Savitribai Phule Pune University

Syllabus

FOR

S.E.(Printing and Graphics Communication Engineering)

2015 Course

UNDER FACULTY OF ENGINEERING

EFFECTIVE FROM June 2016

Savitribai Phule Pune University
S.E. (Printing and Graphic Communication) 2015 Course
(w. e. f. 2016-17)

Sr. No.	Subject Code	Subject Name	Teaching Scheme			Examination Scheme					Total Marks	Credits
			SEMESTER – I									
			Th	Pr	Tut	Paper		TW	PR	OR		
						In-Sem	End-Sem					
1.	207004	Engineering Mathematics III	04	--	01	50	50	25	--	--	125	05
2.	202281	Strength of Machine Elements	04	--	--	50	50	--	--	--	100	04
3.	208281	Introduction to Printing Processes	04	02	--	50	50	25	50	--	175	05
4.	208282	Printing Digital Electronics	04	02	--	50	50	25	--	--	125	05
5.	208283	Material Science	04	02	--	50	50	25	50	--	175	05
6.	208284	Print Layout and Design	--	02	--	--	--	50	--	--	50	01
7.	208285	Audit Course										Grade
Total			**20**	**08**	**01**	**250**	**250**	**150**	**100**	**--**	**750**	**25**

Sr. No.	Subject Code	Subject Name	Teaching Scheme			Examination Scheme					Total Marks	Credits
			SEMESTER – II									
			Th	PR	Tut	Paper		TW	PR	OR		
						In-Sem	End-Sem					
1.	208286	Print Production Techniques	04	02	--	50	50	--	50	--	150	05
2.	208287	Finishing Techniques	04	02	--	50	50	--	50	--	150	05
3.	208288	Microprocessor & Microcontroller in Printing	04	02	--	50	50	25	--	50	175	05
4.	202291	Theory of Printing Machine and Machine Components	03	--	01	50	50	25	--	--	125	04
5.	203283	Electrical Machines & Utilization	04	02	--	50	50	25	--	--	125	05
6.	208289	Soft Skills	--	02	--	--	--	25	--	--	25	01
7.	208290	Audit Course										Grade
Total			**19**	**10**	**01**	**250**	**250**	**100**	**100**	**50**	**750**	**25**

207004: Engineering Mathematics III(Printing & Graphics Communication/Chemical/Bio-Technology

Teaching Scheme:	*Credits:*	*Examination Scheme:*
Lectures:4 Hrs./Week	*Theory: 4*	In-Sem: 50 Marks
Tutorials: 1 Hr./Week	*Tutorial: 1*	End-Sem: 50 Marks
		Term work: 25 Marks

Prerequisites: -Differential and Integral Calculus, Taylor series and Infinite series, Linear Differential equations of first order and first degree, Fourier series, Vector algebra.

Course Objectives:

After Completion of the course, student will have adequate background, conceptual clarity and knowledge of appropriate solution techniques related to:

1. Ordinary and partial differential equations applied to Chemical engineering problems, heat and mass transfer.
2. Integral Transforms such as Laplace transform, Fourier transform and applications to ordinary and partial differential equations arising in Vibration theory, Fluid Mechanics, Heat and Mass Transfer and Thermodynamics.
3. Vector differentiation and integration applied to problems in Fluid Mechanics.

Course Outcomes:

At the end of this course, students will be able to:

1) Solve higher order linear differential equations and apply to modeling and analyzing chemical transformation and heat and mass transfer systems.
2) Apply Laplace Transform and Fourier Transform techniques to solve differential equations involved in vibration theory, Liquid level systems and related chemical engineering applications.
3) Perform vector differentiation and integration, analyze the vector fields and apply to fluid mechanics problems.
4) Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations.

Course Contents

Unit I: Linear Differential Equations (LDE) and Applications   (09 Hours)

LDE of nth 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. Fourier 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).

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. Wartika & 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).

Guidelines for Tutorial and Term Work:
i) Tutorial shall be engaged in four batches (batch size of 20 students maximum) per division.
ii) Term work shall be based on continuous assessment of six assignments (one per each unit) and performance in internal tests.

202281: Strength of Machine Elements

Teaching Scheme:	*Credits:*	*Examination Scheme:*
Lectures:4 Hrs/Week	*Theory: 4*	In-Sem: 50 Marks
		End-Sem: 50 Marks

Prerequisites: NIL

Course Objectives:
1. To introduce the basic elements of the subject like mechanical properties of materials, stress-strain diagram and various elastic constants and their interrelation.
2. To introduce students the concept of shrear force diagram (SFD) and bending moment diagram (BMD) as applicable in cantilever beams, simply supported beams
3. To introduce flexural formula applicable to bending stresses and its application to beams of variety of cross-sections (T, I and C).
4. To study principal stresses & theories of failure
5. To explain the slope and deflection of beams.

