GOVERNMENT OF RAJASTHAN
BOARD OF TECHNICAL EDUCATION RAJASTHAN
JODHPUR

SEMESTER SCHEME-2020-21

(SESSION 2021-2022 & ONWARDS)

TEACHING AND EXAMINATION SCHEME AND SYLLABUS

PRINTING TECHNOLOGY

(PR)

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Board of Technical Education,Rajasthan
W-6 Residency Road,
Jodhpur

GOVERNMENT OF RAJASTHAN

BOARD OF TECHNICAL EDUCATION RAJASTHAN, JODHPUR

TEACHING AND EXAMINATION SCHEME

(SEMESTER SCHEME-2020-21)

FOR DIPLOMA **III SEMESTER (PRINTING TECHNOLOGY) (PR)**

SESSION 2021-2022 & ONWARDS

Subject Category	Subject Code	Subjects	Distribution of Time				Distribution of Max. Marks/ Duration							Total Marks	Credits
			Hours per week				End Semester Exam				Internal Assessment				
			L	T	P	Tot	TH	Hrs.	PR	Hrs.	CT	TU/Assi	PR(S)		
PC	PR 3001	Fundamentals of Printing	2	0	0	2	60	3	–	—	20	20	—	100	2
PC	PR 3002	Printing Design	2	0	0	2	60	3	–	—	20	20	—	100	2
PC	PR 3003	Printing Processes	2	0	0	2	60	3	–	—	20	20	—	100	2
PC	PR 3004	News paper Technology	3	0	0	3	60	3	–	—	20	20	—	100	3
PC	PR 3005	Letter Assembly	3	0	0	3	60	3	–		20	20	–	100	3
PC	PR 3006	Letter Press Machining	3	0	0	3	60	3	–	–	20	20	–	100	3
PC	PR 3007	Printing Workshop	0	0	4	4	–	–	40	–	–	–	60	100	2
PC	PR 3008	Composing Lab	0	0	2	2	–	–	40	–	–	–	60	100	1
PC	PR 3009	Letter Press Machining Lab	0	0	2	2	–	–	40	–	–	–	60	100	1
SI	PR 3010	Summer Internship-I (4 weeks after II Sem)	–	–	–	–	–	–	100	–	—	–	–	100	2
VS	+PR 3333	Anandam (Joy of Giving)	--	--	1	1	--	--	--	--	--	--	100	100	2
		Students Centered Activities	0	0	3	3	--	--	--	--	--	--	--	--	0
		Total	**15**	**0**	**12**	**27**	**360**		**220**		**120**	**120**	**280**	**1100**	**23**
													Grand Total :	**1100**	**23**

1. L : Lecture
2. T : Tutorial
3. P : Practical
4. TH : Marks for End Semester Exam for Theory
5. PR : Marks for End Semester Exam for Practical
6. CT : Marks for class tests (Internal Assessment)
7. TU/Assi : Marks for tutorials/Assignment (Internal Assessment)
8. PR(S) : Marks for practical and viva (Internal Assessment)

1. +PR 3333 is same in all branches of Engineering.

Student Centered Activities will be graded as A, B, C & D on the basis of attendance and interest of the student in learning.

GOVERNMENT OF RAJASTHAN
BOARD OF TECHNICAL EDUCATION RAJASTHAN, JODHPUR
TEACHING AND EXAMINATION SCHEME
(SEMESTER SCHEME-2020-21)
FOR DIPLOMA **IV SEMESTER (PRINTING TECHNOLOGY) (PR)**
SESSION 2021-2022 & ONWARDS

Subject Category	Subject Code	Subjects	Distribution of Time				Distribution of Max. Marks/ Duration							Total Marks	Credits
			Hours per week				End Semester Exam				Internal Assessment				
			L	T	P	Tot	TH	Hrs.	PR	Hrs.	CT	TU/Assi	PR(S)		
PC	PR 4001	Reproduction Photography & Technique-1	3	0	0	3	60	3	–	-	20	20	—	100	3
PC	PR 4002	Printing Science	3	0	0	3	60	3	--	-	20	20	---	100	3
PC	PR 4003	Photo Litho Plate Making	3	0	0	3	60	3	--	-	20	20	---	100	3
PE	PR 4004	**Programme Elective-I** PR 40041- Accounting Costing & Estimating PR 40042- Sheet fed Technology	3	0	0	3	60	3	--	-	20	20	---	100	3
PE	PR 4005	**Programme Elective-II** PR 40051- Converting Operations & Packaging PR 40052- Flexo And Gravure	3	0	0	3	60	3	--	-	20	20	---	100	3
PC	PR 4006	Surface Preparation Lab	0	0	4	4	--	--	40	3	--	---	60	100	2
PC	PR 4007	Photo Reproduction Lab -I	0	0	4	4	--	--	40	3	--	--	60	100	2
PC	PR 4008	Printer's Science Lab	0	0	2	2	--	--	40	3	--	--	60	100	1
PR	PR 4009	Minor Project	0	0	4	4	--	-	40	3	-	-	60	100	2
AU	+PR 4222	Essence of Indian Knowledge and Tradition	2	0	0	2	--	--	--	-	--	--	--	--	0
VS	+PR 4444	Anandam (Joy of Giving)	-	-	1	1	--	--	--	-	--	--	100	100	2
		Students Centered Activities	0	0	3	3	–	--	--	--	--	--	--	--	0
		Total	**17**	**00**	**18**	**35**	**300**		**160**		**100**	**100**	**340**	**1000**	**24**
													Grand Total :	**1000**	**24**

. L : Lecture
2. T : Tutorial
3. P : Practical
4. TH : Marks for End Semester Exam for Theory
5. PR : Marks for End Semester Exam for Practical
6. CT : Marks for class tests (Internal Assessment)
7. TU/Assi : Marks for tutorials/Assignment (Internal Assessment)
8. PR(S) : Marks for practical and viva (Internal Assessment)

1. +PR 4222 and +PR 4444 are same in all branches of Engineering

Student Centered Activities will be graded as A, B, C & D on the basis of attendance and interest of the student in learning.

Note: Students will go for 6 Weeks Summer Internship in the Summer Vacations after Fourth Semester. The assessment of the Summer Internship will be done in Fifth Semester

GOVERNMENT OF RAJASTHAN
BOARD OF TECHNICAL EDUCATION RAJASTHAN, JODHPUR
TEACHING AND EXAMINATION SCHEME
(SEMESTER SCHEME-2020-21)
FOR DIPLOMA **V SEMESTER (PRINTING TECHNOLOGY) (PR)**
SESSION 2022-2023 & ONWARDS

Subject Category	Subject Code	Subjects	Distribution of Time				Distribution of Max. Marks/ Duration							Total Marks	Credits
			Hours per week				End Semester Exam				Internal Assessment				
			L	T	P	Tot	TH	Hrs.	PR	Hrs.	CT	TU/Assi	PR(S)		
PC	PR 5001	Advance Printing Techniques	3	0	0	3	60	3	–	-	20	20	—	100	3
PC	PR 5002	Book Binding, Warehousing & Finishing	2	0	0	2	60	3	–	-	20	20	—	100	2
OE	+PR 5100	**Open Elective-I** +**PR 51001-** Economic Policies in India +**PR 51002-** Engineering Economics & Accountancy	3	0	0	3	60	3	–	-	20	20	—	100	3
PC	PR 5003	Reproduction Photography & Technique-II	3	0	0	3	60	3	–	-	20	20	—	100	3
PE	PR 5004	**Programme Elective-- III** **PR 50041-** Ink Technology **PR 50042-** Screen Printing Technology	3	0	0	3	60	3	–	-	20	20	—	100	3
PE	PR 5005	**Programme Elective - IV** **PR 50051-** Printing Materials **PR 50052-** C Programming	3	0	0	3	60	3	–	-	20	20	—	100	3
PC	PR 5006	Photo Reproduction Lab -II	0	0	4	4	–	–	40	3	–	–	60	100	2
PC	PR 5007	Post Press Operations Lab	0	0	2	2	–	–	40	3	–	–	60	100	1
SI	PR 5008	Summer Internship-II (6 weeks after IV Sem.)	0	0	0	0	–	–	100	-	–	–	–	100	3
PR	PR 5009	Major Project	0	0	2	2	–	–	–	-	–	–	–	–	--
VS	+PR 5555	Anandam (Joy of Giving)	--	--	1	1	--	--	--	-	--	--	100	100	2
		Students Centered Activities	0	0	3	3	--	--	--	-	--	--	--	--	--
		Total	**17**	**0**	**12**	**29**	**360**		**180**		**120**	**120**	**220**	**1000**	**25**
													Grand Total :	**1000**	**25**

1. L : Lecture
2. T : Tutorial
3. P : Practical
4. TH : Marks for End Semester Exam for Theory
5. PR : Marks for End Semester Exam for Practical
6. CT : Marks for class tests (Internal Assessment)
7. TU/Assi: Marks for tutorials/Assignment (Internal Assessment)
8. PR(S) : Marks for practical and viva (Internal Assessment)

1. +PR 51001, +PR 51002 and +PR 5555 are same in all branches of Engineering

Student Centered Activities will be graded as A, B, C & D on the basis of attendance and interest of the student in learning.

Note:Major Project will be continued and Assesed in VI Semester

GOVERNMENT OF RAJASTHAN
BOARD OF TECHNICAL EDUCATION RAJASTHAN, JODHPUR
TEACHING AND EXAMINATION SCHEME
(SEMESTER SCHEME-2020-21)
FOR DIPLOMA **VI SEMESTER (PRINTING TECHNOLOGY) (PR)**
SESSION 2022-2023 & ONWARDS

Subject Category	Subject Code	Subjects	Distribution of Time				Distribution of Max. Marks/ Duration							Total Marks	Credits
			Hours per week				End Semester Exam				Internal Assessment				
			L	T	P	Tot	TH	Hrs	PR	Hrs	CT	TU/Assi	PR(S)		
HS	+PR 6111	Entrepreneurship and Start-ups	3	1	0	4	60	3	–	-	20	20	—	100	4
OE	+PR 6200	**Open Elective-II** **+PR 62001-** Project Management **+PR 62002**- Renewable Energy Technologies	3	0	0	3	60	3	–	-	20	20	—	100	3
OE	+PR 6300	**Open Elective-III** **+PR 63001-** Product Design **+PR 63002-** Disaster Management	3	0	0	3	60	3	–	-	20	20	—	100	3
AU	+PR 6333	Indian Constitution	2	0	0	2	–	–	–	–	–	–	–	–	0
PC	PR 6001	Offset Litho Machining	3	0	0	3	60	3	–	-	20	20	—	100	3
PC	PR 6002	Offset Machining Lab	0	0	4	4	–	–	40	3	–	–	60	100	2
PR	PR 6003	Major Project	0	0	6	6	--	--	40	--	--	--	60	100	4
SE	PR 6004	Seminar	1	0	0	1	–	–	–	–	–	–	100	100	1
VS	+PR 6666	Anandam (Joy of Giving)	--	--	1	1	--	--	--	--	--	--	100	100	2
		Students Centered Activities	0	0	3	3	--	--	--	--	--	--	--	--	--
		Total	**15**	**1**	**14**	**30**	**240**		**80**		**80**	**80**	**320**	**800**	**22**
													Grand Total :	**800**	**22**

1. L : Lecture
2. T : Tutorial
3. P : Practical
4. TH : Marks for End Semester Exam for Theory
5. PR : Marks for End Semester Exam for Practical
6. CT : Marks for class tests (Internal Assessment)
7. TU/Assi: Marks for tutorials/Assignment (Internal Assessment)
8. PR(S) : Marks for practical and viva (Internal Assessment)

1. +PR 6111, +PR 62001, +PR 62002, +PR 63001, +PR 63002, +PR 6333 and +PR 6666 are same in all branches of Engineering

Student Centered Activities will be graded as A, B, C & D on the basis of attendance and interest of the student in learning.

GOVERNMENT OF RAJASTHAN

BOARD OF TECHNICAL EDUCATION RAJASTHAN JODHPUR

SEMESTER SCHEME-2020-21

III SEMESTER

(SESSION 2021-2022 & ONWARDS)

FUNDAMENTALS OF PRINTING

Course Code	PR 3001
Course Title	FUNDAMENTALS OF PRINTING
Number of Credits	2 (L-2,T-0, P-0)
Prerequisites	NIL
Course Category	PC

COURSE CONTENTS:

UNIT 1 –

1.1 Introduction to printed products like leaflets, pamphlets, Booklets, catalogues, brochures, manuals, books , posters, calendars, Magazines, newspapers, business forms, commercial stationary, labels, cartons.
1.2 Point of sales, displays folders and other forms of direct-mail literatures.
1.3 Factors to be considered for print planning, purpose, budget, and materials.

