

**University of Pune**  
**S.E. Printing Engineering 2012 Course**  
**(w.e.f. 2013-2014)**

<b>SEMESTER – I</b>											
Sr. No.	Subject Code	Subject Title	Teaching Scheme			Examination Scheme					Total Marks
			Th.	Pr.	Tut.	Paper		TW	PR	OR	
						Written	Online				
1.	207004	Engineering Mathematics III	4	--	1	50	50	25	--	--	125
2.	202054	Strength of Machine Elements	4	--	--	50	50	--	--	--	100
3.	208281	Basic Printing Techniques	4	2	--	50	50	25	50	--	175
4.	208282	Printing Digital Electronics	3	2	--	50	50	25	--	--	125
5.	208283	Material Science	4	2	--	50	50	25	50	--	175
6.	208284	Print Layout & Design	--	2	--	--	--	--	50	--	50
<b>Total</b>			<b>19</b>	<b>08</b>	<b>1</b>	<b>250</b>	<b>250</b>	<b>100</b>	<b>150</b>		<b>750</b>
<b>SEMESTER – II</b>											
Sr. No.	Subject Code	Subject Title	Teaching Scheme			Examination Scheme					Total Marks
			Th.	Pr.	Tut.	Paper		TW	PR	OR	
						Written	Online				
1.	208285	Print Production Techniques	4	2	--	50	50	25	--	--	125
2.	208286	Finishing Techniques	4	2	--	50	50	--	50	--	150
3.	208287	Microprocessor & Microcontroller in Printing	4	2	--	50	50	25	--	50	175
4.	203153	Electrical Machines & Utilization	3	2	--	50	50	--	--	50	150
5.	202055	Theory of Printing Machine & Machine Components	3	2	--	50	50	25	--	--	125
6.	208288	Soft Skills	--	2	--	--	--	25	--	--	25
<b>Total</b>			<b>18</b>	<b>12</b>	<b>--</b>	<b>250</b>	<b>250</b>	<b>100</b>	<b>150</b>		<b>750</b>

**UNIVERSITY OF PUNE**  
**For Chemical /Bio Tech/Printing Engineering (Sem I)**  
**For Petroleum/Petrochemical/Polymer Engineering (Sem II)**  
207004 ENGINEERING MATHEMATICS – III (2012 Course)

**Teaching Scheme:**  
Lectures – 4 Hrs./Week  
Tutorials – 1 Hr./Week

**Examination Scheme:**  
Paper – 50 Marks (2 Hrs.)  
Online – 50 Marks  
Term work: 25 Marks

**Section I**

**Unit I: Linear Differential Equations (LDE) and Applications** (09 Hours)  
LDE of  $n^{\text{th}}$  order with constant coefficients, Method of variation of parameters, Cauchy's & Legendre's DE, Simultaneous & Symmetric simultaneous DE. Applications of LDE to chemical engineering problems and mass spring system.

**Unit II: Fourier Transform (FT)** (09 Hours):  
Fourier integral theorem. Sine & Cosine integrals. Fourier Transform, Fourier Cosine Transform, Fourier Sine Transforms and their inverses. Finite FT, Application of FT to problems on one and two dimensional heat flow problems.

**Unit III: Laplace Transform (LT) and Applications:** (09 Hours)  
Definition of LT, Inverse LT, Properties & theorems, LT of standard functions, LT of some special functions viz. error, First order Bessel's, Periodic, Unit Step, Unit Impulse, ramp, jump, parabolic, Si(t) and Ei(t). Applications of LT for solving ordinary differential equations, liquid level systems, consisting of single tank and two tanks in series (interacting and non-interacting systems), second order systems (damped vibrator).

**Section II**

**Unit IV: Vector Differential Calculus** (09 Hours)  
Physical interpretation of Vector differentiation. Radial, Transverse, Tangential & Normal components of velocity and acceleration. Vector differential operator, Gradient, Divergence & Curl, Directional derivative, Solenoidal, Irrotational and Conservative fields, Scalar potential, Vector identities.

**Unit V: Vector Integral Calculus and Applications** (09 Hours)  
Line, Surface and Volume integrals, Work-done, Green's Lemma, Gauss's Divergence theorem, Stoke's theorem. Applications of vectors to problems in Fluid Mechanics, Continuity equations, Stream lines, Equations of motion, Bernoulli's equations.

**Unit VI: Applications of Partial Differential Equations (PDE)** (09 Hours)  
Basic concepts, modeling of Vibrating string, Wave equation, one and two dimensional Heat flow equations, method of separation of variables, use of Fourier series. Applications of PDE to problems of Chemical and allied engineering.

**Text Books:**

1. Advanced Engineering Mathematics, 9e, by Erwin Kreyszig (Wiley India).
2. Advanced Engineering Mathematics, 7e, by Peter V. O'Neil (Cengage Learning).