Course Outcomes:
At the end of this course, students will be able to:
1. Ability to understand the fundamentals of simple stresses and strains.
2. Ability to develop analytical competency in solving bending moment and shear force problems Ability to understand concept of axially loaded columns and buckling of columns and torsion in
3. circular shafts
4. Evaluate principle stresses.
5. Evaluate slope and deflection of beams

Course Contents

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

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: *Introduction* **to** *Printing Processes*

Teaching Scheme:
Lectures: 4 Hrs./Week
Practical: 2 Hrs/Week

Credits:
Theory: 4
Practical: 1

Examination Scheme:
In-Sem: 50 Marks
End-Sem: 50 Marks
Term work: 25 Marks
Practical: 50 Marks

Course Objectives
1. To understand the flow of printing
2. To understand details of press department
3. To understand details of prepress department
4. To understand details of post press department
5. To understand the basics of design
6. To learn the types of design for different products
7. To know the specialized printing applications

Course Outcome
1. Analyze the printing workflow to understand pre press, press and post press techniques
2. Analyze the basic printing processes to make a selection of printing processes for specific job
3. Analyze the various binding & finishing techniques to make printing job more effective
4. Apply the principals of design and fundamentals of design to create a effective design
5. Apply the additive & subtractive theory to create a effective design
6. Understand the specialized printing applications

Course Contents

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, conventional, inkjet and electrophotography printing processes, Configuration of machines, machine parts and 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 such as Punching, embossing, foiling, lamination, varnishing, spot UV.

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, Basic concepts of designing, Creativity, steps in creativity; Typography; Visual ingredients of graphic design; Design consideration; Symbols and logos. Layout – purpose & advantages; layout styles; layout components; stages in preparing a layout; marking-up; Dummy, Stages of layout, thumbnails, rough layout, comprehensive layout, artwork, Design for magazines, newspaper, catalogues, cartons, commercial stationary, flexible pouche.

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, Light, Electromagnetic spectrum, Additive color theory, subtractive color theory, Colour Fusion, Colour originals for reproduction. reproduction objectives, resolution, bit depth, grey levels, relationship between grey levels and resolution, dimensions of color, color schemes, color symbolism

Unit VI: Specialized 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 ten 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 optimize the exposure time of PS plate using UGRA step control wedge.
6. To prepare PS plate for offset
7. To prepare flexo plate for flexography printing
8. To take a print on digital printer
9. To take a print on ink jet printer
10. Print process identification from printed samples

Reference Books

1. J. Michael Adams, Penny Ann Dolin, (2002), Printing Technology 5th edition, Delmar Publishing.
2. Rogue C. Parker, (1993), Looking Good in Print - A Guide to Basic Design for Desktop Publishing, 3rd edition, Ventana Pr.
3. Alastair Campbell, (1983), The Designers Handbook, Little Brown.
4. N. N. Sarkar, (2013), Art and Print Production. 2nd edition, Oxford University Press, India.
5. D. C. Mulvihill, (1985), Flexo Primer, Foundation of FTA.
6. H. Kipphan, (2001), Handbook of Print Media, ISBN: 3-540-67326-1 Springer-Verlag Berlin Heidelberg.

208282: Printing Digital Electronics

Teaching Scheme: *Credits:*   *Examination Scheme:*
Lectures:4 Hrs./Week   *Theory: 4*   In-Sem: 50 Marks
Practical: 2 Hrs/Week   *Practical: 1*   End-Sem: 50 Marks
                                                    Term work: 25 Marks

Course objectives

1. Understand fundamentals of number system
2. Understand different number systems and their conversions
3. Understand different codes and their conversions
4. Understand fundamentals of digital electronics
5. Understand truth table and K-map technique
6. Understand SOP and POS technique
7. Understand Logic families
8. Understand binary arithmetic
9. Understand adder and subtractor circuits
10. Understand different types of flipflops
11. Understand different types of counters
12. Understand ADC and DAC
13. Understand different types memories
14. Understand different types of decoders
15. Understand different types of input and output devices

Course Outcomes

1. Understand and apply knowledge of different codes and number systems to understand different circuits
2. Understand and apply KMAP and truth table techniques to design different circuits
3. Understand and design adder subtractor circuits to perform addition and subtraction
4. understand and apply flipflop and counter circuits to get memory blocks and timings
5. Understand and use ADC and DAC circuits for conversions
6. Understand and use different input and output devices

Course Contents

Unit I: Introduction of number system   [8 Hrs]
Decimal, Binary, Octal Hexadecimal number systems and their conversations, BCD codes, 8421, Excess - 3, Gray Code, ASCII code, Concept of bar code and its application in printing

Unit II: Fundamentals of Digital Electronics   [8 Hrs]
Boolean algebra, De-Morgan theorems, all types of gates and their truth tables
Need of minimization, Minimization techniques, K-map simplification up to 4 variables
SOP and POS forms; don't care conditions
Logic families and comparative study of TTL, ECL and CMOS.