UNIT 2 –

2.1 Design Elements: point, line, space, shape, mass, size, scale, colour, tone, texture, pattern, balance, contrast and Harmony

UNIT 3 –

3.1 Typographic Elements: Type Fundamentals, main groups of type face design, Type series, Selection of typefaces suitable to the subject or product.
3.2 Relation between type face and printing processes & Type face and paper surfaces.
3.3 Legibility and readability, Monograms, Trade-marks and logotypes.

UNIT 4 –

4.1 Colour Elements :Colour theory terms used to describe colour (Hue, Brightness, Value, Shade, Tint)
4.2 Warm & cold colour, Colour wheel
4.3 Relationship between colours (Complimentary, Analogous, Split-complementary Colour)
4.4 Selection of colour for two-or-three or four colour jobs.
4.5 Choice and effective use of colours

UNIT 5 –

5.1 Illustrative Elements: Types of original for illustration reproduction ,Continuous tone copy.
5.2 Line drawing, Black & white colour requirements of artwork, High contrast & low contrast illustrations.

UNIT 6-

6.1 Illustration Corrections: Masking, Scaling, cropping of illustration, reduction and enlargement.

UNIT 7-

7.1 Layout Elements**:** Basic geometric shapes, Disposition of elements, Space, Principles of symmetrical and asymmetrical arrangements,
7.2 Distinction between geometric and optical centres, Page structures, Arrangement of illustrations and text matter

UNIT 8-

8.1 Airbrush**:** Principle, Design & its Applications

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Art & Print Production — N.N.Sarkar
2. Typographic Design and letter Assembly — B.D.Mahindiratta
3. Introduction to Printing — Herbert Simonn
4. Type — David Gates
5. Hand book on printing technology — NIIR Board

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PRINTING DESIGN

Course Code	PR 3002
Course Title	PRINTING DESIGN
Number of Credits	2 (L-2,T-0, P-0)
Prerequisites	NIL
Course Category	PC

COURSE CONTENTS:

Unit 1-

1.1 Principles of Design: Balance, Optical centre, Harmony, Contrast, Unity, Proportion, Rhythm, Simplicity.

Unit 2-

2.1 Basic Design: Visual ingredients like point, line, tone, shape, texture, colour, scale, symmetrical and asymmetrical styles.

Unit 3-

3.1 Typographic Design and Layout: Purpose and suitability, use of ornaments, copy preparation.
3.2 Page dimensions & margins, white space, use of Borders, Rules & other decorative materials.
3.3 Selection of types in relation to the paper, printing process, Psychology of typefaces, marking up copy

Unit 4-

4.1 Original Art Works**:** Preparation of line and halftone originals, Copy writing
4.2 Stages of layout (Visuals, Rough layout, Finishing Layout), Layouts and design suitable for reproduction
4.3 Formal and informal layouts, Dummy preparations.

Unit 5-

5.1 Letter Forms: Lettering, Development of letter from early Roman inscriptions to present-day-type designs.
5.2 The design of Typefaces & Letters for printing and their suitability for particular printing techniques and paper surface.
5.3 Legibility and readability, Optical spacing, Letter-space, Line-space, Text and display types, Drop letters and Initial letters.

Unit 6-

6.1 Design for Reproduction: Modern and anaesthetic design,
6.2 Various methods of reproduction like direct printing process, Indirect printing process, Die-stamping, Collotype, Mimeograph.

Unit 7-

7.1 Application of Photography in Design: Preparation and selection of finished designs of advertising, Magazines, Book covers, Catalogues, Brochures, Incorporating photographs.

Unit 8-

8.1 Design Organization: Relationship of a design studio with production and sales departments,
8.2 Control and checking of artwork.
8.3 The employment of freelance artists, Designers, Photographers.

Unit 9-

9.1 Proof Correction: Proof reading routines for different kinds of work
9.2 Proof Reading and Editing

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Art & Print Production — N.N.Sarkar
2. Typographic Design and letter Assembly — B.D.Mahindiratta
3. Hand book on Printing Technology — NIIR Board
4. Introduction to Printing — Herbert Simonn

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PRINTING PROCESSES

Course Code	PR 3003
Course Title	PRINTING PROCESSES
Number of Credits	2 (L-2, T-0, P-0)
Prerequisites	NIL
Course Category	PC

COURSE CONTENTS:

Unit 1-

1.1 History: Origin and development from fifteenth century
1.2 Definition of printing & Modern trends in printing.
1.3 Planning- such as purpose, budget, materials.

Unit 2-

2.1 Classification of Printing processes.
2.2 Principle involved in Relief, Planography, Intaglio, Stencil printing, Dry offset,
2.3 Commercial suitability, Limitations, Identifying features in the print of these processes,
2.4 Current development in Pre-press, Press and Finishing process

Unit 3-

3.1 Letter Press Printing- Types & Function of machines.
3.2 Basic Impression methods and applications.

Unit 4-

4.1 Lithographic Printing: Principles & Outline of lithographic reproduction & its applications.
4.2 Outline & principle of photo lithographic- Reproduction.

Unit 5-

5.1 Offset Printing: Introduction & Principle & Application.

Unit 6-

6.1. Gravure Printing: Introduction & Principle & Application.

Unit 7-

7.1 Silk Screen Printing: Introduction & Principle & Application.

Unit 8-

8.1 Dry Offset: Introduction & Principle & Application.

Unit 9-

9.1 Flexography: Introduction & Principle & Application.

Unit 10-

10.1 Digital Printing: Introduction & Principle & Application.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Art & Print Production — N.N.Sarkar
2. Letter Press Printing — Anupam Prakashan
3. Screen Printing — Kailash Takale
4. Flexo & Gravure — Printing Review, NewDelhi
5. Offset Printing — Anupam Prakashan
6. Modern Printing Technology — NIIR Board
7. Pocket Guide to Digital Printing — Frank Cost

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NEWSPAPER TECHNOLOGY

Course Code	PR 3004
Course Title	NEWSPAPER TECHNOLOGY
Number of Credits	3 (L-3, T-0, P-0)
Prerequisites	NIL
Course Category	PC

COURSE CONTENTS:

Unit 1-

1.1 Newspaper Organization: Various department in newspaper like Editorial Department, Advertisement Department, Circulation Department, Production Department, Accounts Department, Personnel Department, Store Department, Library their function, organisation, responsibility.

Unit 2-

2.1 Newspaper Design: House style of newspaper, Newspaper typography.

2.2 Page making Elements like column, caption, master head, footer, print line etc.

Unit 3-

3.1 Newspaper Materials: News Print, Ink, Fountain Solution, Plate, Blankets & Rollers.

Unit 4-

4.1 Newspaper Plate Setters: Application and CtP & CtF concepts.

4.2 Various types of CtP like violet, thermal, laser, inkjet CtP.

4.3 Various types of CtF like laser, inkjet CtF.

Unit 5-

5.1 Newspaper printing machine: Cold Set Web-Offset, Heat Set Web-Offset, Web Offset Folder, Different types of Printing Units.

Unit 6-

6.1 Newspaper Production Process: Pre press work, Press (Printing & Folding), Post Press operations like Insetting, Counting, Binding & Dispatch.

Unit 7-

7.1 Quality Control: Controlling of Fountain Solution ph & conductivity, Controlling of print waste, Controlling colour density using Densitometer

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Newspaper Management Patrika Publication

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LETTER ASSEMBLY

Course Code	PR 3005
Course Title	LETTER ASSEMBLY
Number of Credits	3 (L-3, T-0, P-0)
Prerequisites	NIL
Course Category	PC

COURSE CONTENTS:

Unit 1-

1.1 Type: Dimension of type, Physical parts, Faces, Size range, Type Fonts, Extra sorts.

Unit 2-

2.1 Hand Composing: Method of Hand Composing, Setting the Measure, Composing and Justifying, Table and Tabular Setting, Distribution.

Unit 3-

3.1 Composing Room Materials, Tools & Furniture: Types of Spacing Materials their description & applications

3.2 Locking-up devices & Chases, Compositor Tools, Composing room Furniture and Equipments, proofing press.

Unit 4-

4.1 Typographical Details: Spelling, Compound of Words, Division of Words, Capitalization, Small Capitals, Italics, Figures, Abbreviations, Ampersand '&', Punctuations, Measure, Leading, Paragraphs, Captions, Foot notes, Initial Letters.

4.2 Word Spacing, Letter Spacing, Parentheses and Brackets, Hyphens and Dashes, Reference Marks, Quotations Marks, Optical alignment & centring of lines

Unit 5-

5.1 Composition Room Calculation: Terminology, Casting Off, Copy fitting, Casting up, Weight of Type & Leads, Point and Point System

Unit 6-

6.1 Copy Editing & Preparation

6.2 Proof reading & Duties of Proof Reader, Proof correction marks.

6.3 Duties of Copy holder, House Style & Typography, Requirement of proof reading room.

Unit 7-

7.1 Imposition: Imposition Terminology (upright & oblong, section, inset & outset, signature & collating marks, inner & outer form, perfecting, verso & recto, margin & gutter margin etc.)

7.2 Sheet and half sheet work, General Rules of Imposition.

7.3 Regular imposition schemes of 4,8,12 and 16 pages.

7.4 Four and Eight page jobs printed in two-up, Folding schemes.

Unit 8-

8.1 Computers in Composition: Study of computer equipments its function and operations, Software requirement.

8.2 Word processing, electronic scanning, electronic page make-up, Laser printer.

Unit 9-

9.1 Correction and Editing Methods: Soft copy correction and Hard copy correction.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Adhunik Sanyojan Shashtra — Anupam Prakashan
2. Typographic Design and letter Assembly — B.D.Mahindiratta
3. Letter Press Printing — Anupam Prakashan
4. Letter Assembly in Printing — Wooldridge D.

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LETTER PRESS MACHINING

Course Code	PR 3006
Course Title	LETTER PRESS MACHINING
Number of Credits	3 (L-3, T-0, P-0)
Prerequisites	NIL
Course Category	PC

COURSE CONTENTS:

Unit 1-

1.1 Letter Press Machines: Materials used & Principles of Letterpress machines, Proving press, Vertical job machines.

Unit 2-

2.1 Work of letterpress printers: Appropriate sequence of operations, Pre-make-ready & Make-ready, its purpose & principles involved, Choice of appropriate dressing.

2.2 Causes and remedies of common difficulties, Handling & storage of forms, Use of furniture and quoins, various types of mounting bases.

Unit 3-

3.1 Platen Machine: Simple platen machine, Automatic platens, Adjustments, Control of inking and impression.

3.2 Locking-up Devices- Hand fed &Automatic machines, Setting of automatic feeders, Make-ready of all kinds of forms Methods of hand feeding, Safety guards.

Unit 4-

4.1 Cylinder Machines: Classification Relative merits and limitations, Mechanical and operational features of Feeding, inking, Delivery Systems, Sheet control, Registration.

4.2 Perfecting machine

Unit 5-

5.1 Rotary Machines: Classification, Mechanical and operational feature of rotaries for Newspaper, Magazines, Books, Forms, Stationary.

Unit 6-

6.1 Automatic Feeders: Principles and Classification, Mechanical and operational features of models in use.

Unit 7-

7.1 Make-Ready: Make-ready on cylinder machines regarding text matter, line & halftone blocks.

7.2 Underlay, Interlay & Overlay making. Hand out stand mechanical overlays.

Unit 8-

8.1 Imposition: Scheme of imposition up to 32 pages (Sheet work & Half sheet work)

Unit 9-

9.1 Defects: Analysis of causes and remedies of various defects

Unit 10-

10.1 Miscellaneous Operations like Creasing, Perforating, Embossing, Thermography, Vignettes and cut outs.

Unit 11-

11.1 Letter Press Inks: Characteristics, Modification, Care and Storage.

Unit 12-

12.1 Rollers: Kinds of rollers, Seasoning, Cleaning and the use of suitable solvents, Care and storage.

Unit 13-

13.1 Multicolour Printing: Colour sequence and its effect & Colour mixing and matching.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Printing by Letterpress — Hutchings, E.A.D.
2. Theory and Practice of Press Work — U.S. Govt. Printing office
3. Akshar Mudran Shastra (Hindi) — Misra, C.S.
4. Letter Press Printing I & II — Misra, C.S.
5. Handbook on Printing Technology — NIIR Board

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PRINTING WORKSHOP

Course Code	PR 3007
Course Title	PRINTING WORKSHOP
Number of Credits	2 (L-0, T-0, P-4)
Prerequisites	NIL
Course Category	PC

PRACTICALS:-

1. Letter press:
1.1 Oiling and cleaning of platen machine.
1.2 Pre make-ready of a platen form.
1.3 Proofing on platen machine with line block.
1.4 Simple imposition exercises up to 8 pages.