**Reference Books:**

1. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education).
2. Advanced Engineering Mathematics, Wylie C.R. & Barrett L.C. (McGraw-Hill, Inc.)
3. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi).
4. Applied Mathematics (Volumes I and II) by P. N. Wartikar & J. N. Wartikar (Pune Vidyarthi Griha Prakashan, Pune).
5. Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill).
6. Advanced Engineering Mathematics with MATLAB, 2e, by Thomas L. Harman, James Dabney and Norman Richert (Brooks/Cole, Thomson Learning).

**Tutorial and Term Work:**

- i) Tutorial for the subject shall be engaged in minimum of four batches (batch size of 20 students maximum) per division.
- ii) Term work shall consist of six assignments (one per each unit) based on performance and continuous internal assessment.

*Mujumdar*

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## S.E. (PRINTING) 2012 COURSE

### Semester I

#### 202054: Strength of Machine Elements

##### Teaching scheme

Lectures: 4 Hrs./ Week

##### Examination scheme

Written: 50 Marks [2hrs]

Online: 50 Marks

#### SECTION – I

##### UNIT - I Simple stresses & strains

[8 Hrs]

Introduction to Engineering materials, their classification, designation & applications

Mechanical properties - strength, hardness, toughness, ductility, malleability, stiffness, resilience, fatigue, endurance limit & creep.

Types of stresses & strains, Hooke's Law, stress - strain diagram for ductile & brittle materials, allowable stress, factor of safety, modulus of elasticity, modulus of rigidity, volumetric strain, bulk modulus, Poisson's ratio, relationship between elastic constants, thermal stresses & strains, thermal stresses in composite sections.

##### UNIT - II Shear Force & Bending Moment Diagrams of Beams

[8 Hrs]

Concept of SFD & BMD SFD & BMD for cantilevers, simply supported beams & over hanging beams subjected to point load Uniformly Distributed Load, Uniformly Varying Load and couple, Point of contra- flexure Relation between SF, BM and rate of loading at a section of a beam, Loading diagram from SFD and BMD, Numericals on above.

##### UNIT - III Bending and Shear stresses

[8 Hrs]

Bending stresses- Theory of simple bending, derivation of Flexural formula, area centre & moment of inertia of common cross sections such as rectangular, circular, T, I & C sections. Moment of resistance, section modulus calculations

for above sections. Beams of uniform strength. Shear stresses-Introduction, assumptions, derivations of shear stress formula. Shear stress distribution diagram for common cross-sections such as rectangular, circular, T, I & C sections.

## **SECTION – II**

### **UNIT - IV Axially Loaded Columns and Torsion in circular shafts [8 Hrs]**

Axially Loaded Columns - Concept of buckling of columns, Derivation of Euler's formula for buckling load for column with hinged ends, concept of equivalent length for various end conditions, Limitations of Euler's formula, Rankine's buckling load, Johnson's buckling load, safe load on column Torsion in circular shafts-Stresses, strains and deformations in solid and hollow shafts, homogeneous and composite circular cross sections subjected to torsion, Derivation of torsion equation. Stresses subjected to combined torsion, bending and axial force on shafts. Shafts in series & parallel.

### **UNIT - V Principal Stresses & Strains, Theories of Elastic Failure, Strain**

#### **Energy & Impact [8 Hrs]**

Principal Stresses & Strains -Normal shear stresses & strains on oblique plane, concept of principal planes, derivation of principal stresses & maximum shear stresses, position of principal planes & planes of Maximum shear, graphical solution using Mohr's circle. Theories of Elastic Failure-Maximum principal stress theory, Maximum shear stress theory & distortion energy theory. Strain Energy & Impact - Concept of strain energy, derivations & use of expression for deformations of axially loaded members under gradual, sudden & impact loads, strain energy due to self load, strain energy due to shear, strain energy due to bending, strain energy due to torsion.

### **UNIT - VI Slope and Deflection of Beams [8 Hrs]**

Importance of deflection in practical applications. Relation between bending moment and slope, slope and deflection of statically determinate beams. Derivation of equations for slope & deflection of beams in case of cantilevers & simply supported beams loaded with point loads, uniformly distributed loads & couple Determination of slope & deflection for

cantilevers, simply supported beams & beams with overhang, subjected to point loads & uniformly distributed load by double integration method, Macaulay's method.

### **Text Books**

1. S. Ramamrutham, "Strength of Materials", Dhanpat Rai and sons
2. S.S.Bhavikatti," Strength of Materials", Vikas Publication
3. Junnarkar and Shah," Mechanics of structures Vol-I", Charotar Book Co.

### **Reference Books**

1. E.P.Popov," Introduction to Mechanics of Solids", Prentice Hall Publishers
2. Singer and Pytel," Strength of Materials", Harper and Row Publications.
3. Beer F.P. & Johnston E.R,"Mechanics of materials", Mc Graw Hill publications.

