Printing B. D. Mendiratta	B. D. Mendiratta	

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Syllabus

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Title of the Course: Ink Technology								
Year: I				Semester: II				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
DSC-5	BVOC-PT122T	03	00	03	45	30	70	100

Learning Objectives:

1. A process in which the image is in relief above a printing plate, and ink applied to the plate.
2. Ink is manufactured in two stages: first varnish (a mixture of solvent, resins and additives) is made and then pigments are mixed into it.
3. Varnish is a clear liquid that solidifies as a thin film.

Course Outcomes (Cos)

1. Ink Manufacturing Production
2. Ink Mixing and Shade Matching
3. Panton Matching types of Shades

Detailed Syllabus:

Unit 1	Introduction to Ink Technology	08 Hrs.
1.1 Different types of printing processes, 1.2 Types of inks used for printing processes: Liquid inks and paste inks 1.3 Raw materials used in an ink: 1.3.1 Pigment: pigment function, types: organic, inorganic, white, black, extenders, pigment properties 1.3.2 Vehicles - Function &Types - Drying vehicles, Non Drying vehicles 1.3.3 Resins -Natural resins, Synthetic Resins 1.3.4 Solvents - Hydrocarbons, Aliphatic, Alcohols, Wash up solvents 1.3.5 Additives -, Waxes, wetting agents, Anti set off compounds, Shortening compounds, Reducers, Plasticizers Stiffening agents 1.3.6 Driers - Liquid driers, Paste driers, Inhibitors, Accelerators		
Unit 2	Inks for Different Printing Processes	08 Hrs.

<p>2.1 Classification of inks based on printing processes:</p> <p>2.1.2 Offset inks - General formulation, properties</p> <p>2.1.3 Gravure inks - General formulation, properties</p> <p>2.1.4 Flexographic inks - General formulation, properties</p> <p>2.1.5 Screen Inks - General formulation, properties</p> <p>2.1.6 Specialty inks - Toners, Ink jet inks, magnetic inks, OCR inks, Scratch off inks, water washable inks, Water sensitive inks, Invisible inks, Thermo - chromic ink, fluorescent inks, metallic inks.</p>		
Unit 3	Manufacturing and Drying Methods of Printing Ink	15 Hrs.
<p>3.1 Liquid Ink Manufacture –Mixing & milling - ball mill,</p> <p>3.2 Paste Ink Manufacture –Mixing & milling - three roll mills, bead mill, attritor mill and grinding media types and its function.</p> <p>3.3 Preparation of varnishes, Ink Pigment Dispersion Process: Wetting of the Pigment Particles, Breakdown of the Pigment Particles, Stabilization of the Dispersion; The influence of various process parameters on the pigment dispersion.</p> <p>3.4 Ink drying methods: Absorption, oxidation & polymerization, evaporation, precipitation, heat set, cold set, radiation drying or curing i.e. ultra violet curable, electron beam curable, Infrared curable, Radio frequency drying and radiation curable equipment.</p> <p>3.5 End use properties - Rub and scuff resistance, Adhesion flexibility block resistance, Skid & product resistance, Light fastness, heat seal resistance, lamination tests; Optical properties- Opacity, Gloss.</p>		
Unit 4	Rheology of Printing Inks	07 Hrs.
<p>4.1 Introduction to Rheology, Shear Flow, Shear Rate, Shear Stress, Newtonian fluids, non-Newtonian fluids , Shear Thinning Liquids, Shear Thickening Liquids, Thixotropy of Ink, Visco-Elasticity, loss modulus and elastic modulus.</p> <p>4.2 Factors that have effect on Rheological Behavior of Printing Ink, Influence of Ink Rheology on Printing Quality.</p> <p>4.3 Study of measuring equipment's such as viscometer, B4 ford cup, Zahn cup.</p>		
Unit 5	Testing Methods Of Printing Ink	07 Hrs.

5.1 Ink Tests and Measurement: Ink proofing, Tests for color, shade & strength, viscosity, solids content, ink compatibility, ink adhesion test, COF, Rub resistance, Gloss, Mottle, Wet and Dry Abrasion resistance, 5.2 Testing methods for printing smoothness, ink receptivity, picking and runnability.