2. Offset Printing :
2.1 Steps of handling and care of offset machine.
2.2 Preparation of Plate for receiving image.
2.3 Proofing on sheet fed offset machine.

3. Silk screen Printing :
3.1 Preparation of silk screen.
3.2 Image formation on screen by coating and stencil method.
3.3 Proofing.

Note: Visit to local Offset printing industry
Visit to local Gravure printing industry
Visit to local Flexography printing industry
Visit to local Dry Offset printing industry

REFERENCE BOOKS :

1. Art & Print Production — N.N.Sarkar
2. Introduction to Printing — Herbert Simonn
3. Letter Press Printing — Anupam Prakashan
4. Modern Lithography — Ian Fanx
5. Screen Printing — Kailash Takale
6. Flexo & Gravure — Printing Review, NewDelhi
7. Offset Printing — Anupam Prakashan

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COMPOSING LAB

Course Code	PR 3008
Course Title	COMPOSING LAB
Number of Credits	1 (L-0, T-0, P-2)
Prerequisites	NIL
Course Category	PC

PRACTICALS:-

1. Hand Composition:

1.1 Introduction of composition room materials and tools.
1.2 Drawing of layout of the cases in Hindi.
1.3 Drawing of layout of the cases in English.
1.4 Measure Making & Composing Matter.
1.5 Proofing of composed matter, Proof reading & Correction

2. Computer Composition:

2.1 Handling & Operating of computer equipments
2.2 Scanning of original in B/W, Gray, Colour
2.3 Justification (Left, Right, Centre, Justify)
2.4 Composing with Text & Photo
2.5 Hard & Soft Copy Corrections

REFERENCES / SUGGESTED LEARNING RESOURCES:

1 Adhunik Sanyojan Shashtra Anupam Prakashan
2. Typographic Design and letter Assembly B.D.Mahindiratta
3. Letter Press Printing Anupam Prakashan
4. Letter Assembly in Printing Wooldridge D.

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LETTER PRESS MACHINING LAB

Course Code	PR 3009
Course Title	LETTER PRESS MACHINING LAB
Number of Credits	1 (L-0, T-0, P-2)
Prerequisites	NIL
Course Category	PC

PRACTICALS:-

1. Exercises in pre-make-ready of Platen Machine
2. Exercises in imposition up to 16 pages (sheet work)
3. Exercises in imposition up to 16 pages (half sheet work)
4. Handling, make-ready and operation of cylinder machines.
5. Printing of text and halftone combination.
6. Printing of vignettes and cut out blocks.
7. Preparation of overlay.
8. Exercises in cutting.
9. Exercises in numbering.
10. Exercises in embossing.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1 Adhunik Sanyojan Shashtra — Anupam Prakashan
2. Typographic Design and letter Assembly — B.D.Mahindiratta
3. Letter Press Printing — Anupam Prakashan
4. Letter Assembly in Printing — Wooldridge D.
5. Akshar Mudran Shastra (Hindi) — Misra, C.S.

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GOVERNMENT OF RAJASTHAN

BOARD OF TECHNICAL EDUCATION RAJASTHAN JODHPUR

SEMESTER SCHEME-2020-21

IV SEMESTER

(SESSION 2021-2022 & ONWARDS)

REPRODUCTION PHOTOGRAPHY & TECHNIQUE- I

Course Code	PR 4001
Course Title	REPRODUCTION PHOTOGRAPHY & TECHNIQUE-I
Number of Credits	3 (L-3, T-0, P-0)
Prerequisites	NIL
Course Category	PC

COURSE CONTENTS:

Unit 1-

1.1 Process Photography: Principles and Outline of the process, Photographic films
1.2 Brief introduction of photographic cameras in use.
1.3 Practice of photography like Exposing, Processing, Printing, Enlarging.

Unit 2-

2.1 Process Optics: Process room equipments, Process camera its structure and types.
2.2 Requisites of process lens & Standard lens design.
2.3 Characteristics of line originals and their Suitability for reproduction, Stripping.

Unit 3-

3.1 Line Photography: Dry film process (Exposure, Development & after treatments), Factors governing exposure
3.2 Preparation of line negatives, Defects of negative & Positive, Preparation Positives on dry film.

Unit 4-

4.1 Contact Photography: Basic principle and Applications, Advantage and Limitations, determining correct exposure, Inspection of negatives and positives, Hard and soft dots, Contact screens & Contact Printer.

Unit 5-

5.1 Light & Colour: Nature of light, Electromagnetic waves, Light waves, Transmission, Refraction, Absorption, Colour temperature. Filters, Filter factors, ratio and their application.

Unit 6-

6.1 Photographic Films and their Processing: Structure of film sensitive emulsion.
6.2 Solution used in film development, Types of developers and their components and characteristics.
6.3 Exposure and latent image, Factors controlling development, Fixation, Reduction, Intensification, Hardening.
6.4 Characteristics curve of emulsion, Dark and continuous reaction, Gray scale & Register Punch, Light integrating meter

Unit 7-

7.1 Illumination: Illuminants characteristics, Suitability of different types of illuminants.
7.2 Use of Fluorescent tubes, Xenon lamp, Electronics flash, 405nm Laser Diode.

Unit 8-

8.1 Halftone Reproduction: Glass halftone screen, Theories of dot formation, Screen distance (its calculation & correction)
8.2 Halftone negative making, Continuous tone negative making, Requirement of halftone negatives for letterpress & lithographic reproduction.
8.3 System of halftone exposures & Flash exposure, Halftone failure and remedies.

Unit 9-

9.1 Miscellaneous: Originals for Black and white halftone reproduction, Line colour work, Preparation of key drawing
9.2 Technique of colour separation by opaqueing, Tints and tint laying in negatives, Special effects photographs- Montage, Vignettes, Windows, Posterization, Conversion of halftone into line, quarter tone & special effect halftones.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1.	Graphic Arts Photography	Hentzel, Fred Ray Blair
2.	Manual of Graphic Reproduction for lithography	Eric Chambers
3.	The Handbook of Modern Halftone Photography	Ekald Fred Noemer
4.	Graphic Reproduction Photography	JWB, Focal Press, London, 1973
5.	Colour and its Reproduction	Gary G. Field,
6.	Basic Photography for the Graphic Arts	Eastman Kodak, Co. N.Y.
7.	Halftone Methods for the Graphic Arts	Eastman Kodak, Co. N.Y.
8.	Kodak Bulletin for the Graphic arts 38	Eastman Kodak, Co. N.Y.

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PRINTING SCIENCE

Course Code	PR 4002
Course Title	PRINTING SCIENCE
Number of Credits	3 (L-3, T-0, P-0)
Prerequisites	NIL
Course Category	PC

COURSE CONTENTS:

Unit 1-

1.1 Metallurgy: Principle properties and uses of Copper, Zinc, Aluminium & Chromium

1.2 Type alloy- requirements, metals used in type alloys, properties, Composition of various type alloys, melting range and melting point, Effect of Impurities and remedies, dross & segregation.

Unit 2-

2.1 Properties of Printing Inks: Viscosity, Yield value, Thixotropy, Tack, Drying time, Covering power, Resistance to chemical fading, Light fastness, Standard three and four colour process inks.

Unit 3-

3.1 Paper: Raw materials used in manufacturing & outline of paper manufacturing.

3.2 Physical and chemical testing of paper- Checking of dimensions, weight, folding endurance, busting strength, tensile strength, chemical testing, microscope examination of fiber.

3.3 Paper testing from Printers point of view- Oil absorbency, Dampening expansion, surface gloss, opacity, smoothness, pick resistance, printability of paper. Effect of humidity on paper and printing quality. Control of humidity in pressroom.

Unit 4-

4.1 Chemistry of lithography: Principles of lithography, Chemistry of plate making operations (surface & deep etch), Desensitisation and its chemistry, Chemistry of bi & tri metal plates.

Unit 5-

5.1 Physics and Chemistry of Photography: Chemistry of wet plate process, Chemistry of development, fixation, reduction, intensification, Ortho & Pen chromatism, Characteristics & Time-gamma Curve, Flare and its determination.

Unit 6-

6.1 Electronics: Photo electricity, Photoelectric cells, Application in printing, Electronic devices, Densitometer and its application in the analysis of process inks, Integrating light meters.

Unit 7-

7.1 Water: Importance of water in offset printing process, Roll of ph, conductivity & water hardness in dampening solution. Roll of fountain solution & requirement for improved dampening performance.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Hand book on printing technology — NIIR Board
2. Lithographers Manuals — G.A.T.F.
3. Paper & Inks — C.S. Mishra
4. Practical Guide Book in Offset Printing & Troubleshooting — K.Goswami
5. Printing Basic Science — Chales C. Ammonds
6. Printing Science — F. Pateman & L.C. Young

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PHOTO LITHO PLATE MAKING

Course Code	PR 4003
Course Title	PHOTO LITHO PLATE MAKING
Number of Credits	3 (L-3, T-0, P-0)
Prerequisites	NIL
Course Category	PC

COURSE CONTENTS:

Unit 1-

1.1 Litho Plate Metals: Characteristics, Ink & water receptivity of Zinc, Aluminium, Copper, Chromium, Steel, Variables in Graining like Types of grain & Anodizing.

Unit 2-

2.1 General Operations in Plate Making: Counter Etching, Pre-treatment of the surface, Pre-etching, Coating solutions.

2.2 Illuminations for printing down, Factors governing exposures, Light sensitivity of bi-chromate colloids, Dark and continuing reactions.

Unit 3-

3.1 Surface Plates: Development, Use of ammonia, Hardening of albumin image after development, Post treatment for removal of residual film, Desensitisation & After treatments.

Unit 4-

4.1 Deep Etch Plates: Development, Deep etching, Alcohol wash, Lacquering, Inking, Removal of stencil.

Unit 5-

5.1 Imaging: Multiple images by step and repeat machine, Addition and removal of work on zinc and aluminium plates, Troubles in plate making, Prevention and remedies.

Unit 6-

6.1 Specialized Plates: Pre-sensitised plates negative & positive working both, Wipe on processes, Bi-& tri-metal plates, Direct image plates.

Unit 7-

7.1 Control Devices: Light integrating meter, Light sensitivity guide, Star target.

Unit 8-

8.1 Film Assembly: Planning, Equipment and material, Preparing the layout, Imposition schemes up to 32 pages (sheet work), Imposition schemes up to 32 pages (half sheet work).

Unit 9-

9.1 Modern Plate Making Methods: Automatic plate processor, Electrostatic chemical transfer, Photo-direct, Direct-image, Projection plate making, Laser-exposed plate

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Enlarging — Jaccobson & Mathews, Focal
2. Introduction to Lithography — Gerald Wood
3. Lithographer's Manual — GATF
4. Photo litho Offset — Eric Chambers
5. Photo Mechanics & Printing — Gordon
6. Practical Photo Engraving for students — F.H. Hurdler Pitman
7. Techniques of Photography — R.O. Fosett.

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ACCOUNTING COSTING & ESTIMATING

Course Code	PR 40041
Course Title	ACCOUNTING COSTING & ESTIMATING
Number of Credits	3 (L-3, T-0, P-0)
Prerequisites	NIL
Course Category	PE

COURSE CONTENTS:

Unit 1-

1.1 Accounting: Principle of accountancy, Procedure, Preparation of trading profit & loss account, Balance sheet.

Unit 2-

2.1 Costing: Elements of cost, Objects of costing, Principle of a scientific costing system, Preparation and analysis of statement of expenses.

Unit 3-

3.1 Departmentalization: Classes of departments, Allocation & Apportionment of expenses, Bases of apportionment.

Unit 4-

4.1 Departmental Labour Cost: Direct and indirect hours, Hourly rates, Recovery of elements of cost, Distribution of Expenses, Premises, Capital, Power, Personnel, Wages, Maintenance, Administrative expenses.

Unit 5-

5.1 Distribution of Departmental cost to works: Hourly Cost rates, Direct service expenses rates.

Unit 6-

6.1 Routine office works: Estimating department, Estimate form, Order department.

6.2 Work instruction ticket, Cost sheet, Work daily docket, Daily return of materials issued, Daily delivery sheet.

6.3 Costing department, Compilation of cost sheet, recorded labour cost, Budgeted and recorded cost, Sales daybook and analysis of costs, Relative profitability.