## **208281: Basic Printing Techniques**

### **Teaching scheme**

Lectures: 4 Hrs./ week

Practical: 2 Hrs./ week

### **Examination scheme**

Written: 50 Marks [2hrs]

Online: 50 Marks

Term Work: 25 Marks

Practical : 50 Marks

### **SECTION – I**

#### **UNIT - I Pre-Press**

[8 Hrs]

Printing Workflow, Typography – 2D & 3D Typefaces, Family, Series of type, legibility readability of type, type measurement, type alignment & arrangement, DTP, Camera Processing. Conversion to film output –negative, positive & tracing, CTP technology Surface preparation for letterpress, lithography, screen, gravure & flexography.

#### **UNIT - II Press**

[8 Hrs]

Principles of printing, different printing processes- conventional, inkjet and electrophotography, Configuration of machines, machine parts & accessories, Introduction to non-conventional printing processes –pad printing, dry offset, waterless offset.

#### **UNIT - III Post –Press**

[8 Hrs]

Binding techniques- Hard Binding, Paperback Binding, Mechanical loose leaf binding, Finishing techniques-Punching, embossing, foiling, lamination, varnishing, spot UV

### **SECTION –II**

#### **UNIT - IV Basics Of design**

[8 Hrs]

Introduction to graphic design, fundamental of design, principle of design, Types of design – natural, conventional, decorative, geometric, and abstract

## **UNIT – V Layout and Color**

[8 Hrs]

Stages of layout – thumbnails, rough layout, comprehensive layout, artwork, Design for magazines, newspaper, catalogues, cartons, commercial stationary, flexible pouches  
Color Definition of color, additive and subtractive theory, Dimensions of color, color schemes, color symbolism

## **UNIT - VI Specialised printing applications**

[8 Hrs]

Lenticular Printing, Thermographic printing, Dye sublimation, Large format printing- backlit and front lit, hologram printing, printing with encapsulated (scented) inks, RFID labels, Organ Printing

### **Term Work**

Term Work shall consist of following **eight** experiments;

- 1) To prepare screen and cut stencil method and print single and multicolour Job
- 2) To prepare the screen by direct photographic method.
- 3) To prepare the screen by indirect photographic method.
- 4) To prepare the screen by Direct-Indirect photographic method.
- 5) To prepare PS plate for offset
- 6) To prepare flexo plate for flexography printing
- 7) To take a print on digital printer
- 8) To take a print on ink jet printer

### **Reference Books**

1. Penny and Ann Dolin, Printing technology 5E
2. Rogue C. Parker, Looking Good in print – A guide to basic Design for Desktop publishing.
3. Roger C. Parker, 101 solutions for Desktop publishing
4. Alastair Campbell, The Designers handbook
5. N. N. Sarkar, Art and Production. Revised edition, Sagar publication
6. Krishnamurthy, Modern printing processes
7. Mulvihill, Flexography primer
8. H.Kipphan, Handbook of Print Media, [ISBN 3-540-67326-1] Springer Publication

## **208282: Printing Digital Electronics**

### **Teaching scheme**

Lectures: 3 Hrs./ week

Practical: 2 Hrs./ week

### **Examination scheme**

Written: 50 Marks [2hrs]

Online: 50 Marks

Term Work: 25 Marks

### **SECTION – I**

#### **UNIT - I Introduction of Microprocessor** [8 hrs]

Microprocessor Architecture and its operation, Study of 8085 Microprocessor Pin out and Signals, Memory organization and Memory Mapping, Interfacing devices and review of input / output devices, Latches Buffers Decoders as 74139.

Block diagram and working of 8085 based microcomputer system.

#### **UNIT - II Programming Concepts of Microprocessor** [8 hrs]

Classification of Instructions, Instruction format, Instruction timing and operation status, Program writing skills of Hand Coding, Expected execution for simple programs, Assembly language programs and debugging, Addressing Modes, Status of Flags, Data transfer, Arithmetic, Logical operations with 16 bit, Counters and Timing Delays. Debugging, Stack and Subroutines, Introduction of Assembler Programming.

#### **UNIT – III Interfacing Peripheral Devices** [8 hrs]

Basic Interfacing concepts, Interfacing input keyboard, interfacing output display [LED/LCD], Study of 8279 keyboard / display interface, Memory interfacing, Interfacing Devices study 8255. Study of 8253

### **SECTION – II**

#### **UNIT - IV Introduction of Microcontrollers** [8 hrs]

Architecture of 8051. Comparison with microprocessor, Pin diagram, clock and oscillator, flags, PSW, stack, Internal memory, ideal mode, power mode, SFR, Counter, Timer mode, Serial I/O and Interrupt structure.

## **UNIT - IV Programming concepts of Microcontroller**

[8 hrs]

Instruction set and programming of 8051. Addressing Modes, Timing Delays  
Comparison of microprocessor and microcontroller. Applications of microcontroller in printing such as printer interface Bus standards such as RS232-C, RS485 and IEEE488.