Unit III: Combination logic and Arithmetic   [8 Hrs]

Combination logic and Arithmetic such as addition, subtraction, 1's complement and 2's complement method. Binary multiplication and division. Half adder / Half subtractor, Full Adder / Full Subtractor, BCD adder. One bit digital comparator Concept and Application of ALU.

Unit IV: Sequential logic circuits and their applications in printing   [8 Hrs]

Study of level clocked S-R, D, JK, M-SJK flip-flops (Includes logical diagrams, symbol truth - table, waveforms / timing diagrams). Edge triggered flip flops (includes S-R, D, JK, M-S Jk flip-flops along with logical diagram, symbol truth table, waveforms / timing diagram). Study of asynchronous and synchronous counters and their applications such as paper counting.   Roller speed measurements etc Concept of modulo `N' counter, UP/Down counter. Principle operation of Universal shift register (IC 7495 including all modes of operation - concept only) and its application in printing.

Unit V: Digital signals and its storage and display Basic   [8 Hrs]

Introduction to ADC's and DAC's (includes classification and specifications in brief). Classification of Memories, study of RAM, ROM, EPROM, E PROM, NVRAM, SRAM, DRAM, concept of PLA, PAL and PLD's.

Display Devices and decoders 7 segment LED display (includes basic diagrams of Common Anode and Common Cathode) study of decoder driver IC's such as IC 7447, 7448, LCD display & Display Drivers IC's such as 7106, 7107.

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Unit VI: Introduction to Digital Computer   [8 Hrs]

Block diagram of digital computer, serial port / parallel port concept, Input devices such as Keyboard, Mouse, Joystick, Output Devices such as Printers (includes classification and one application of each), Floppy Disks, CD's concept of Modern, special accessories such as Digital Camera and Digital Scanner.

Term Work

Term Work shall consist of following experiments:

1. Logic gates – I
2. Logic gates – II
3. Comparative study of TTL and CMOS (Parameter measurement for any simple functional circuit using TTL IC and CMOS IC)
4. Study of code conversions and their applications in printing
   a. Binary to gray and gray to binary.
   b. Bar code evaluation
5. Arithmetic Circuits
   a. Half and Full Adder / Half and Full Subtractor functionality verification.
   b. One bit digital comparator. "
6. Combinational Circuits
7. Sequential Circuits I
8. Sequential circuits II
9. Study of Shift Register IC 749 and its application in printing.
10. Study of ADC & DAC IC (8 bit only) or Study of or Display Devices and Drivers

Reference Books
1. Modern Digital Electronics by R.P.Jain, Tata McGraw Hill
2. Digital Electronics - An introduction to theory and practice by Gothman, Prentice Hall Publication.
3. Digital Electronics - Principles and applications by Malvino, Leach, Prentice Hall Publication.
4. Digital systems Principles and application by Tocci, Prentice Hall Publication.

208283: Material Science

Teaching Scheme:	*Credits:*	*Examination Scheme:*
Lectures: 4 Hrs./Week	*Theory: 4*	In-Sem: 50 Marks
Practical: 2 Hrs/Week	*Practical: 1*	End-Sem: 50 Marks
		Term work: 25 Marks
		Practical: 50Marks

Prerequisites: Applied Physics and Applied Chemistry

Course Objectives:
After Completion of the course, student will have adequate background, conceptual clarity and knowledge of appropriate solution techniques related to:
1. Attain the basic technical knowledge of various materials used in different printing processes.
2. Understand the importance of surface energy and surface tension for the better interaction of substrate and coatings.
3. Know the importance various types of printing inks and their properties required in different printing processes.
4. Understand the various grades of papers used for printing and packaging applications and their properties.
5. Understand the vital role other consumables used during printing.
6. Learn the method of testing the materials scientifically.
7. Understand the role of plastic in printing and packaging industry.
8. Know the process of manufacturing of printing ink and paper.