Unit 7-

7.1 Estimating: Estimator's qualifications and work, Production norms and hourly rates, Salient features of federation Costing System. Copy Fitting & Casting off, Calculation of Quantity of Paper, Ink, Board, Covering material, Stitching wire, Numerical problems.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Accountancy for Printer — F. Shakelton
2. Cost Accounting methods & Problems — B.K. Bharti
3. Costing Accounting — Mahaveer Publication, Delhi
4. Costing Accounting — Sahitya Bhawan, Agara
5. Costing for Printer — Hery Chff
6. Estimating for Printer — Hery Chff
7. Estimating Methods & Cost Analysis for Printers — Vekataraman & Balaraman
8. Principles & Practice of Cost Accounting — N.K. Prasad
9. Printer's Costing & Estimating — B.D.Mendiratta

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SHEET FED TECHNOLOGY

Course Code	PR 40042
Course Title	SHEET FED TECHNOLOGY
Number of Credits	3 (L-3, T-0, P-0)
Prerequisites	NIL
Course Category	PE

COURSE CONTENTS:

Unit 1-

1.1 Basic principles: Introduction, Construction Design and types of machine, Single colour, Multi colour, perfecting machine, CI and Satellite principles.

Unit 2-

2.1 Feeding unit: Introduction & Function of Feeding unit, Types of Sheet feeding, Types of feeders, Mechanism of Sheet conveying, Sheet detector, sheet register, Lays, Grippers.

Unit 3-

3.1 Inking unit: Introduction & Function of Inking unit, Various parts of inking unit, Forme roller setting, Roller hardness, Care and maintenance.

Unit 4-

4.1 Dampening unit: Introduction & Function of dampening unit, Types of dampening unit, Dampener Rollers and their hardness, Fountain Solution and its circulation system, Dampening roller setting, Emulsification, Scumming, Tinting, Care and maintenance.

Unit 5-

5.1 Printing unit: Introduction & Function of printing unit, Plate Cylinder, Blanket Cylinder, Impression Cylinder, Cylinder Gear, Cylinder Bearers & Cylinder Gap, Under cut & Cylinder Packing, Cylinder Setting & Impression Setting.

Unit 6-

6.1 Delivery unit: Introduction & Function of Delivery unit, Sheet delivery system and its types, Sheet control device, Anti setoff device, Joggers, Delivery board.

Unit 7-

7.1 Pre-makeready and Makeready Operations: Introduction of these operations, Pre-makeready operations, Makeready operations.

Unit 8-

8.1 Production: Introduction, Colour Sequence, Inspection of sheets during press run, Quality control through densitometer, Uniform print quality, Standard condition for proof viewing.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Hand Book of Offset Technology — EIRI Board
2. Offset Press Troubles — R.F. Ried
3. Offset Printing — C.S.Mishra
4. Sheet Fed Offset Technology — Anjan Kumar Baral

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CONVERTING OPERATIONS & PACKAGING

Course Code	PR 40051
Course Title	CONVERTING OPERATIONS & PACKAGING
Number of Credits	3 (L-3, T-0, P-0)
Prerequisites	NIL
Course Category	PE

COURSE CONTENTS:

Unit 1-

1.1 Laminating: Requirements of materials used in laminating, Methods of laminating, Causes of de-lamination warp, Inherent stresses, Adhesion factors, Metal film and laminations.

Unit 2-

2.1 Varnishing: Economic application of varnishing, Lamination imposed by surface to be varnished, The nature of gloss, Purpose of varnish, Effect on colour, Methods of drying, Plate glazing.

Unit 3-

3.1 Carton and box Making: Planning for folding and creasing, Form making, Tools, Equipment and materials used in die from making, Grades and type of rules, Type of dies in use, Block and one piece die construction, Ejectors and rule nicking.

Unit 4-

4.1 Board and Materials used in Box-Making: Suitability of different classes of work, Cutting and creasing make-ready, Crease fault recognition, Methods of waste stripping.

Unit 5-

5.1 Folding, Gluing and Creasing Work: Type of machines used, Windowing, Waxing, Side seam gluing, Stitching machinery, Corner staying and box covering.

Unit 6-

6.1 Materials for Finishing: Adhesives, Properties, Selection and testing, Varnishes, Surface laminates, cover decorating materials, Binding materials, Metal for cutting, Stamping and embossing, Ancillary finishing equipment.

Unit 7-

7.1 Principle of Packaging: Principles of Packaging & designing, Economic importance, Advantages and selling aspects.

Unit 8-

8.1 Packaging and Dispatch: Analysis of packing requirements, Importance of packing, Transit and handling hazards, Packing materials, Methods and appliances, Applications of special containers.

Note:

1. Students should be taken to the industry where packaging work is performed.
2. Student should be taken to the industry where lamination & varnishing work is done.
3. Student should collect packaging products related to medical and prepare a record in the form of a file.
4. Student should collect packaging products related to food and prepare a record in the form of a file.
5. Student should collect packaging products related to Fast Moving Consumer Goods (FMCG) and prepare a record in the form of a file.
6. Student should collect packaging products related to liquid items and prepare a record in the form of a file.
7. Student should collect packaging products related to zipper pack and prepare a record in the form of a file.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Finishing Process in Printing — Focal Mortin, A.G
2. Hand Book of Packaging Engg — Hanlin, J.F.
3. Fundamentals of Packaging — Pain, F.A
4. Book Binding & Finishing — B.D.Mendiratta

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FLEXO AND GRAVURE

Course Code	PR 40052
Course Title	FLEXO AND GRAVURE
Number of Credits	3 (L-3, T-0, P-0)
Prerequisites	NIL
Course Category	PE

COURSE CONTENTS:

Unit 1-

1.1 Flexography: Development of the process, Types of flexography machine, Advantages of flexography.

Unit 2-

2.1 Flexography Machine units: Infeed Unit, Printing Unit, Drying Unit, Out feed Unit.

Unit 3-

3.1 Flexography Plates: Structure of Flexographic Plate, Plate Preparation Methods – Rubber Plates preparation, Sheet Photopolymer Plates preparation and Liquid Photopolymer Plates Preparation.

3.2 Structure and Mounting Techniques, Plate Mounting Fundamentals, Sticky back plate mounting, Metal backed plates, Magnetic plates, Types of Flexography Plate cylinders.

Unit 4-

4.1 Flexography Inking System: Types of Flexography Inking systems, Ink Metering.

4.2 Anilox Roller, Types of Anilox Cells and Cleaning Systems, Anilox Roll specifications – Cell count, Cell depth, Cell volume.

4.3 Types of Anilox roll based on cell shapes – Inverted Pyramid shape cells, Quadrangular shapes cell and Trihelical shape cells.

4.4 Types of Anilox Rolls based on roller surfaces –Laser engraved ceramic anilox rolls and Conventional or mechanically engraved chrome anilox rolls, Different types of Anilox Roll Cleaning Systems.

Unit 5-

5.1 Flexography Rollers: Sleeve Technology, Direct laser engraving – Laser engraving on Rubber Rollers.

Unit 6-

6.1 Flexo Substrates: Flexo Substrates – Paper and Paperboard stocks, Corrugated stocks, Plastic Films, Foils and Laminates, Corona Treatment.

Unit 7-

7.1 Principles of Gravure Printing Process: Advantages, Limitations and Characteristics of Gravure Process, Main Sections of Gravure Printing Machine: Unwind section, Printing section, Drying section and Rewind section.

Unit 8-

8.1 Structure of Gravure Cylinder: Gravure cylinder parts – Axis, Shaft, Diameter, Circumference and Face length.

Unit 9-

9.1 Gravure Drying System: Drying Chamber, Solvent Recovery Systems, Environmental Friendly Solvent Removal Systems.

Unit 10-

10.1 Doctor Blade: Structure, Types and Mechanisms of doctor blade.

10.2 Impression Roller: Structure, Types and Mechanisms of Impression Roller.

10.3 Gravure Presses: Gravure Packaging Presses, Gravure Label Presses and Gravure Publication Presses.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. A Hand Book of Gravure & Flexographic Printing — Anando Seal
2. Hand book on printing technology — NIIR Board
3. Printing Technology 5e — Adams
4. Flexography - A Practical Handbook — Eudes Scarpeta
5. Flexography Primer — J. Page Crouch

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SURFACE PREPARATION LAB

Course Code	PR 4006
Course Title	SURFACE PREPARATION LAB
Number of Credits	2 (L-0, T-0, P-4)
Prerequisites	NIL
Course Category	PC

PRACTICALS:

1. Care and handling of plate making equipments.
2. Graining
3. Study of anodising.
4. Film assembly up to 16 pages.
5. Surface plate making involving line work, halftone work, and combination.
6. Deep-etch plate making involving line work, halftone work, and combination.
7. PS plate making involving line work, halftone work, and combination.
8. Line colour work from key negative and colour scheme.
9. Addition and deletion of work.
10. Study of Automatic plate processor.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Enlarging — Jaccobson & Mathews, Focal
2. Introduction to Lithography — Gerald Wood
3. Lithographer's Manual — GATF
4. Photo litho Offset — Eric Chambers
5. Photo Mechanics & Printing — Gordon
6. Practical Photo Engraving for students — F.H. Hurdler Pitman
7. Techniques of Photography — R.O. Fosett.

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PHOTO REPRODUCTION LAB-I

Course Code	PR 4007
Course Title	PHOTO REPRODUCTION LAB -I
Number of Credits	2(L-0, T-0, P-4)
Prerequisites	NIL
Course Category	PC

PRACTICALS:-

1. Basic exercise in photography.
2. Focusing the process camera to a given size.
3. Preparation of contact prints.
4. Preparation of Line negative on film
5. Preparation of positive making on films.
6. Enlargements and Reduction of originals.
7. Halftone negative making by single stop exposure system
8. Halftone negative making by multiple stop exposure system
9. Preparation of contact halftone positives.
10. Retouching practice on negative /positive

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Graphic Arts Photography — Hentzel, Fred Ray Blair
2. Manual of Graphic Reproduction for — Eric Chambers, Litho
3. Lithography — Training Service Ltd.
4. The Handbook of Modern Halftone Photography — Ekald Fred Noemer
5. Graphic Reproduction Photography — JWB, Focal Press, London, 1973
6. Colour and its Reproduction — Gary G. Field,
7. Basic Photography for the Graphic Arts — Eastman Kodak, Co. N.Y.
8. Halftone Methods for the Graphic Arts — Eastman Kodak, Co. N.Y.
9. Kodak Bulletin for the Graphic arts 38 — Eastman Kodak, Co. N.Y.

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PRINTER'S SCIENCE LAB

Course Code	PR 4008
Course Title	PRINTER'S SCIENCE LAB
Number of Credits	1 (L-0, T-0, P-2)
Prerequisites	NIL
Course Category	PC

PRACTICALS:

1. Conductivity of water determination by electronic methods.
2. ph determination by electronic methods.
3. ph determination by manual methods.
4. Determination of viscosity of Liquid.
5. Determination of GSM of any paper.
6. Determination of ream weight and substance of paper.
7. Determination of deficiency of process ink e.g. hue error and greyness.
8. Determination of folding strength.
9. Determination of resistance of ink towards ordinary chemicals such as soap water, weak alkaline and acids.
10. Determination of tensile strength of paper.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Hand book on printing technology — NIIR Board
2. Lithographers Manuals — G.A.T.F.
3. Paper & Inks — C.S. Mishra
4. Practical Guide Book in Offset Printing & Troubleshooting — K.Goswami
5. Printing Basic Science — Chales C. Ammonds
6. Printing Science — F. Pateman & L.C. Young

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ESSENCE OF INDIAN KNOWLEDGE AND TRADITION

Course Code	PR 4222 (Same in All Branches of Engg.)
Course Title	Essence of Indian Knowledge and Tradition
Number of Credits	0(L-2, T-0, P-0)
Prerequisites	None
Course Category	AU

COURSE CONTENTS:

Basic Structure of Indian Knowledge System:

(i)वेद,

(ii)उन्नवेद (आयुवेद, धनुवेद, गन्धवेद, स्थान्नत्यआदद)

(iii)वेदथाथांग (शिक्था, कलन्न, ननरुत, व्थाकरण, ज्योनतषछथांद),

(iv)उन्नथाइग (धर्मशथास्न, र्ीर्थाथांसथा, नुरथाण, तकशरथास्न)

- •Modern Science and Indian Knowledge System
- •Yoga and Holistic Health care
- •Case Studies.