## **UNIT-VI Microprocessor and Microcontroller Applications in Printing**

### **Technology**

Stepper Motor Drive and Controller, Printer Interfacing with 8085, Colors Monitor Controller, Microprocessor based Sequence Controller, Concept of Programmable logic controller, with block diagram and simple programming (8 bit) related to specific printing operation sequence.

### **Term Work –**

Term Work shall consist of following **TEN** experiments;

1. Write and execute Programs for
  - a) Addition, Subtraction (8 bit and 16 bit)
  - b) Multiplication, division (8 bit)
2. Write and Execute Programs for
  - a) Time delay using Register Pair
  - b) Decade counter
  - c) Up / Down Counter
  - d) Pulse Timing for Flashing Lights
3. Study of interfacing chips 8279
  - a) Chip study waveform Observation
  - b) Program related to printing field application
4. Write and Execute a Program for Serial Data Transfer.
5. Study of Interrupt Controller 8259
6. Interfacing with ADC/DAC (8 bit only)
7. Interfacing of Stepper Motor

8. Study of 8255 Chip & Interfacing with Printer (any type)

9. Study of EPROM Programmer

OR

Study of Timer Controller Chip 8253

10. Study of PLC and Simple Program Execution using PLC (8 bit / 16 bit any one)

### **Reference Books**

1. R. S. Gaonkar Microprocessor Architecture, programming and applications with 8085, Wiley

Eastern Publication.

2. A. P. Mathur Microprocessor architecture & applications, TMH.

3. Lance leventhal Programming with 8085, Mc Graw Hill.

4. "Microprocessors and Microcontrollers" Jhadhe, Thavare, Nirali Prakashan

5. Kenneth Ayala,"8051 microcontroller" PHI

6. Microprocessor Applications Douglas Hall - McGraw Hill

7. 8085 peripheral & application manual - Intel.

8 Microcontrollers by Mazidi

9 Ajay Deshmukh ,"Microcontroller Theory and application " TMH

## **208283: Material Science**

### **Teaching scheme**

Lectures: 4 Hrs./ week

Practical: 2 Hrs./ week

### **Examination scheme**

Written: 50 Marks [2hrs]

Online: 50 Marks

Term Work: 25 Marks

Practical: 50 Marks

## **SECTION I**

### **UNIT - I Metals and Polymers**

[8 Hrs]

Metals used as image carriers, Metals used as substrate for various applications.

Introduction to polymer, Thermo set & thermoplastic polymer, natural & synthetic polymer, application of polymers in printing industry as printing substrates, image carrier emulsion, rollers for application of various coatings.

### **UNIT - II Printing Chemicals & Consumables**

[8 Hrs]

Silver Halide and other photographic emulsions, its ingredients and structure used in different printing processes, manufacturing, role of different developers used in development of the photographic image, Role of fountain solution in offset litho printing process, Adhesives - natural / synthetic and their use in printing and packaging. Chemistry of prepress, press and post press room chemicals.

### **UNIT -III Printing Inks**

[8 Hrs]

Classification & General characteristics of printing inks, Ingredients of printing ink - pigments, Vehicles, solvents and additives etc. Manufacturing of printing ink, General formulation of printing ink and factors affecting ink formulation Other specialty inks for various applications

## **SECTION- II**

### **UNIT – IV Properties & Testing of Printing Inks**

[8 Hrs]

Printing ink drying and curing mechanisms, Rheological properties of ink like viscosity, shear, yield, thixotropy, length and tack Subjective & objective ink testing methods. Various ink problems like Set off, trapping, filling, caking, End use properties of ink

### **UNIT – V Paper Manufacturing**

[8 Hrs]

Importance of paper and paper products in printing industry  
Fibrous & non-fibrous materials & its importance in paper  
Paper manufacturing process & different machines used for manufacturing the paper  
Different surface finishes obtained in paper  
Selection criteria of paper substrate for printing and converting applications

### **UNIT -VI Properties & Testing of Paper**

[8 Hrs]

Physical properties of paper such as GSM, thickness, density,  
Strength properties of paper such as tensile, tearing, folding strength.  
Chemical & Optical properties of paper like pH, color, gloss, brightness and opacity  
Importance of BIS & TAPPI standards for paper & its relation to printing industry.