Course Outcomes:
At the end of this course, students will be able to:
1. Apply the knowledge to use of metals and polymers in printing and allied industry.
2. Apply the knowledge to select the appropriate consumable for the effective use in printing and converting applications.
3. Analyse the characteristics of various raw material used in printing ink and to formulate the best suitable ink for the printing application.
4. Analyse the properties and testing methods of printing ink for runnability, printability and shelf life.
5. Analyse the characteristics of various raw materials used to manufacture paper and its properties for runnability, printability and shelf life.
6. Understand the various methods and instruments used for material analysis.

Course Contents

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, types of rollers for various printing applications.

Unit II: Printing Chemicals & Surface Tension   [8 Hrs]

Role of acids, alkalis and other chemicals in various printing process, Types and role of adhesives in printing and packaging, Surface tension, angle of contact, shape of a liquid surface in a capillary tube, determination of surface tension by capillary tube method, bubble pressure method, dynamic surface tension, Surface Tension measurement of liquid by Ring and Plate method.

Unit III: Printing Inks, Properties & Testing   [8 Hrs]
Classification & General characteristics of printing inks for various printing processes, Ingredients of printing ink such as pigments, Vehicles, solvents and additives etc, Manufacturing of printing ink, Drying and curing mechanism of printing inks, 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 IV: Paper Manufacturing, Properties & Testing   [8 Hrs]
Importance of paper and paper products in printing industry, Paper manufacturing process including Pulping, Bleaching, waste paper utilization and deinking, Stock preparation, Sizing, Different machines used for paper manufacturing, Single wire and Two wire, Pressing, Drying, Calendering, Super calendaring, Embossers etc., Different surface finishes obtained in paper, selection criteria of paper substrate for printing and converting applications Surface and Physical properties of paper such as GSM, thickness, density etc., strength properties of paper such as tensile, tearing, folding strength etc., chemical and optical properties of paper like pH, color, gloss, brightness and opacity, Importance of BIS & TAPPI standards for paper & its relation to printing industry.

Unit V: Packaging Materials   [8 Hrs]
Specialty papers for Packaging, Folding board cartons and coated cartons; Types of Corrugated Boards, Applications
.
Unit VI: Instruments and Methods for Material Analysis   [8 Hrs]
Working principle of Confocal Laser Scanning Microscopy, Scanning Electron Microscopy and Atomic Force Microscopy, 2-D and 3-D analysis of substrate, measurement of surface energy of paper, surface tension of a liquid ink and interfacial tension between ink and paper

Term Work
Term Work shall consist of following experiments:
1. To identify various types of plastic films
2. To measure the contact angle of liquid ink and surface energy of substrate
3. To measure the surface tension of an ink by Du Nouy Ring method
4. To measure the surface tension of an ink by Wilhelmy Plate method
5. To take a proof of paste ink and study physical and end use properties of an ink
6. To take a proof of liquid ink by bar coater and flexo lab printer
7. To measure the viscosity of paste and liquid ink
8. To find GSM and caliper thickness of substrate
9. To find top and bottom side and cross and machine direction of paper
10. To find Cobb value and measure opacity of paper
11. To measure brightness and gloss of substrate
12. To measure smoothness and porosity of substrate

Reference Books

1. L.C. Young, Printing Science, Pitman publication.
2. L.C. Young, Materials in Printing Processes, Focal Press publication.
3. D.S. Mathur, (2007), Properties of Matter, S. Chand & Co. Ltd.
4. Leach and Pierce, Printing Ink Manual, Springer Publication.
5. Dr. Nelson R. Eldred, What Printer Should Know About Ink, GATF Press, Pittsburgh
6. Lawrence A. Wilson, What Printer Should Know About Paper, 3rd Edition, GATF Press, Pittsburgh
7. E.A. Apps, Printing Ink technology, Leonard Hills, London Publication.
8. A.J. Athaley, Plastics in Packaging, Multi-tech publication

9. R. Holman, Technology of Printing Inks, All India PIMA Publication
10. C. H. Williams, Printing Ink Technology, PIRA UK Publication
11. K.W. Britt, Handbook of Pulp and Paper technology, CBS Publishers
12. P. J. Hartsuch, Chemistry of Lithography, GATF Publication
13. Dara.S. S., (2010), A Textbook of Engineering Chemistry, S. Chand & Company Ltd., New Delhi.
14. B. Sivasankar., (2008), Engineering Chemistry, TATA McGraw Hill, 2008
15. Kenneth G. Budinski, Michael K. Budinski., (2010), Engineering Materials: Properties and Selection, Ninth Edition, Pearson Publication.
16. P. Kannan and A. Ravi Krishnan, "Engineering Chemistry" 9th edition- 2009, Sri Krishna Hitech Publishing Company (P) Ltd, Chennai.
17. Gauri Shankar Misra, (2010), Introductory Polymer Chemistry, New Age International.