REFERENCES /SUGGESTED LEARNING RESOURCES:

1. V. Sivarama Krishna, "Cultural Heritage of India- Course Material", Bhartiya Vidya Bhavan, Mumbai, fifth Edition, 2014.
2. Swami Jitatmanand, "Modern Physics and Vedant", Bhartiya Vidya Bhavan.
3. Fritz of Capra, "The wave of Life".
4. Fritz of Capra, "Tao of Physics".
5. V N Jha, "Tarka sangraha of Annam Bhatta, International" Cinmay Foundation, Velliarnad, Amakuam.
6. R N Jha, "Science of Consciousness Psychotheraphy and Yoga Practices" Vidya nidhi Prakasham, Delhi, 2016.

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GOVERNMENT OF RAJASTHAN

BOARD OF TECHNICAL EDUCATION RAJASTHAN JODHPUR

SEMESTER SCHEME-2020-21

V SEMESTER

(SESSION 2021-2022 & ONWARDS)

ADVANCED PRINTING TECHNIQUES

Course Code	PR 5001
Course Title	ADVANCED PRINTING TECHNIQUES
Number of Credits	3 (L-3,T-0, P-0)
Prerequisites	NIL
Course Category	PC

COURSE CONTENTS:

Unit 1-

1.1 Flexography: Development of the process, Basics of flexography, Advantages of flexography.

1.2 Flexography printing units, Flexography plate making, Printing subtracts.

Unit 2-

2.1 Gravure Printing: Introduction & principle of the process, Evaluation of the process, Outline of the gravure cylinder surface preparation & modern trends in surface preparation of cylinder.

2.2 Application of gravure process in periodical printing, packaging, fine art, stamp work & security printing.

Unit 3-

3.1 Digital printing process: Silver halide processes, Thermal printing processes, Mechanics of digital thermal printing

3.2 Direct thermal printing, Thermal transfer process, Laser thermal transfer process, Continuous ink jet printing, Electrographic printing.

Unit 4-

4.1 Digital colour press

Unit 5-

5.1 P.O.S. System: Need and merits, Barcode, Standardisation, JAN symbols (EAN-13), Characteristics, Barcode scanner.

Unit 6-

6.1 Miscellaneous Processes: Application & Outline of the process, Xerography, Thermography, Collotype, Die Stamping, Transfer printing.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1 Art & Print Production N.N.Sarkar
2 Flexo & Gravure Printing Review, New Delhi
3 Flexographic Principles & Practices F.C.Durramt
4 Pocket Guide to Digital Printing Frank Cost
5 Printing Technology (5e) J.Adams

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BOOK BINDING, WAREHOUSING & FINISHING

Course Code	PR 5002
Course Title	BOOK BINDING, WAREHOUSING & FINISHING
Number of Credits	2 (L-2, T-0, P-0)
Prerequisites	NIL
Course Category	PC

COURSE CONTENTS:

Unit 1-

1.1 Book Binding: Brief history, Modern trends, B.I.S and International paper sizes and sub-divisions.

1.2 Handling temperature, Humidity control, Storage and safety of printed and unprinted stock, common cause of spoilage of paper, Grams per square meter (GSM).

Unit 2-

2.1 Warehouse Operation and Machines: Jogging, Folding, Gathering, Collating, Stitching, Sewing, Cutting and trimming operations, Treatment of plates, Maps-tipping and guarding.

Unit 3-

3.1 Sewing: Different kinds, Thread cord sewing, Flexible sewing, Over costing, Tape sewing, French sewing, Side and saddle stitching, End papers and their types and common use.

Unit 4-

4.1 Forwarding Operations: In board & Out board forwarding, Gluing the back, Rounding and backing, Object-care and precautions, Reducing swelling in the back, Flat backs, Back lining, Adhesive binding, Thermoplastic un sewing, Thread less and perfect binding.

Unit 5-

5.1 Attaching Board: Dimensional variation of boards, Lining, Cutting to size, Attaching boards, Lacing in, Spilt board work.

Unit 6-

6.1 Covering Operations: Different kinds of covering materials, Measuring and cutting to size, Shape applying, Adhesive turning it, Pressing, Setting the groove or joints, Setting the head, Setting the band, Polishing, Pressing and pasting down.

Unit 7-

7.1 Finishing: Decorative with finishing tools, Blind blocking, Gold blocking, Sliding hand tools, Fillets, Pallets, Rules and meter, Lettering, Type holder, Brass type, Making for tooling and lettering, Heating, testing and pressing, Cleaning, Inlaying lacing, Bands open up and pressing, Edge-decoration, Colouring, Spraying, Marbling, Gilding, Gauffering or tooling the edges, Head bands, Hand made and machine made head bands.

Unit 8-

8.1 Adhesives: Various types and their characteristics and uses.

Unit 9-

9.1 Miscellaneous Operations: Punching, Perforating, Eye cutting, Indexing, Round cornering, Label punching, Cutting & Creasing, Numbering, Bronzing, Metal decoration, Varnishing.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Basic Book Binding — Lewis, A.W.
2. Book Binding & Finishing — B.D. Mendiratta
3. Book binding by hand — Laurance Town
4. Finishing Process in printing — Focal Mortin, A.G.
5. Hand Book of packaging Engg. — Hanlon, J.F.
6. Manual of Book Binding — Johnson, A.W.
7. Modern Book binding — Alex J. Vaughan
8. Gum, Adhesives & Sealants Technology & their Applications — NIIR Board

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ECONOMIC POLICIES IN INDIA

Course Code	PR 51001 (Same in All Branches of Engg.)
Course Title	Economic Policies in India
Number of Credits	3 (L:3, T:0, P:0)
Prerequisites	NIL
CourseCategory	OE

COURSE LEARNING OBJECTIVES:

The objective of this course is to familiarize the students of different streams with the basic concepts, structure, problems and issues concerning Indian economy.

CO1	Understand Indian economics policy, planning strategies
CO2	It will enable to students to comprehend theoretical and empirical development across countries and region for policy purposes
CO3	Development Economics as a discipline encompasses different approach es to the problems of unemployment, poverty, income generation, industrialization from different perspectives
CO4	Able to identify the problems and capable to decide the application for future development
CO5	Analyze economic issues and find solutions to complex economic problems and take correct economic judgment

COURSE CONTENTS:

1. BASIC FEATURES AND PROBLEMS OF INDIAN ECONOMY:
- 1.1. Economic History of India;
- 1.2. Nature of Indian Economy
- 1.3. Demographic features and Human Development Index,
- 1.4. Problems of Poverty, Unemploy-ment, Inflation, income inequality, Blackmoney in India.

2. SECTORAL COMPOSITION OF INDIAN ECONOMY:
- 2.1. Issues in Agriculture sector in India,
- 2.2. land reforms
- 2.3. Green Revolution
- 2.4. agriculture policies of India,

3. INDUSTRIAL DEVELOPMENT,
- 3.1. Small scale and cottage industries,
- 3.2. Industrial Policy,
- 3.3. Public sector in India,
- 3.4. Service sector in India.

4. ECONOMIC POLICIES:
- 4.1. Economic Planning in India,
- 4.2. Planning commission v/s NITI Aayog,
- 4.3. Five Year Plans,
- 4.4. Monetary policy in India,
- 4.5. Fiscal Policy in India,
- 4.6. Centre state Finance Relations,
- 4.7. Finance commission in India
- 4.8. LPG policy in India

5. EXTERNAL SECTOR IN INDIA

5.1. India's foreign trade value composition and direction,
5.2. India Balance of payment since 1991,
5.3. FDI in India,
5.4. Impact of Globalization on Indian Economy,
5.5. WTO and India.

REFERENCE BOOKS:

1. Dutt Rudder and K.P.M Sunderam (2017). Indian Economy .S Chand & Co.Ltd. New Delhi.
2. Mishra S. K & V. K Puri (2017). Indian Economy and Its Development Experience. Himalaya Publishing House.
3. Singh, Ramesh, (2016): Indian Economy, Tata-McGraw Hill Publications, New Delhi.
4. Dhingra, I.C., (2017): March of the Indian Economy, Heed Publications Pvt. Ltd.
5. Karam Singh Gill, (1978): Evolution of the Indian Economy, NCERT, NewDelhi
6. Kaushik Basu (2007): The Oxford Companion to Economics of India ,Oxford University Press.

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ENGINEERING ECONOMICS & ACCOUNTANCY

Course Code	PR 51002 (Same in All Branches of Engg.)
Course Title	Engineering Economics & Accountancy
Number of Credits	3 (L:3, T:0, P:0)
Prerequisites	NIL
Course Category	OE

COURSE OBJECTIVES

•To acquire knowledge of basic economics and facilitate the process of economic decision making.
•To acquire knowledge on basic financial management aspects.
•To develop the basic skills to analyze financial statements.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

CO1	Understand the macro-economic environment of the business and its impact on enterprise
CO2	Understand cost elements of the product and its effect on decision making
CO3	Prepare accounting records and summarize and interpret the accounting datafor managerial decisions
CO4	Understand accounting systems and analyze financial statements using ratio analysis
CO5	Understand the concepts of financial management and investment

COURSE CONTENTS

1. INTRODUCTION:
- 1.1. Managerial Economics;
- 1.2. Relationship with other disciplines;
- 1.3. Firms: Types, objectives and goals;
- 1.4. Managerial decisions;
- 1.5. Decision analysis.

2. DEMAND & SUPPLY ANALYSIS:
- 2.1. Demand;
  - 2.1.1. Types of demand;
  - 2.1.2. Determinants of demand;
  - 2.1.3. Demand function;
  - 2.1.4. Demand elasticity;
  - 2.1.5. Demand forecasting;
- 2.2. Supply;
  - 2.2.1. Determinants of supply;
  - 2.2.2. Supply function;
  - 2.2.3. Supply elasticity.

3. PRODUCTION AND COST ANALYSIS:
- 3.1. Production function;
- 3.2. Returns to scale;
- 3.3. Production optimization;
- 3.4. Least cost input; Iso quants;
- 3.5. Managerial uses of production function;
- 3.6. Cost Concepts;

3.6.1. Cost function;
3.6.2. Types of Cost;
3.6.3. Determinants of cost;
3.6.4. Short run and Long run cost curves;
3.6.5. Cost Output Decision;
3.6.6. Estimation of Cost.

4. PRICING:

4.1. Determinants of Price;
4.2. Pricing under different objectives and different market structures;
4.3. Price discrimination;
4.4. Pricing methods in practice;
4.5. Role of Government in pricing control.

5. FINANCIAL ACCOUNTING (ELEMENTARY TREATMENT):

5.1. Balance sheet and related concepts;
5.2. Profit & Loss Statement and related concepts;
5.3. Financial Ratio Analysis;
5.4. Cash flow analysis;
5.5. Funds flow analysis;
5.6. Comparative financial statements;
5.7. Analysis & Interpretation of financial statements;
5.8. Investments;
5.9. Risks and return evaluation of investment decision;
5.10. Average rate of return;
5.11. Payback Period;
5.12. Net Present Value;
5.13. Internal rate of return,

REFERENCE BOOKS:

1.Mc Guigan, Moyer and Harris,' Managerial Economics; Applications, Strategy and Tactics', Thomson South Western, 10th Edition, 2005.

2.Prasanna Chandra. 'Fundamentals of Financial Management', Tata Mcgraw Hill Publishing Ltd., 4th edition,2005.

3.Samuelson. Paul A and Nordhaus W. D., 'Economics', Tata Mcgraw Hill Publishing Company Limited, New Delhi, 2004.

4.Paresh Shah, 'Basic Financial Accounting for Management', Oxford University Press, NewDelhi, 2007.

5.Salvatore Dominick, 'Managerial Economics in a global economy'. Thomson SouthWestern, 4th Edition, 2001.

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REPRODUCTION PHOTOGRAPHY & TECHNIQUE-II

Course Code	PR 5003
Course Title	REPRODUCTION PHOTOGRAPHY & TECHNIQUE-II
Number of Credits	3 (L-3,T-0, P-0)
Prerequisites	NIL
Course Category	PC

COURSE CONTENTS:

Unit 1-

1.1 Densitometry: Optical density and its measurement.
1.2 Transmission and reflection Densitometer & their applications.

Unit 2-

2.1 Colour and its Reproduction: Preparation of colour, Additive and subtractive colours, Colour reproduction by subtractive process.
2.2 Filters, Filter factor, Filter ratio & their determination, Circular screen and angles.
2.3 Direct colour separation, Use of Gray Scale, Register marks, Colour separation guides, Black Printer negative.
2.4 Indirect colour separation from a reflection copy & small transparency, Evaluation of separation negatives.

Unit 3-

3.1 Colour Correction: Deficiency of process inks, Correction by positive masking & Negative masking.
3.2 Multi layer dye mask, High light mask.
3.3 Single overlay, Double overlay, Tri-mask, Multi mask, Under colour removal, Camera back masking.