**Term Work shall consist of following experiments:**

#### **A. Testing of printing inks**

1. To study physical properties of an ink
2. To take a drawdown of paste ink
3. To take a proof of paste ink
4. To take a proof of liquid ink by bar coater
5. To take a proof of liquid ink by flexo lab printer
6. To measure the viscosity of paste ink
7. To measure the viscosity of liquid ink
8. To study the end use properties of an ink

#### **B. Testing of substrate**

1. To find GSM of substrate
2. To find caliper thickness of substrate
3. To find top and bottom side of paper
4. To find cross and machine direction of paper
5. To find Cobb value of paper
6. To measure opacity of substrate
7. To measure brightness and gloss of substrate
8. To measure smoothness and porosity of substrate
9. To identify various types of plastic films

### **Reference Books**

1. L.C. Young, Printing Science, Pitman publication.
2. L.C. Young, Materials in Printing Processes, Focal Press publication.
3. Leach and Pierce, Printing Ink Manual, Springer Publication.
4. Dr. Nelson R. Eldred, What Printer Should Know About Ink, GATFPress, Pittsburgh
5. Lawrence A. Wilson, What Printer Should Know About Paper, 3<sup>rd</sup> Edition, GATFPress, Pittsburgh
6. E.A. Apps, Printing Ink technology, Leonard Hills, London Publication.
7. A. J. Athaley, Plastics in Packaging, Multi-tech publication
8. R. Holman, Technology of Printing Inks, All India PIMA Publication
9. C.H.Williams, Printing Ink Technology, PIRA UK Publication
10. K.W. Britt, Handbook of Pulp and Paper technology, CBS Publishers
11. P.J.Hartsuch, Chemistry of Lithography, GATF Publication

## **208284: Print Layout and Design**

### **Teaching scheme**

Practical: 2 Hrs./ week

### **Examination scheme**

Practical : 50 Marks

### **Term Work shall consist of following experiments:**

- 1) Introduction to Adobe In Design
- 2) To design a pamphlet in Adobe In Design
- 3) To design a brochure in Adobe In Design
- 4) To design a bookwork in Adobe In Design
- 5) Introduction to Adobe Photoshop CS4
- 6) Image editing in Adobe Photoshop CS4
- 7) Creating backgrounds in Adobe Photoshop CS4
- 8) Introduction to Corel Draw
- 9) Designing of Magazine Cover page in Corel draw
- 10) Designing of Magazine Advertisement in Corel draw

## Semester II

### 208285: Print Production Techniques

#### Teaching scheme

Lectures: 4 Hrs./ week

Practical: 2 Hrs./ week

#### Examination scheme

Written: 50 Marks [2hrs]

Online: 50 Marks

Term Work: 25 Marks

### SECTION – I

#### UNIT - I Print Layout Preparation

[8 Hrs]

Creating Originals: Analog and Digital Originals. Basics of page layouting, important considerations: margins, bleeds, marks and print aids. Layout of packaging designs, carton and flexible. Proofing systems, dummy preparation, instructions for print production

#### UNIT – II Artwork and design Processing

[8 Hrs]

Line & halftone techniques, history of film and film processing, basic prepress Techniques, Halftone theory, methods of converting continuous tone to Halftone - AM, FM & hybrid screening, Dot reproduction, Color correction in DTP – Tonal Gradation Curve, UCR, GCR, UCA, PDF workflow systems.

#### UNIT –III Digital Imaging

[8 Hrs]

Study of Digital Input systems: Types of Scanners, Digital Camera CCD, CMOS, Image resolutions, Camera Resolution, Lenses, Focal length, Iris Diaphragm, Aperture, Shutter, Camera Operation, pixel aspect ratio.

### SECTION - II

#### UNIT - IV Understanding Densitometry

[8 Hrs]

Types of Densitometers- Reflection, transmission, Print Density, Characteristics curve, Dot Gain/Loss, Dot Compensation curves, Print Contrast, Grayness, Hue error, Ink Trapping, Grey Balance, ANSI, DIN standards, Study and analysis of Print, Parameters affecting densitometry curves.

## **UNIT - IV Fundamentals of Color**

[8 Hrs]

Light, Electromagnetic spectrum, Additive color theory, subtractive color theory, digitizing color- sampling, spatial resolution, re-sampling, addressable resolution, bit depth, grey levels, relationship between grey levels and resolution, gamma settings

## **UNIT –VI Print Production**

[8 Hrs]

Costing- images and text and layout, processing and print costing, various parameters of post press considerations,

### **Term Work**

Term Work shall consist of following **eight** experiments

- 1) To study various types of conventional Originals, Digital Originals and Resolution
- 2) To scan a photograph and study the settings and edit the photographs for further processing
- 3) To scan a pre-printed original to understand and reduce moiré effect
- 4) To apply UCR, GCR and tonal gradation curves in Photoshop
- 5) To study working of Densitometer measurement of ink and paper densities, dot area, dot gain, contrast, trapping
- 6) To study Halftone dot structures, AM & FM, FAM
- 7) To study elements of Control strips & measurement
- 8) To study digital camera operations