208284: Print Layout and Design

Teaching Scheme: *Credits:*   *Examination Scheme:*

Practical: 2 Hrs/Week   *Practical: 1*   Term work: 50 Marks

Prerequisites: -

Application of Page lay outing software, vector based software and photo editing software.

Course Objectives:

Objective of this course is to:

1. Understand basic tools, commands of page layouting software.
2. To learn application of page layouting software for preparation of pamphlet design.
3. To learn application of page layouting software for designing brochure and learn print layouting for various machine sizes.
4. To learn application of character style, paragrah style in text book layouting. Also learn how to apply numbering, footer, header for text book layout.
5. To learn image editing tools of photo editing software.
6. To learn how to apply different filters, styles of different filter of photo editing software
7. To learn how to convert color image into gray scale image in photo editing software
8. To learn Basic tools, commands of vector based software.
9. To learn application of Basic tools, commands of vector based software to design magazine cover page.
10. To learn application of Basic tools, commands of vector based software to design newspaper advertisement.

Course Outcomes:

At the end of this course, students will be able to:

1. Understand Basic tools, commands used in page layouting software and its application for layouting.
2. Apply basic concept of page layouting software to create pamphlet design as per printing requirement.
3. Apply basic concept of page layouting software to design single color brochure for various print machine sizes
4. To apply knowledge of page layouting software to create text book layout with different imposition styles.
5. To understand image editing tools of photo editing software.
6. To create a background for specific design by using filters of photo editing software.
7. To apply knowledge of photo editing software for converting color image into gray scale image.
8. To create newspaper advertisement using vector based software.
9. To apply knowledge of vector graphic software to design a magazine cover page.
10. To Understand Basic tools, commands used in vector graphic software.

Term Work shall consist of following experiments:

1. Introduction to page lay-outing software.

2. Prepare a pamphlet by using lay-outing software in A5 size and create step and repeat in A3 size.

3. Design a single color brochure using lay-outing software for A4 size and create print layout for offset machine size such as 15 x 20 inches, 18 x 23 inches, 20 x 30 inches etc.

4. To design a bookwork using lay-outing software and different imposition styles.

5. Introduction to image editing tools using photo editing software.

6. Create a background for specific design by using filters from photo editing software.

7. Convert color image into gray scale image and adjust the highlight, mid tone and shadow areas.

8. Introduction to vector graphic software.

9. Design a magazine cover page using vector base software.

Designing of newspaper advertisement using vector based software.

Audit Course

In addition to credits course, it is recommended that there should be audit course (non-credit course) preferably in each semester from second year. The student will be awarded grade as AP on successful completion of audit course. The student may opt for one of the audit courses per semester, starting in second year first semester. Though not mandatory, such audit courses can help the student to get awareness of different issues which make impact on human lives and enhance their skill sets to improve their employability. List of audit courses offered in each semester is provided in curriculum. Each student has to choose one audit course from the list per semester. Evaluation of audit course will be done at institute level. Method of conduction and method of assessment for audit courses is suggested.

The student registered for audit course shall be awarded the grade AP and shall be included such grade in the Semester grade report for that course, provided student has the minimum attendance as prescribed by the SavitribaiPhule Pune University and satisfactory in-semester performance and secured a passing grade in that audit course. No grade points are associated with this 'AP' grade and performance in these courses is not accounted in the calculation of the performance indices SGPA and CGPA. Evaluation of audit course will be done at institute level itself.

(Ref-http://www.unipune.ac.in/Syllabi_PDF/revised-
2015/engineering/UG_RULE_REGULATIONS_FOR_CREDIT_SYSTEM-2015_18June.pdf)

Guidelines for Conduction and Assessment (Any one or more of following but not limited to)

- Lectures/ Guest Lectures
- Visits (Social/Field) and reports
- Demonstrations
- Surveys
- Mini Project
- Hands on experience on specific focused topic

Guidelines for Assessment (Any one or more of following but not limited to)

- Written Test
- Demonstrations/ Practical Test
- Presentations
- IPR/Publication
- Report

- **List of courses under Audit Course1**

Course Code	Audit Course Title
208285A:AC1-I	Basic Photography
208285B:AC1-II	Personalized Printing I

Students can opt for audit course from the list of Audit Course of any branch of engineering.