Unit 4-

4.1 Miscellaneous Camera Works: Duo tone negative making, Re-screening of halftone proofs, Preparation of screen tints, Dropout negatives, Contact screen and halftone techniques, Line and halftone combination, Auto screen films, Register control devices, Photographic colour proofing.

Unit 5-

5.1 Electronic Colour Scanners: Working principles and parts, Functions of an electronic colour scanner, Advantages over conventional colour correction, Copy analysis with exposure control & adjustment, Electronic circuitry computer facilities, Sharp and un sharp masks, Under-colour removal, Scanning (Reflection copy & Transmission copy).

Unit 6-

6.1 Electronic Colour Separation: Principles of electronic colour separation, Colour correction, Various kinds of copy scanning with size reproduction, Scanner output, Programming, Operation of scanner & precautions, Evaluation of separation negatives and positive, Dot generation.

Unit 7-

7.1 Retouching: Dot etching, Staging, Brush etching, Chemical reduction, Farmers reducer, Retouching screen negative and positive, Colour charts, Under colour removal, Sequence of colour printing, Dot size and dot percentage.

Unit 8-

8.1 Quality Control Aids: Tone and colour controls, Grey scales, Colour control patches, The ink paper interaction, Measurement and control by Densitometer, Use of punch register systems for perfect registration, Proofing methods.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Colour Control in Lithography — Kelvin Tritton
2. Graphic Arts Photography — G.A.T.F
3. Graphic Reproduction photography — J.M. Buden
4. Halftone Photography — G.A.T.F
5. Line Photography — G.A.T.F

6. Lithographers Manual G.A.T.F
7. Photo Machines G.A.T.F
8. Printing Technology (5e) J.Adams

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INK TECHNOLOGY

Course Code	PR 50041
Course Title	INK TECHNOLOGY
Number of Credits	3 (L-3, T-0, P-0)
Prerequisites	NIL
Course Category	PE

COURSE CONTENTS:

Unit 1-

1.1 Raw Materials used in Inks: Pigments, Dye stuffs, Oils, Resins, Solvents, Plasticiser, Waxes, Drives, Other additives.

Unit 2-

2.1 Different methods of Drying of Inks: Absorption, Evaporation, Precipitation, Oxidation.

Unit 3-

3.1 Manufacturing Processes of Ink

Unit 4-

4.1 Letterpress Ink: General Consideration and troubles with letterpress inks during printing.

Unit 5-

5.1 Lithographic Inks: Qualities of good offset inks.
5.2 Merits of offset inks like- Draying capacity, Moisture resistance, Tackiness, Flow, Viscosity, Thixotropy,
5.3 Optical merits like- Opacity, Colour effect, Colour strength, Faded colour, Ink lifting, Heat resistance, Affected from light.
5.4 Various types of offset inks like- Sheet fed inks, Heat set inks, Quick set inks, High Gloss Inks, Web fed inks, Metallic inks, Metal decorative inks, Magnetic inks, Moisture set inks, Process inks.

Unit 6-

6.1 Gravure Inks: General consideration, Inks for packaging, paper & board, cellulose films, plastic films, Aluminium foil, Publication gravure inks.

Unit 7-

7.1 Flexographic Inks: General consideration, Substrates, Raw material and additives, Formulation, Press behaviour of Flexo inks.
7.2 Inks for: paper, flexible films, PVC films, polyester films, aluminium foils, ultravoilet-Curing inks (UV Inks).

Unit 8-

8.1 Screen Inks: Characteristics of screen inks, Raw materials.
8.2 Inks for: Paper & Board, impervious surfaces, metal containers, sheet plastic, glass, plastic containers, printed circuits resists, transfer inks, overprinting varnishes, fluorescent inks, process inks.

Unit 9-

9.1 Inks for Special Purpose: Inks for use on food wrappers and packages, Phosphorescence ink, Textile transfer inks, Carbonising inks, Magnetic inks, Drop Out Inks, Gold & Silver varnishing inks.

Unit 10-

10.1 Quality Control of Inks: Care & Storage of inks.
10.2 Quality Control Test like- Viscosity, Colour strength, Ink Drying on paper/machine, Pigment test, Specific density, Printability, Rub resistance, Emulsification.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Flexo & Gravure — Printing Review, New Delhi
2. Modern Technology of Printing Inks — EIRI Board
3. Modern Technology of Printing Writing Inks — NIIR Board
4. Paper & Ink — C.S. Mishra

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SCREEN PRINTING TECHNOLOGY

Course Code	PR 50042
Course Title	SCREEN PRINTING TECHNOLOGY
Number of Credits	3 (L-3, T-0, P-0)
Prerequisites	NIL
Course Category	PE

COURSE CONTENTS:

Unit 1-

1.1 Introduction: Historical Development of screen printing, Principle, Nature and scope, Application.

Unit2-

2.1 Accessories and Equipments used in screen printing process.

2.2 Chemical and Materials used in screen printing process.

Unit 3-

3.1 Originals for Screen Printing: Classification, Requirement for good original, Masking, Cropping and Sizing process.

Unit 4-

4.1 Stencil: Preparation methods and their classification.

4.2 Screen preparation for multi colour jobs.

Unit 5-

5.1 Methods: Manual & Mechanical method of screen printing process

Unit 6-

6.1 Substrate: Various types of printing substrate like Textiles, Glass, Plastics, Jute, Ceramics, Tin, Metals, Foils Wood, Circuit board, Curved and 3D surfaces, Gumming, Flocking and Pulp based substrates.

Unit 7-

7.1 Ink: Characteristics of screen printing inks and their composition, Types and classification of inks, Job and Substrate specific inks, Drying of Screen Printing Inks.

Unit 8-

8.1 Screen Printing Problems and Remedies: like Mis-registration, uneven printing, mottling, moiré pattern, pinholes in stencil, screen clogging during printing, fading away of colour etc.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Technology of Screen Printing — B.D.Mahindiratta
2. A Guide to Professional Screen Printing — Sarvdeep Singh
3. Screen Printing Technology Handbook — NIIR Board
4. Screen Printing — Kailash Takale

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PRINTING MATERIALS

Course Code	PR 50051
Course Title	PRINTING MATERIALS
Number of Credits	3 (L-3, T-0, P-0)
Prerequisites	NIL
Course Category	PE

COURSE CONTENTS:

Unit 1-

1.1 Metal: Types of metal, Characteristics of metal, Type alloys- various composition of lino & stereos & their purposes.

1.2 Effect of working temperature, Speed cooling, Impurities, Maintenance of composition, Testing for porosity, Hardness.

1.3 Metals for electro typing & their characteristics, physical and chemical properties of Magnesium, Aluminium, Zinc, Copper, Nickel, Chromium.

1.4 Metal used for printing surface like Relief, Planography & Intaglio processes and their characteristics and application.

Unit 2-

2.1 Paper & Board: Fibers, Pulping, Bleaching, Stock preparation, Paper manufacturing, Finishing converting and coating, Fibrous and Non-fibrous raw materials used in paper & board manufacture, Classification, Selection of paper and boards, Different varieties & their characteristics, Surface treatment related to ultimate use loading, sizing, colouring, coating materials, Choice of paper for different printing processes, Surface treatments.

Unit 3-

3.1 Printing Inks: General characteristics, Requirement of printing inks, Types of Pigments, Vehicles, Varnishes, Solvents, Agents.

Unit 4-

4.1 Plastics and Rubber: Various types used in Laminating, Printing, Blankets, Rollers, Stereos, Stamps, Film.

Unit 5-

5.1 Adhesives: Classification & Characteristics & range of applications of adhesives, Uses in binding & warehouse work, their range of application & selection for specific purposes.

Unit 6-

6.1 Photographic Materials and Light Sensitive Materials: Main kind of films, Photographic papers, Film positives, Main Base, Stripping, Thickness, Right & wrong reading negatives, Paper positive materials.

6.2 Photographic materials based on Silver & Non-silver, Classification according to speed, contrast, special sensitivity.

6.3 Range of sensitized materials, Relationship with different processes, Photo-sensitive polymers & their application.

Unit 7-

7.1 Print-Finishing Materials: Securing materials like Thread, Tapes, Stitching wire.

7.2 Adhesives, their classes, characteristics, applications, selection of purposes.

7.3 Cover materials like Non-woven materials, Leather, Leatherette and Plastic.

7.4 Finishing materials like Gold leaf, Metal foils, Colouring materials for edge decoration.

7.5 Material used for varnishing and lamination.

Unit 8-

8.1 Materials Handling: A brief survey of materials handling and storage of Paper, Films, Chemicals, Other printing materials.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Book Binding & Finishing — B.D. Mendiratta
2. Hand book of pulp & paper, paper board and paper based Technology — EIIR Board

3.	Hand book on Printing Technology	NIIR Board
4.	Letter Press Printing	Anupam Prakashan
5.	Modern Printing Technology	NIIR Board
6.	Offset Printing	Anupam Prakashan
7.	Practical Printing and Binding	Odhams J

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C PROGRAMMING

Course Code	PR 50052
Course Title	C PROGRAMMING
Number of Credits	3 (L-3, T-0, P-0)
Prerequisites	NIL
Course Category	PE

RATIONALE

'C' is computer programming language and also structured programming language. In 'C' programming language we consider various syntax used in programming. By having good knowledge of 'C', students can write modular application and system programs. 'C' can be used in the engineering applications. By acquiring a sound knowledge of 'C' students will be able to understand the concept of all the application areas. This course is specially designed for engineering students of all diploma streams.

CONTENTS

1. Introduction :

1.1 Scope of 'C' Language
1.2 Distinction and similarities with other HLLs
1.3 Special features and Application areas

2. Elements of 'C' :

2.1 Character set
2.2 Key words
2.3 Data types
2.4 Constants and Variables
2.5 Operators: unary, binary, ternary
2.6 Operator precedence

3. Console Input-Output :

3.1 Types of I-O
3.2 Console I-O
3.3 Unformatted console I-O: getchar(),putchar(), gets(), puts(), getch(),getche()
3.4 Formatted I-O : scanf(), printf()

4. Control Flow :

4.1 Statements and blocks
4.2 if
4.3 switch
4.4 Loops: for, while, do-while
4.5 goto and labels
4.6 break, continue, exit
4.7 Nesting control statements

5. Arrays :

5.1 Basic concepts
5.2 Memory representation
5.3 One dimensional array
5.4 Two dimensional array

6. Functions :

6.1 Basic concepts
6.2 Declaration and prototypes
6.3 Calling

6.4 Arguments
6.5 Scope rules
6.6 Recursion
6.7 Storage classes types
6.8 Library of functions: math, string, system

7. Pointers :

7.1 Basic concepts
7.2 &, * operator
7.3 Pointer expression: assignment, arithmetic, comparison
7.4 Dynamic memory allocation
7.5 Pointer v/s Arrays

8. Structure and Enumerated Data Types:

8.1 Basic concepts
8.2 Declaration and memory map
8.3 Elements of structures
8.4 Enumerated data types : typedef, enum
8.5 Union

REFERENCE BOOKS :

1. 'C' Programming — Stephen Kochan
2. Programming with 'C' — Schaum's Series
3. 'C' Programming — E. Balgurusami
4. 'C' Programming — Kernighan & Ritchie
5. Let us 'C' — Yashwant Kanetkar

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PHOTO REPRODUCTION LAB -II

Course Code	PR 5006
Course Title	PHOTO REPRODUCTION LAB -II
Number of Credits	2 (L-0, T-0, P-4)
Prerequisites	NIL
Course Category	PC

PRACTICALS:-

1. Halftone negative making using glass screens.
2. Halftone negative making using contact screens.
3. Re-screening of halftone prints.
4. Making negatives for duo tones.
5. Colour separations negative making for three and four colour process by direct method.
6. Colour separation by indirect method.
7. Colour correction by masking.
8. Exercises in chemical reduction of halftone negative / positive.
9. Preparation of tint negative.
10. Composition of line and halftone negatives.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Colour Control in Lithography — Kelvin Tritton
2. Graphic Arts Photography — G.A.T.F
3. Graphic Reproduction photography — J.M. Buden
4. Halftone Photography — G.A.T.F
5. Line Photography — G.A.T.F
6. Lithographers Manual — G.A.T.F
7. Photo Machines — G.A.T.F
8. Printing Technology (5e) — J.Adams

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POST PRESS OPERATIONS LAB

Course Code	PR 5007
Course Title	POST PRESS OPERATIONS LAB
Number of Credits	1 (L-0, T-0, P-2)
Prerequisites	NIL
Course Category	PC

PRACTICALS:-

1. Handling & care of binding materials and equipments.
2. Jogging, Counting, Folding Gathering and Collating by hand.
3. Book sewing by hand, different kinds of sewing, sawn in sewing, tape sewing, flexible sewing, over casting sewing.
4. Preparation of adhesives.
5. Preparation of pads.
6. Preparation of end papers.
7. Preparation of books, containing all the forwarding operations.
8. Edge decoration.
9. Rebinding of old damaged books & Loose leaf binding.
10. Simple exercises in packaging- preparation of box, envelopes bags etc.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Basic Book Binding — Lewis, A.W.
2. Book Binding & Finishing — B.D. Mendiratta
3. Book binding & the care of Books — Douglas Cockerell
4. Book binding by hand — Laurance Town
5. Finishing Process in printing — Focal Mortin, A.G.
6. Fundamental of packaging — Pain, F.A., 1981.
7. Hand Book of packaging Engg. — Hanlon, J.F.
8. Manual of Book Binding — Johnson, A.W.
9. Modern Book binding — Alex J. Vaughan
10. Gum, Adhesives & Sealants Technology & their Applications — NIIR Board

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GOVERNMENT OF RAJASTHAN

BOARD OF TECHNICAL EDUCATION RAJASTHAN JODHPUR

SEMESTER SCHEME-2020-21

VI SEMESTER

(SESSION 2021-2022 & ONWARDS)

ENTREPRENEURSHIP AND START-UPS

Course Code	PR 6111 (Same in All Branches of Engg.)
Course Title	Entrepreneurship and Start-ups
Number of Credits	4 (L-3, T-1, P-0)
Prerequisites (Course code)	None
Course Category	HS

COURSE LEARNING OBJECTIVES:

1. Acquiring Entrepreneurial spirit and resourcefulness.
2. Familiarization with various uses of human resource for earning dignified means of living.
3. Understanding the concept and process of entrepreneurship-its contribution and role in the growth and development of individual and the nation.
4. Acquiring entrepreneurial quality, competency, and motivation.
5. Learning the process and skills of creation and management of entrepreneurial venture.