### **Reference Books**

- 1) H.Kipphan, Handbook of Print Media, [ISBN 3-540-67326-1] Springer Publication
- 2) Leo, Manual of Graphic Design
- 3) Eric Chambers, Manual of reproduction for Lithography
- 4) R.W.G. Hunt, The Reproduction of Color, Wiley-IS and Series in Imaging Science and Technology.
- 5) Phil Green, Understanding Digital Color, 2<sup>nd</sup> Edition, GATFPRESS

## **208286: Finishing Techniques**

### **Teaching scheme**

Lectures: 4 Hrs./ week

Practical: 2 Hrs./ week

### **Examination scheme**

Written: 50 Marks [2hrs]

Online: 50 Marks

Practical : 50 Marks

## **SECTION I**

### **UNIT – I Classification of Binding Techniques**

[8 Hrs]

Parts of book, Brief Introduction to Print Finishing, Classification of binding,-Quarter bound(ASTI method), half bound, full bound / cloth, leather / Foam rexine Binding techniques- hard binding paperback binding and mechanical loose leaf binding.

Tools & equipment used in finishing operations.

### **UNIT – II Pre-forwarding and Forwarding Operations**

[8 Hrs]

Pre- forwarding operations - automation in respective operations. Forwarding operations  
Utility operations - Ruling, index cutting, numbering, punching, perforating, corner cutting, tag stringing, calendar rimming, spiral, comb and wire-o binding, eye-letting, die punching, velvet printing, etc.

### **UNIT – III Materials used in Binding**

[8 Hrs]

Materials used in print finishing and properties and standards, British and ISO sizes.  
Testing of materials, Securing, reinforcing, covering, adhesives, miscellaneous materials.

## **SECTION II**

### **UNIT – IV Imposition Schemes and Inventory Management**

[8 Hrs]

Imposition schemes and rules for hand folding and machine folding, folding schemes with marks. Organization and workshop layout, Inventory, storage and stock management, quality control

## **UNIT – V Costing and Estimation for Finishing Operations**

[8 Hrs]

Material calculation and cost estimating for finishing operations Estimation for finished job including paper, other raw material, processing charges etc.

## **UNIT – VI Modern Trends in Binding and Print Finishing**

[8 Hrs]

Equipments used, Cutting machines, Folding machines, ruling machines, 3 knife trimming machines, wire stitching machines, Thread sewing, Perfect Binder, Case making, lamination techniques- Wet and heat seal, thermal and extrusion lamination, foil stamping- Hot & cold, other ancillary machines, Use of robotics or mechanical handling systems.

### **Term Work**

Term Work shall consist of following Eight experiments

- 1) To prepare portrait folding schemes
- 2) To prepare Landscape folding schemes
- 3) To prepare saddle & side stitched booklet
- 4) To prepare half bound book - cut flush - French stitch
- 5) To prepare quarter bound book - ASTI - Kettle stitch
- 6) To prepare half bound book- Kettle stitch
- 7) To prepare full bound book- French stitch
- 8) To prepare Full bound book with kettle sewing and decorate it using finishing Techniques

### **Reference Books**

- 1) A. G. Martin, Finishing process in Printing Focal Press, London.
- 2) B. D. Mendiratta, Binding & Finishing Printek Publication, New Delhi.
- 3) Hassy Whetton, Practical Printing & Binding Ohams Press Ltd. London.
- 4) Pocket pal, International Paper Company, U.S.A.
- 5) Book on Binding and Finishing, GATFP Press

## **208287: Microprocessor & Microcontroller Techniques in Printing**

### **Teaching scheme**

Lectures: 4 Hrs./ week  
Practical: 2 Hrs./ week

### **Examination scheme**

Written: 50 Marks [2hrs]  
Online: 50 Marks  
Term Work: 25 Marks  
Practical: 50 Marks

## **SECTION – I**

### **UNIT - I Introduction of Microprocessor** [8 Hrs]

Microprocessor Architecture and its operation, Study of 8085 Microprocessor Pin out and Signals, Memory organization and Memory Mapping, Interfacing devices and review of input / output devices, Latches Buffers Decoders as 74139. Block diagram and working of 8085 based microcomputer system.

### **UNIT - II Programming Concepts of Microprocessor** [8 Hrs]

Classification of Instructions, Instruction format, Instruction timing and operation status, Program writing skills of Hand Coding, Expected execution for simple programs, Assembly language programs and debugging, Addressing Modes, Status of Flags, Data transfer, Arithmetic, Logical operations with 16 bit, Counters and Timing Delays. Debugging, Stack and Subroutines, Introduction of Assembler Programming.

### **UNIT – III Interfacing Peripheral Devices** [8 Hrs]

Basic Interfacing concepts, Interfacing input keyboard, interfacing output display [LED/LCD], Study of 8279 keyboard / display interface, Memory interfacing, Interfacing Devices study 8255. Study of 8253

## **SECTION – II**

### **UNIT - IV Introduction of Microcontrollers** [8 Hrs]

Architecture of 8051. Comparison with microprocessor, Pin diagram, clock and oscillator, flags, PSW, stack, Internal memory, ideal mode, power mode, SFR, Counter, Timer mode, Serial I/O and Interrupt structure.