208285A: AC1-I Basic Photography

1. **Camera Controls:** Auto, shutter speed, f-number, ISO compensation, zoom and so on. A very basic overview, to be followed up with more detail as it pertains to the following areas.

2. **Quantity of light:** A very basic outline of ISO, aperture and shutter speed, the gist of it being keep the shutter speed to a decent level and what to expect as you increase ISO. Evaluating exposure, including an introduction to the histogram. (Depth of field is probably best reserved for a follow-up intermediate course.)

3. **Quality of light:** Hard vs. soft light. Directionality. The basics of light color and white balance. Show lots of example photos. Ask them to make and show their own examples.

4. **On-camera flash:** As main light source and as a fill source. At least try to help them understand that flash is useful only at relatively short distances.

5. **Composition and Content:** I would put the emphasis on capturing the mood and moment and telling the story -- not on rules. Talk in terms of organization within the frame, story content, sense of time and movement, and (for people) facial expression. Talk about quality of light in different weather and different times of day and how it affects the mood of the photo.

6. **Editing and Post Processing:** Encourage them to edit hard -- point out the best photographers throw away more pictures than they show. With digital there is no reason not to shoot enough to have choices. Basic computer controls. Adjusting brightness, contrast and color. Sharpening. Resizing and resampling for web use or prints. At least introduce the idea of archiving and backup files.

208285B: AC1-II   Personalized Printing I

1. Design Preparation for Transfers
2. Types of Transfer materials
3. Types of Surfaces for Transfers: Mug, Ceramics, metals, Fabrics, Thermoplastics
4. Sublimation Inks and Printers
5. Transfer settings, Trouble shooting and Quality Control
6. Costing and Estimating

208286: Print Production Techniques

Teaching Scheme:	*Credits:*	*Examination Scheme:*
Lectures: 4 Hrs./Week	*Theory: 4*	In-Sem: 50 Marks
Practical: 2 Hrs/Week	*Practical: 1*	End-Sem: 50 Marks
		Practical: 50 Marks

Pre-requisites: Introduction to Printing Processes

Course Objectives
1. To learn and work with various typesetting requirements
2. To prepare Page Lay-outing and processing
3. To do Proofing and Dummy Preparation
4. To understand Halftone techniques
5. To work with Digital Input Systems
6. To work with Densitometry, and use Densitometer

To do management and Production Planning of Print jobs

Course Outcome
1. Anlayze the requirements of type setting to create a effective design
2. Analyze the requirements of Page layouting standards to create effective design for specific job
3. Apply the various halftone techniques for dot reproduction
4. Analyze the various digital input systems for effective selection of digital devices for specific job
5. To understand the densitometer and its application
6. Apply the production strategy for costing of specific job

Course contents

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, conventional, inkjet and electrophotography printing processes, Configuration of machines, machine parts and 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 such as Punching, embossing, foiling, lamination, varnishing, spot UV.

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, Basic concepts of designing, Creativity, steps in creativity; Typography; Visual ingredients of graphic design; Design consideration; Symbols and logos. Layout – purpose & advantages; layout styles; layout components; stages in preparing a layout; marking-up; Dummy, Stages of layout, thumbnails, rough layout, comprehensive layout, artwork, Design for magazines, newspaper, catalogues, cartons, commercial stationary, flexible pouches

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, Light, Electromagnetic spectrum, Additive color theory, subtractive color theory, Colour Fusion, Colour originals for reproduction. reproduction objectives, resolution, bit depth, grey levels, relationship between grey levels and resolution, dimensions of color, color schemes, color symbolism

Unit VI: Specialized 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 ten 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 optimize the exposure time of PS plate using UGRA step control wedge.
6. To prepare PS plate for offset
7. To prepare flexo plate for flexography printing
8. To take a print on digital printer
9. To take a print on ink jet printer
10. Print process identification from printed samples

Reference Books
1. J. Michael Adams, Penny Ann Dolin, (2002), Printing Technology 5th edition, Delmar Publishing.
2. Rogue C. Parker, (1993), Looking Good in Print - A Guide to Basic Design for Desktop Publishing, 3rd edition, Ventana Pr.
3. Alastair Campbell, (1983), The Designers Handbook, Little Brown.
4. N. N. Sarkar, (2013), Art and Print Production. 2nd edition, Oxford University Press, India.
5. D. C. Mulvihill, (1985), Flexo Primer, Foundation of FTA.
6. H. Kipphan, (2001), Handbook of Print Media, ISBN: 3-540-67326-1 Springer-Verlag Berlin Heidelberg.