LEARNING OUTCOME:

Upon completion of the course, these students will be able to demonstrate knowledge of the following topics:

1. Understanding the dynamic role of entrepreneurship and small businesses
2. Organizing and Managing a Small Business
3. Financial Planning and Control
4. Forms of Ownership for Small Business
5. Strategic Marketing Planning
6. New Productor Service Development
7. Business Plan Creation

COURSE CONTENTS:

1. INTRODUCTION TO ENTREPRENEURSHIP AND START–UPS
- 1.1. Definitions, Traits of an entrepreneur, Intrapreneurship, Motivation
- 1.2. Types of Business Structures,
- 1.3. Similarities / differences between entrepreneurs and managers.

2. BUSINESS IDEAS AND THEIR IMPLEMENTATION
- 2.1. Discovering ideas and visualizing the business
- 2.2. Activity map
- 2.3. Business Plan

3. IDEA TO START-UP
- 3.1. Market Analysis– Identifying the target market,
- 3.2. Competition evaluation and Strategy Development,
- 3.3. Marketing and accounting,
- 3.4. Risk analysis

4. MANAGEMENT
- 4.1. Company's Organization Structure,
- 4.2. Recruitment and management of talent.
- 4.3. Financial organization and management

5. FINANCING AND PROTECTION OF IDEAS
- 5.1. Financing methods available for start-ups in India
- 5.2. Communication of Ideas to potential investors– Investor Pitch
- 5.3. Patenting and Licenses

6. EXIT STRATEGIES FOR ENTREPRENEURS, BANKRUPTCY, AND SUCCESSION AND HARVESTING STRATEGY

SUGGESTED LEARNING RESOURCES:

S.No.	Title of Book	Author	Publication
1.	The Startup Owner's Manual: The Step by-Step Guide for Building a Great Company	Steve Blank and Bob Dorf	K & S Ranch ISBN–978-0984999392
2.	The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses	Eric Ries	Penguin UK ISBN–978-0670921607
3.	Demand: Creating What People Love Before They Know They Want It	Adrian J. Slywotzky with Karl Weber	Headline Book Publishing ISBN–978-0755388974
4.	The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business	Clayton M. Chris Tensen	Harvard business ISBN:978-142219602

SUGGESTEDSOFTWARE/LEARNINGWEBSITES:

a. https://www.fundable.com/learn/resources/guides/startup
b. https://corporatefinanceinstitute.com/resources/knowledge/finance/corporatehstructure/
c .https://www.finder.com/small-business-finance-tips
d. https://www.profitbooks.net/funding-options-to-raise-startup-capital-for-your-business/

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PROJECT MANAGEMENT

Course Code	PR 62001(Same in All Branches of Engg.)
Course Title	Project Management
Number of Credits	3(L:3,T:0,P:0)
Prerequisites	NIL
Course Category	OE

COURSE LEARNING OBJECTIVES

•To develop the idea of project plan, from defining and confirming the project goals and objectives, identifying tasks and how goals will be achieved.

•To develop an understanding of key project management skills and strategies.

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1	Understand the importance of projects and its phases.
CO2	Analyze projects from marketing, operational and financial perspectives.
CO3	Evaluate projects based on discount and non-discount methods.
CO4	Develop network diagrams for planning and execution of a given project.
CO5	Apply crashing procedures for time and cost optimization.

COURSE CONTENTS

1. **CONCEPT OF A PROJECT**:
   - 1.1. Classification of projects
   - 1.2. Importance of project management
   - 1.3. The project Life cycle
   - 1.4. Establishing project priorities (scope-cost-time)
   - 1.5. Project priority matrix
   - 1.6. Work break down structure.

2. **CAPITAL BUDGETING PROCESS:**
   - 2.1. Planning -Analysis-Selection-Financing-Implementation-Review.
   - 2.2. Generation and screening of project ideas
   - 2.3. Market and demand analysis
   - 2.4. Demand forecasting techniques.
   - 2.5. Market planning and marketing research process
   - 2.6. Technical analysis

3. **FINANCIAL ESTIMATES AND PROJECTIONS:**
   - 3.1. Cost of projects
   - 3.2. Means of financing
   - 3.3. Estimates of sales and production-cost of production
   - 3.4. Working capital requirement and its financing
   - 3.5. Profitability project , cash flow statement and balance sheet.
   - 3.6. Breakeven analysis.

4. **BASIC TECHNIQUES IN CAPITAL BUDGETING**:
   - 4.1. Non discounting and discounting methods
   - 4.2. pay-back period
   - 4.3. Accounting rate of return

4.4. Net present value
4.5. Benefit cost ratio
4.6. Internal rate of return.
4.7. Project risk.
4.8. Social cost benefit analysis and economic rate of return.
4.9. Non-financial justification of projects**.**

5. PROJECT ADMINISTRATION:

5.1. Progress payments,
5.2. Expenditure planning,
5.3. Project scheduling and network planning,
5.4. Use of Critical Path Method(CPM),
5.5. Schedule of payments and physical progress,
5.6. time-cost trade off.
5.7. Concepts and uses of PERT
5.8. Cost as a function of time,
5.9. Project Evaluation and Review Techniques
5.10. Cost mechanisms.
5.11. Determination of least cost duration.
5.12. Post project evaluation.
5.13. Introduction to various Project management softwares.

REFERENCE BOOKS

1.Project planning, analysis, selection, implementation and review –Prasannachandra–Tata McGraw Hill
2.Project Management – the Managerial Process– Clifford F. Gray & Erik W. Larson-McGrawHill
3.Project management- David I Cleland- Mcgraw Hill International Edition, 1999
4.Project Management– Gopala krishnan– Mcmillan India Ltd.
5.Project Management- Harry – Maylor – Peason Publication

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RENEWABLE ENERGY TECHNOLOGIES

Course Code	PR 62002(Same in All Branches of Engg.)
Course Title	Renewable Energy Technologies
Number of Credits	3 (L:3, T:0, P:0)
Prerequisites	NIL
Course Category	OE

COURSE LEARNING OBJECTIVES

•To understand present and future scenario of world energy use.
•To understand fundamentals of solar energy systems.
•To understand basics of wind energy.
•To understand bio energy and its usage in different ways.
•To identify different available non-conventional energy sources.

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1	Understand present and future energy scenario of the world.
CO2	Understand various methods of solar energy harvesting.
CO3	Identify various wind energy systems.
CO4	Evaluate appropriate methods for Bio energy generations from various Bio wastes.
CO5	Identify suitable energy sources for a location.

COURSE CONTENTS

1. **INTRODUCTION:**
   - 1.1. World Energy Use;
   - 1.2. Reserves of Energy Resources;
   - 1.3. Environmental Aspects OF Energy Utilisation;
   - 1.4. Renewable Energy Scenario in India and around the World;
   - 1.5. Potentials; Achievements/ Applications;
   - 1.6. Economics of renewable energy systems.

2. **SOLAR ENERGY:**
   - 2.1. Solar Radiation;
   - 2.2. Measurements of Solar Radiation;
   - 2.3. Flat Plate and Concentrating Collectors;
   - 2.4. Solar direct Thermal Applications;
   - 2.5. Solar thermal Power Generation
   - 2.6. Fundamentals of Solar Photo Voltaic Conversion;
   - 2.7. Solar Cells;
   - 2.8. Solar PV Power Generation;
   - 2.9. Solar PV Applications.

3. **WIND ENERGY:**
   - 3.1. Wind Data and Energy Estimation;
   - 3.2. Types of Wind Energy Systems;
   - 3.3. Performance; Site Selection;
   - 3.4. Details of Wind Turbine Generator;
   - 3.5. Safety and Environmental Aspects.

4. **BIO-ENERGY:**

4.1. Bio mass direct combustion;
4.2. Bio mass gasifiers;
4.3. Bio gas plants;
4.4. Digesters;
4.5. Ethanol production;
4.6. Bio diesel;
4.7. Cogeneration;
4.8. Bio mass Applications.

5. OTHER RENEWABLE ENERGY SOURCES:

5.1. Tidal energy;
5.2. Wave Energy;
5.3. Open and Closed OTEC Cycles;
5.4. Small Hydro Geothermal Energy;
5.5. Hydrogen and Storage;
5.6. Fuel Cell Systems;
5.7. Hybrid Systems.

REFERENCE BOOKS

1. Non-Conventional Energy Sources, Rai. G. D., Khanna Publishers, New Delhi, 2011.
2. Renewable Energy Sources, Twidell, J.W. & Weir, A., EFN SponLtd.,UK,2 006.
3. Solar Energy, Sukhatme. S. P., Tata Mc Graw Hill Publishing CompanyLtd. ,New Delhi, 1997.
4. Renewable Energy, Power for a Sustainable Future, Godfrey Boyle, Oxford University Press, U.K., 1996.
5. Fundamental of Renewable Energy Sources, G N Tiwari and M K Ghoshal, Narosa, New Delhi, 2007.
6. Renewable Energy and Environment A Policy Analysis for India ,NH Ravindranath, U K Rao, B Natarajan, P Monga, Tata McGraw Hill.
7. Energy and The Environment, R A Ristinen and J J Kraushaar, second edition, John Willey & Sons, New York, 2006.
8. Renewable Energy Resources, J W T widell and A D Weir, ELBS, 2006.

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PRODUCT DESIGN

CourseCode	PR 63001(Same in All Branches of Engg.)
CourseTitle	Product Design
NumberofCredits	3 (L:3, T:0, P:0)
Prerequisites	NIL
CourseCategory	OE

COURSE LEARNING OBJECTIVES

•To acquire the basic concepts of product design and development process

•To understand the engineering and scientific process in executing a design from concept to finished product

•To study the key reasons for design or redesign.

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1	Understand the basic concepts of product design and development process.
CO2	Illustrate the methods to define the customer needs.
CO3	Describe an engineering design and development process.
CO4	Understand the intuitive and advanced methods used to develop and evaluate a concept.
CO5	Apply modelling and embodiment principles in product design and development process.

COURSE CONTENTS

1. DEFINITION OF A PRODUCT

- 1.1. Types of product;
- 1.2. Levels of product;
- 1.3. Product-market mix;
- 1.4. New product development (NPD) process;
- 1.5. Idea generation methods;
- 1.6. Creativity;
  - 1.6.1. Creative attitude;
  - 1.6.2. Creative design process;
- 1.7. Morpho logical analysis;
- 1.8. Analysis of inter-connected decision areas;
- 1.9. Brain storming.

2. PRODUCT LIFECYCLE;

- 2.1. The challenges of Product development;
- 2.2. Product analysis;
- 2.3. Product characteristics;
- 2.4. Economic considerations;
- 2.5. Production and Marketing aspects;
- 2.6. Characteristics of successful Product development;
- 2.7. Phases of a generic product development process;
- 2.8. Customer need identification;
- 2.9. Product development practices and industry-product strategies.