#### **UNIT - IV Programming concepts of Microcontroller**

[8 Hrs]

Instruction set and programming of 8051. Addressing Modes, Timing Delays

Comparison of microprocessor and microcontroller.

Applications of microcontroller in printing such as printer interface

Bus standards such as RS232-C, RS485 and IEEE488.

#### **UNIT-VI Microprocessor and Microcontroller Applications in Printing**

##### **Technology**

[8 Hrs]

Stepper Motor Drive and Controller, Printer Interfacing with 8085, Colors Monitor Controller, Microprocessor based Sequence Controller, Concept of Programmable logic controller, with block diagram and simple programming (8 bit) related to specific printing operation sequence.

##### **Term Work –**

Term Work shall consist of following **TEN** experiments;

1. Write and execute Programs for
  - a) Addition, Subtraction (8 bit and 16 bit)
  - b) Multiplication, division (8 bit)
2. Write and Execute Programs for
  - a) Time delay using Register Pair
  - b) Decade counter
  - c) Up / Down Counter
  - d) Pulse Timing for Flashing Lights
3. Study of interfacing chips 8279
  - a) Chip study waveform Observation
  - b) Program related to printing field application
4. Write and Execute a Program for Serial Data Transfer.
5. Study of Interrupt Controller 8259
6. Interfacing with ADC/DAC (8 bit only)
7. Interfacing of Stepper Motor

8. Study of 8255 Chip & Interfacing with Printer (any type)

9. Study of EPROM Programmer

OR

Study of Timer Controller Chip 8253

10. Study of PLC and Simple Program Execution using PLC (8 bit / 16 bit any one)

### **Reference Books**

1. R. S. Gaonkar Microprocessor Architecture, programming and applications with 8085, Wiley

Eastern Publication.

2. A. P. Mathur Microprocessor architecture & applications, TMH.

3. Lance leventhal Programming with 8085, Mc Graw Hill.

4. "Microprocessors and Microcontrollers" Jhadhe, Thavare, Nirali Prakashan

5. Kenneth Ayala,"8051 microcontroller" PHI

6. Microprocessor Applications Douglas Hall - McGraw Hill

7. 8085 peripheral & application manual - Intel.

8 Microcontrollers by Mazidi

9 Ajay Deshmukh , "Microcontroller Theory and application " TMH

## **203153: Electrical Machines & Utilization**

### **Teaching scheme**

Lectures: 3 Hrs./ week

Practical: 2 Hrs./ week

### **Examination scheme**

Written: 50 Marks [2hrs]

Online: 50 Marks

Oral: 50 Marks

### **SECTION – I**

#### **UNIT – I D.C. Motors**

[8 Hrs]

D.C. Generator- Construction & Principle of working, Types of D.C. Generator, EMF Equation

D.C. Motors- Working Principle, Back EMF, Types of motors, Torque Equation, Characteristics of Motors, Starting & Reversing, Speed Control Methods of Shunt and Series Motors, Necessity of Starters, Two and Three Point Starters, Efficiency & Losses, Applications of Shunt & Series motors

#### **UNIT – II Three Phase and Single Phase Induction Motor**

[8 Hrs]

Three Phase Induction Motor- Basic Principle of Operation, Production of Rotating Magnetic Field, Types of Induction Motors, Slip, Current, Power and Torque Relations, Torque-Slip Characteristics, Relationship Between Rotor Copper Loss, Slip and Rotor Output, Different Types of Starters, Speed Control of Induction Motors, Applications.

Single Phase Induction Motor- Principles of Operation of Single Phase Induction Motors, Starting Techniques of Single Phase Induction Motors (Split Phase & Shaded Pole), Applications

#### **UNIT – III Special Purpose Motors and Drives**

[8 Hrs]

Special Purpose Motors- Servo Motors, Stepper Motor and Universal Motor (Construction & Applications), Introduction to Synchronous motors – special features. Drives- Advantages of Electrical Drives, Individual & Group Drive, Selection of motors depending on load characteristics

## **SECTION - II**

### **UNIT – IV Measurement of Power in Three Phase Circuit** [8 Hrs]

Star and Delta Connections (brief review), Power Measurement in Three Phase Circuit by Two Wattmeter & Single Wattmeter Method , Reactive Power Measurement with two wattmeter method Special Components in Printing Industry Introduction, Various Types of Relays, Contractor, Limit Switches, Proximity Switches, Micro Switches, Solenoids, Photocells, Electric Encoders etc.