208287: Finishing Techniques

Teaching Scheme: *Credits:*   *Examination Scheme:*
Lectures:4 Hrs./Week   *Theory: 4*   In-Sem: 50 Marks
Practical: 2 Hr./Week   *Practical: 1*   End-Sem: 50 Marks
                                                          Practical: 50 Marks

Course Objectives

1. Learn basic structure of book and book making techniques
2. Understand methods of book planning
3. Understand various methods of book production and folding, gathering and collating operations
4. Understand different materials in and adhesives in book production
5. Understand various ancillary operations carried out in finishing techniques
6. Understand costing and estimation in book production

Course outcome

1.Identify the different parts of a book and know various hand binding techniques
1. Demonstrate various imposition schemes for different book binding styles
2. Evaluate different machine folding mechanisms and their utilisations in terms of applicatioms and its use for book production methods and equipments
3. Identify and understand the purpose of various materials such as adhesives, securing threads, reinforcing and lining materials used in the binding process
4. Understand properties and functions of surface finishing techniques required for book producion and identify other ancillary operations
5. Calculate book sizes and material requirements for a book including other processessing charges during book making

Course contents

Unit I: Book Binding Techniques   **[8 Hrs.]**
Anatomy of a book and terminology in use, Introduction to various binding techniques, Industrial binding techniques - Adhesive/Perfect Binding, Hardcover binding, Wire stitching, Office stationery binding techniques - Loose leaf binding, spiral, ring, comb binding etc., Legacy hand binding methods - Quarter bound, half bound, full bound, cover drawing, Stitching schemes such as french, kettle, Adhesive binding process - spine preparation, adhesive application, creasing, nipping, Hardcover binding process – end paper, case making, book block making, casing in, finishing

Unit II: Book Binding and Planning Schemes   **[8 Hrs.]**
Imposition schemes for various signature schemes - saddle stitch, perfect bound, various folding schemes, Imposition schemes for odd signatures, insertions and wrap around signatures, Book cover planning for soft cover and hard cover case, 2-up imposition schemes, come and go imposition scheme

Unit III: Book Production Methods and Equipment   **[8 Hrs.]**
SE(Printing and Graphics Communication) syllabus   2015 Course

Folding - folding schemes and mechanisms (buckle folding, knife folding), equipment configurations - All Buckle folding, combination folding machines, terminology in use, (KTL, KLL etc.), Gathering - automated gathering process, signature inspections systems, collating marks, Sewing process and sewing equipment mechanisms, Perfect binding process and inline/offline perfect binding operations, Gluing off for book blocks and case making process, hardcover book manufacturing, Three knife trimming, Troubleshooting of book binding

Unit IV: Materials Used in Print Finishing   [8 Hrs.]
Adhesives - Hot melt adhesives, animal (protein) glues, water based adhesives, PUR hot-melts, Application of adhesives in various print finishing processes - lamination, sealing, tipping, gluing off of spine, side glue application, case making, casing in, Securing materials - threads, wire, Reinforcing and lining materials - mull, kraft, gauze, covering materials - printed and laminated materials, rexin, leather etc., Material testing and QC procedures for book binding materials

Unit V: Ancillary Processes and Surface Finishing Techniques   [8 Hrs.]
Surface finishing techniques - lamination, over print varnishes (OPV), aqueous varnishes, UV varnishes, hot/cold foil stamping, embossing/debossing, Utility operations - Ruling, index cutting, numbering, punching, perforating, corner cutting, tag stringing, calendar rimming, eye-letting, die punching, velvet printing, etc., Post-press material flow and inventory management processes

Unit VI: Costing and Estimation for Print Finishing   [8 Hrs.]
Units and measurements - grammage (gsm), bulk, thickness, Estimating book sizes and thickness, estimating material consumption of book binding materials, Estimation for finished job including paper, other raw material, processing charges etc.

Term Work
Term Work shall consist of following experiments
1. To prepare folded signatures using right angle folds - Folding - standard folding schemes up to 16 pages
2. To prepare folded signatures using zigzag folds and other types of folding styles
3. To prepare saddle and 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
9. To prepare various document files
10. To prepare envelope for various applications

Reference Books
1. G. Martin, (1980), Finishing process in Printing Focal Press, London.
2. 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. Ralp Lyman, (1993), Binding and Finishing, GATFPress

6. T. J. Tedesco, (1999), Binding, Finishing and Mailing: The Final World", GATFPress, Pittsburgh.
7. Arthur W. Johnson, (1986), Manual of Book Binding, Thames and Hudson.
8. Arthur W. Johnson, (1985), The Practical Guide to Craft Book Binding, Thames and Hudson.
9. T. M. Adams, D.D. Faux and L. T. Ricber, (1996), Printing Technology, Delmar Publications Inc.
10. Helmutt Kipphan, (2000), Handbook of Print Media, Springer, Heidelberg.