3. PRODUCT DESIGN

- 3.1. Design by evolution;
- 3.2. Design by innovation;
- 3.3. Design by imitation;
- 3.4. Factors affecting product design;
- 3.5. Standards of performance and environmental factors;
- 3.6. Decision making and iteration;

3.7. Morphology of design (different phases);
3.8. Role of aesthetics in design.

4. INTRODUCTION TO OPTIMIZATION IN DESIGN

4.1. Economic factors in design;
4.2. Design for safety and reliability;
4.3. Role of computers in design;
4.4. Modeling and Simulation;
4.5. The role of models in engineering design;
4.6. Mathematical modeling;
4.7. Similitude and scale models;
4.8. Concurrent design;
4.9. Six sigma and design for six sigma;
4.10. Introduction to optimization in design;
4.11. Economic factors and financial feasibility in design;
4.12. Design for manufacturing;
4.13. Rapid Proto typing (RP);
4.14. Application of RP in product design;
4.15. Product Development versus Design.

5. DESIGN OF SIMPLE PRODUCTS DEALING WITH VARIOUS ASPECTS OF PRODUCT DEVELOPMENT;

5.1. Design Starting from need till the manufacture of the product

REFERENCE BOOKS

1.Product Design and Development, Karl T.Ulrichand Steven D.Eppinger, TataMc Graw–Hill edition.
2.Engineering Design– George E. Dieter.
3.An Introduction to Engineering Design methods Vijay Gupta.
4.Merie Crawford: New Product management, McGraw-Hill Irwin.
5.Chitale A K and Gupta R C, "Product Design and Manufacturing", Prentice Hall of India, 2005.
6.Kevin Otto and Kristin Wood, Product Design, Techniques in Reverse Engineering and New Product Development, Pears on education.

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DISASTER MANAGEMENT

Course Code	PR 63002(Same in All Branches of Engg.)
Course Title	Disaster Management
Number of Credits	3 (L: 3, T: 0, P :0)
Prerequisites	NIL
Course Category	OE

COURSE LEARNING OBJECTIVES

Following are the objectives of this course:
•To learn about various types of natural and man-made disasters.
•To know pre and post-disaster management for some of the disasters.
•To know about various information and organizations in disaster management in India.
•To get exposed to technological tools and their role in disaster management.

COURSE OUTCOMES:

1.1. After competing this course, student will be:
1.2. Acquainted with basic information on various types of disasters
1.3. Knowing the precautions and awareness regarding various disasters
1.4. Decide first action to be taken under various disasters
1.5. Familiarised with organization in India which are dealing with disasters
1.6. Able to select IT tools to help in disaster management

COURSE CONTENTS

1. UNDERSTANDING DISASTER

1.1. Understanding the Concepts and definitions of Disaster,
1.2. Hazard,
1.3. Vulnerability,
1.4. Risk,
1.5. Capacity–Disaster and Development,
1.6. Disaster management.

2. TYPES, TRENDS, CAUSES, CONSEQUENCES AND CONTROL OF DISASTERS

2.1. Geological Disasters (earth quakes, landslides, tsunami, mining);
2.2. Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hailstorms, avalanches, droughts, cold and heat waves)
2.3. Biological Disasters (epidemics, pest attacks, forest fire);
2.4. Technological Disasters (chemical, industrial, radiological, nuclear)
2.5. Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters)
2.6. Global Disaster Trends
2.7. Emerging Risks of Disasters
2.8. Climate Change and Urban Disasters.

3. DISASTER MANAGEMENT CYCLE AND FRAME WORK

3.1. Disaster Management Cycle
3.2. Paradigm Shift in Disaster Management.
3.3. Pre-Disaster
3.4. Risk Assessment and Analysis,
3.5. Risk Mapping,
3.6. Zonation and Micro zonation,
3.7. Prevention and Mitigation of Disasters,
3.8. Early Warning System
  3.8.1. Preparedness,
  3.8.2. Capacity Development;
  3.8.3. Awareness.

3.9. During Disaster
- 3.9.1. Evacuation
- 3.9.2. Disaster Communication
- 3.9.3. Search and Rescue
- 3.9.4. Emergency Operation Centre
- 3.9.5. Incident Comm and System
- 3.9.6. Relief and Rehabilitation

3.10. Post-disaster
- 3.10.1. Damage and Needs Assessment,
- 3.10.2. Restoration of Critical Infra structure
- 3.10.3. Early Recovery Reconstruction and Redevelopment;
- 3.10.4. IDNDR, Yokohama Stretegy, Hyogo Frame-work of Action.

4. DISASTER MANAGEMENT IN INDIA

4.1. Disaster Profile of India
4.2. Mega Disasters of India and Lessons Learnt.
4.3. Disaster Management Act 2005
4.4. Institutional and Financial Mechanism,
4.5. National Policy on Disaster Management,
4.6. National Guidelines and Plans on Disaster Management;
4.7. Role of Government (local, state and national),
4.8. Non-Government and Inter Governmental Agencies

5. APPLICATIONS OF SCIENCE AND TECHNOLOGY FOR DISASTER MANAGEMENT

5.1. Geo informatics in Disaster Management (RS, GIS, GPS and RS).
5.2. Disaster Communication System (Early Warning and Its Dissemination).
5.3. Land Use Planning and Development Regulations,
5.4. Disaster Safe Designs and Constructions,
5.5. Structural and Non Structural Mitigation of Disasters
5.6. S & T Institutions for Disaster Management in India

REFERENCES

1.Publications of National Disaster Management Authority (NDMA) on Various Templates and Guide lines for Disaster Management
2.Bhandani, R. K., An over view on natural & man-made disasters and their reduction, CSIR, New Delhi
3.Srivastava, H. N., and Gupta G. D. , Management of Natural Disasters in developing countries, Daya Publishers, Delhi
4.Alexander, David, Natural Disasters, Kluwer Academic London
5.Ghosh, G .K. ,Disaster Management, APH Publishing Corporation
6.Murthy, D. B. N., Disaster Management: Text & Case Studies, Deep & Deep Pvt. Ltd.

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INDIAN CONSTITUTION

CourseCode	PR 6333(Same in All Branches of Engg.)
CourseTitle	Indian Constitution
NumberofCredits	0 (L:2,T:0;P:0)
Prerequisites(Coursecode)	None
CourseCategory	AU

COURSE CONTENT

1. THE CONSTITUTION –
- 1.1. Introduction
- 1.2. The History of the Making of the Indian Constitution
- 1.3. Preamble and the Basic Structure, and its interpretation
- 1.4. Fundamental Rights and Duties and their interpretation
- 1.5. State Policy Principles

2. UNION GOVERNMENT
- 2.1. Structure of the Indian Union
- 2.2. President– Role and Power
- 2.3. Prime Minister and Council of Ministers
- 2.4. Lok Sabha and Rajya Sabha

3. STATE GOVERNMENT
- 3.1. Governor– Role and Power
- 3.2. Chief Minister and Council of Ministers
- 3.3. State Secretariat

4. LOCAL ADMINISTRATION
- 4.1. District Administration
- 4.2. Municipal Corporation
- 4.3. Zila Panchayat

5. ELECTION COMMISSION
- 5.1. Role and Functioning
- 5.2. Chief Election Commissioner
- 5.3. State Election Commission

SUGGESTED LEARNING RESOURCES:

S.No.	Title of Book	Author	Publication
1.	Ethics and Politics of the Indian Constitution	Rajeev Bhargava	Oxford University Press, New Delhi, 2008
2.	The Constitution of India	B.L.Fadia	Sahitya Bhawan; New edition(2017)
3.	Introduction to the Constitution of India	D D Basu	Lexis Nexis; Twenty-Third 2018 edition

SUGGESTED SOFTWARE / LEARNING WEBSITES:

1. https://www.constitution.org/cons/india/const.html
2. http://www.legislative.gov.in/constitution-of-india
3. https://www.sci.gov.in/constitution
4. https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/

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OFFSET LITHO MACHINING

Course Code	PR 6001
Course Title	OFFSET LITHO MACHINING
Number of Credits	3 (L-3, T-0, P-0)
Prerequisites	NIL
Course Category	PC

COURSE CONTENTS:

Unit 1-

1.1 Principle & design of single colour offset machines with Mechanical & operational features.
1.2 Pressure settings, Plate Cylinder, Blanket cylinder, Impression cylinder, Cylinder gears, fitting of offset blankets.
1.3 Sheet detectors, Anti-setoff devices, Inking System & Dampening System, Feeding System & Delivery System.

Unit 2-

2.1 Multi Colour Offset Machines & Perfectors.
2.2 Construction, Principle & design, Transfer systems.
2.3 Fitting plates on multicolour machine to secure register, wet on wet printing.

Unit 3-

3.1 Web Offset Machines Design features.
3.2 Reel Stand , Web tension & tension control, Path rollers & Folders.
3.3 Printing unit cylinder construction (Mono, 3C, 4I).
3.4 Inking system & Damping system, Drier unit of web offset machine.
3.5 Automatic control register, Automatic reel change mechanism.
3.6 Make-ready on web offset press & Colour sequence.
3.7 Speed Measurement by Stroboscope in high speed machine**.**

Unit 4-

4.1 Offset Printers work like Pre-make ready & Make ready.
4.2 Preparation of the pile, setting the sheet path, printed image size.
4.3 Preparing the plate storage, Roller wash-up dampening unit, cleaning.
4.4 Registration of colour work, Colour mixing and matching.
4.5 Ink & water management, Importance of control of ph.
4.6 Relative humidity (rh), Temperature in press room, Paper Conditioning.

Unit 5-

5.1 Press Operating Problems: Slur, Image blinding, Set off, Picking, Plucking, Fluffing.
5.2 Scumming, Tinting, Bleeding, Mottling, Ghost marks, Hickies and spots etc.

Unit 6-

6.1 Structure and properties of blankets & Selection of off-set blankets, Characteristics, Care & maintenance of blankets.
6.2 Different types of rollers and their functions, Rollers Hardness, Care, Maintenance and storage of rollers

Unit 7-

7.1 Mechanism of printing machines: Application of bearing & their classification.
7.2 Gears & its classification, Cams & its types.
7.3 Clutch & its function & classification.
7.4 Purpose & function of pulleys, belt drives, breaks.
7.5 Application of skeleton cylinder, rollers, drums, spindles, brushes and tracks.

Unit 8-

8.1 Repair and maintenance of printing machine and graphic arts equipment.
8.2 Testing the machine under normal printing conditions.

8.3 Foundation & Erection of machine.
8.4 Purpose of lubrication (oiling & greasing both) & its method.
8.5 Operator's duties & Pressroom conditions.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1.	Hand Book of Offset Technology	EIRI Board
2.	Hand book on printing technology	NIIR Board
3.	Introduction Lithography	Gerald Wood Pitman
4.	Lithographer's Manuals	GATF
5.	Lithographic Offset Press Operating	C.W.Latham
6.	Lithographic press operation	A.S.Porter
7.	Offset Press Troubles	R.F. Ried
8.	Offset Printing	C.S.Mishra
9.	Photo Litho Offset	Eric Chanbers
10.	Practical Guide Book in Offset Printing & Troubleshooting	K.Goswami
11.	Printing Technology (5e)	J.Adams
12.	Sheet Fed Offset Technology	Anjan Kumar Baral
13.	Web Offset Press Troubles	G.A.T.F.

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OFFSET MACHINING LAB

Course Code	PR 6002
Course Title	OFFSET MACHINING LAB
Number of Credits	2 (L-0, T-0, P-4)
Prerequisites	NIL
Course Category	PC

PRACTICALS:

1. Oiling, Cleaning & lubrication of sheet fed offset machine.
2. Plate mounting on Plate Cylinder.
3. Determination of roller hardness.
4. Proofing of line and text matter.
5. Printing for halftones.
6. Proofing of line and halftone combination.
7. Proofing three and four colour jobs.
8. Printing of posters, calendars and folders.
9. Printing of 16 pages bookwork.
10. Printing of small jobs in four or more ups.

REFERENCES / SUGGESTED LEARNING RESOURCES:

1. Hand Book of Offset Technology — EIRI Board
2. Hand book on printing technology — NIIR Board
3. Introduction Lithography — Gerald Wood Pitman
4. Lithographer's Manuals — GATF
5. Lithographic press operation — A.S.Porter
6. Offset Press Troubles — R.F. Ried
7. Offset Printing — C.S.Mishra
8. Practical Guide Book in Offset Printing & Troubleshooting — K.Goswami
9. Printing Technology (5e) — J.Adams
10. Sheet Fed Offset Technology — Anjan Kumar Baral

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