### **UNIT - V Electrical Heating** [8 Hrs]

Advantages of Electrical Heating, Resistance and Arc Heating, Principal of Induction Heating and Dielectric Heating, Furnaces, Temperature Control of Furnaces. Application of Different Heating Methods

### **UNIT – VI**

#### **Illumination, Energy Conservation and Safety in Printing Industry** [8 Hrs]

Illumination- Laws of Illumination, Inverse Square law, Lambert's Cosine Law, Requirements of Good Lighting Scheme, Special Purpose Lighting Energy Conservation and Safety in Printing Industry- Introduction & Necessity for energy conservation , Methods of energy conservation, Application in Printing Industry, Safety & Maintenance of Printing Industry

#### **Term Work**

Term work should consist of any 7 experiments from 1 to 9 of the above list and 1 Compulsory report of industrial visit.

- 1) To measure reactive power consumed by a balanced three phase inductive load by single wattmeter method.
- 2) To measure power in three phase, three wire balanced load circuit using two wattmeter
- 3) Speed control of D.C. Shunt Motor by variation of armature voltage and field current.

- 4) Brake test on D.C. Shunt Motor
- 5) Load test on D.C. Series Motor
- 6) Load test on Three Phase Induction Motor
- 7) To study of various starters used for Three Phase Induction Motors.
- 8) Study of various Single Phase Induction Motors.
- 9) A report on Industrial Visit to any one of place given below where students can observe a] Various Motors b] Industrial Furnace c] Electrolysis Process

#### **Text Books**

- 1) S.K. Battacharya, Electrical Machines TTTI Chandigarh
- 2) Manikandan, Electrical Machines & Drives, Scitech Publications, Chennai
- 3) Ashfaq Husain, Fundamentals of Electrical Engineering, Dhanpat Rai & Co.Ltd.
- 4) H.Pratab, Art & Science of Utilization of Electrical Energy, Dhanpat Rai & Com.

#### **Reference Books**

1. E.O. Taylor, Utilization of Electrical Energy, Orient Longman
2. Theodore Wildi, Electrical Machines, Drives and Power Systems, Fourth Edition, Pearson Education

## **202055: Theory of Printing Machines and Machine Components**

### **Teaching scheme**

Lectures: 3 Hrs./ week

Practical: 2 Hrs./ week

### **Examination scheme**

Written: 50 Marks [2hrs]

Online: 50 Marks

Term Work : 25 Marks

## **SECTION I**

### **UNIT I Introduction**

[8 Hrs]

Definitions of link, kinematics pair, kinematics chain, mechanism, machine, structure, inversion, degree of freedom. Inversions of four bar chain, single slider crank chain and double slider crank chain. Geneva mechanism, Ratchet and pawl arrangement, Pantograph mechanism.

### **UNIT II Velocity and Acceleration Analysis**

[8 Hrs]

Importance of velocity and acceleration analysis in mechanisms, Velocity analysis of mechanisms by relative velocity method, acceleration analysis of mechanisms by relative acceleration method, velocity and acceleration image principle.

### **UNIT III Coriolis Acceleration**

[8 Hrs]

Concept of Coriolis component of acceleration, direction of coriolis component of acceleration, velocity and acceleration analysis of mechanisms having Coriolis component of acceleration.

## **SECTION II**

### **UNIT IV Friction and Friction Clutches**

[8 Hrs]

Dry friction, Lubrication methods, principle of hydrodynamic and hydrostatic lubrication. Pivot and collar friction. Plate clutch, cone clutch and centrifugal clutch, Torque transmitting capacity by uniform wear and uniform pressure theory, clutch operating mechanisms.

## **UNIT V Brakes**

[8 Hrs]

Different types of brakes, Shoe brakes, External and Internal shoe brakes, Block brakes, Band brakes, Band and Block brakes, Braking torque.

## **UNIT VI Belt, Rope and Chain Drives**

[8 Hrs]

Flat and Vee belt, Rope, Limiting tension ratio, power transmitted, centrifugal effect, maximum power transmitted by a belt, slip, creep, initial tension. Selection of belt from manufacturer's catalogue. Chain drive classification of chain, pitch, pitches circle diameter, chain speed, angular velocity of sprocket, chain length.

### **Term Work**

Term Work shall consist of following **Eight** experiments

1. Study of inversions of one of the kinematics chains.
2. Velocity and acceleration diagrams
3. Velocity and acceleration diagrams( with coriolis component of acceleration)
4. Study of belt drive.
5. Selection procedure of belt from manufacturer's catalogue.
6. Study of clutches.
7. Study of brakes.
8. Study of chain drive.

### **Reference Books**

1. Thomas Bevan- Theory of Machines, CBS Publishers
2. J. E. Shigley- Theory of Machines and Mechanisms, McGraw Hill Publication
3. P. L. Ballaney- Theory of Machines, Khanna Publishers
4. S. S. Rattan- Theory of Machines, Tata McGraw Hill Publication.

## **Soft Skills (208288)**

### **Teaching scheme**

Tutorial: 2 Hrs./ week

### **Examination scheme**

Term Work : 25 Marks