5.3 Quality Control for Paste and Liquid inks.

5.4 Troubleshooting in various printing processes.

Suggested Readings/Material:

Sr. No.	Author	Title of Book	Publishers name
1	L. C. Young	Materials in Printing Processes.	Focal Press Ltd, , London.
2	D. E. Visset	The Printing Ink Mannual	Northwood Books London
3	Dr. Nelson R. Eldered	What Printer Should Know About Ink	Third Edition, (2001), Published by GATF Press, Pittsburgh
4	Chris H. Williams,	Printing Ink Technology,	Third Edition (2001), Pira International

**Ahmednagar Jilha Maratha Vidya Prasarak Samaj's
New Arts, Commerce and Science College, Ahmednagar
(Autonomous)
Syllabus
B.Voc. Printing Technology (Major)**

Title of the Course: Sheet-fed Offset Printing								
Year: I				Semester: II				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
SEC-2	BVOC-PT123P	00	02	02	60	15	35	50

Learning Objectives:

1. A The student should be able to operate a Multi Colour Offset Printing Machine.
2. Know about the Pre-Make ready and Make ready Procedure, Maintenance of Offset Printing Machine.
3. Understanding and Maintain the Quality Control Management in the Printing Industry.

Course Outcomes (Cos):

After completion of the course student will be able :

1. To perform Offset Printing Production
2. Exposing system methods of plate, and plate exposing standardization
3. Analyse the problems occurring during the Make ready & Multicolour Printing
4. Power transmission, Electrical controls and pumps maintenance
- 5.

Detailed Syllabus:

Assignment 1	Feeder to Delivery Setting	15 Hrs.
a) Setting of feeder unit in single color offset printing process. b) Setting of Delivery unit in single color offset printing process. c) Setting of ink duct and ink tracking path in inking unit of single color offset printing process.		
Assignment 2	Setting of Dampening System	15 Hrs.
a) Setting of Dampening system b) To measure and prepare the fountain solution c) Mounting of plate		

Assignment 3	Make Ready	20 Hrs.
a) Mounting of blanket on blanket cylinder b) Make ready procedure for single color printing c) Two color printing with perfect registration		
Assignment 4	Cleaning and Trouble shooting	10 Hrs.
a) Cleaning of inking and dampening unit b) Troubleshooting		

**Ahmednagar Jilha Maratha Vidya Prasarak Samaj's
New Arts, Commerce and Science College, Ahmednagar
(Autonomous)
Syllabus
B.Voc. Printing Technology (Major)**

Title of the Course: Ink Mixing and Shade Matching								
Year: I				Semester: II				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
VSC-1	BVOC-PT124P	00	02	02	60	15	35	50

Learning Objectives:

- a) ink mixing and shade matching techniques on various substrates.
- b) color mixing ratio and calculations for total quantity of ink being used.
- c) Drawdown, and ink shade comparison with standard

Course Outcomes (Cos)

- a) Understand ink mixing and shade matching techniques on various substrates.
- b) Understand color mixing ratio and calculations for total quantity of ink being used.
- c) Understand drawdown, and ink shade comparison with standard

Detailed Syllabus:

	Assignments	60Hrs.
	<ol style="list-style-type: none">1. Take a sample color from printed absorbent paper and match the color using same absorbent paper using same color, write down the ratio of colors used. Attach a drawdown.2. Take a sample color from printed glossy paper and match the color using same glossy paper using same color, write down the ratio of colors used. Attach a drawdown.3. Take a sample color from printed non- absorbent substrate and match the color using same non-absorbent substrate using same color, write down the ratio of colors used. Attach a drawdown.4. Take a wet color sample and match the color using any substrate, write down the ratio of colors used. Attach a drawdown.5. Take a wet color sample and match the color using any substrate, write down the ratio of colors used. Attach a drawdown.6. Take a PANTONE process color and match the color using substrate, write down the ratio of colors used. Attach a drawdown.7. Take a PANTONE process gray color and match the color using substrate, write down the ratio of colors used. Attach a drawdown.	

8. Take a PANTONE SPOT Color and match the color using substrate, write down the ratio of colors used. Attach a drawdown.
9. Take a PANTONE Metallic color and match the color using substrate, write down the ratio of colors used. Attach a drawdown.
- 10.** Take a PANTONE Solid color and match the color using any substrate, write down the ratio of colors used. Attach a drawdown.