208288: Microprocessor and microcontroller techniques in printing

Teaching Scheme: **Credits:**   **Examination Scheme:**

Lectures: 4 Hrs/Week   *Theory: 4*   In-Sem: 50 Marks

Practical: 2 Hrs/Week   *Practical: 1*   End-Sem: 50 Marks

                                                            Term work: 25 Marks

                                                            Oral:50 Marks

Course objectives
1. Understand fundamentals of microprocessor
2. Understand fundamentals of microprocessor 8085
3. Understand instruction of microprocessor 8085
4. Understand timing diagram concept
5. Understand memory organization in microprocessor
6. Understand microcontoller 8051 architecture
7. Understand programming skills
8. Understand instructions of microcontroller 8051
9. Understand interfacing different Ics to microprocessor 8051
10. understand programming skills of microcontroller 8051
11. Understand applications of microcontroller 8085 and microcontroller 8051 in the field of printing

Course outcome
12. Understand and apply knowledge of microprocessor 8085 for understanding different applications
13. Understand programming for executing different tasks
14. Understand use of microcontroller in different application
15. Understand prigramming of microcontroller 8051 to execute different tasks
16. Understand interfacing for interfacing diiferent devices such as printer or steppermotor
17. Understand use of microprocessor and microcontroller for automation in the field of printing

Course contents

Unit I: Introduction of Microprocessor   [8 Hrs]
Microprocessor architecture and its operations, Study of microprocessor 8085 pin out and signals, Memory orgnisation and memory mapping, Interfacing devices and review of input output devices, Block diagram and working of 8085 based microcomputer system

Unit II: Programming Concepts of Microprocessor   [8 Hrs]
Classification of instructions. Program writing skills of handcoding. Assembly langauge programming. Expected execution of simple programs, Addressing modes, Status of flags. Arithmatic logical operations, Instruction timings and timing delays, Stack an subroutines

Unit III: Introduction of Microcontrollers   [8 Hrs]

Architecture of microcontroller 8051, Comparison eith microprocessor, Clock and oscillator. Flags PSW, Internal memory SFR , Conter, Timer, serial IO and interrupt

Unit IV: Programming concepts of Microcontroller   [8 Hrs]

Instruction set of microcontroller 8051, Addressing modes of microcontroller 8051,   Programming   of microcontroller 8051

Unit V: Interfacing Peripheral Devices   [8 Hrs]

Basics of interfacing concepts, Study of interfacing devices, Study of programmable peripheral IC 8255, Study of programmable timer IC 8253, Study of programmable interrupt control IC 8259

Unit VI: Microprocessor and Microprocessor Applications in Printing Technology   [8 Hrs]

Stepper moto drive and controller, Printer interface with 8085
Study of programmable logic controller "with block diagram and simple programming (8 bit) related to specific printing operation sequence. Introduction to contemporary microprocessors

Term Work

Term Work shall consist of following 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 PLC and Simple Program Execution
10. Study of EPROM Programmer
          OR
    Study of Timer Controller Chip 8253

Reference Books

1. "Microprocessor Architecture, programming and applications with 8085, R.S Gaonka ,Wiley Eastern Publication
2. Microprocessor architecture & applications, A.P. Mathur, TMH
3. Programming with 8085, Lance Leventhal, Mc Graw Hill
4. "Microprocessors and Microcontrollers" Jhadhe,Thavare, Nirali Prakashan
5. 8051 microcontroller, Kenneth Ayala, PHI
6. Microprocessor Applications Douglus Hall - McGraw Hill
7. 8085 peripheral & application manual - Intel.
8. Microcontroller Theory and application, Ajay Deshmukh , TMH

202291: Theory of Printing Machines and Machine Components

Teaching Scheme:	*Credit Scheme:*	*Examination Scheme:*
Lectures: 3 Hrs/Week	*Theory: 3*	In-Sem: 50 Marks
Tutorial: 1 Hr/Week	*Tutorial: 1*	End-Sem: 50 Marks
		Term work: 25 Marks

Course objectives
1. To make the student conversant with commonly used mechanism for Printing industry application.
2. To develop competency in conducting laboratory experiments to measure power transmitted and absorbed by friction clutches.
3. To develop competency in conducting laboratory experiments to measure power transmitted and absorbed by brakes.
4. To develop competency in conducting laboratory experiments to measure power transmitted by belt, rope and chain drives.
5. To develop competency in drawing velocity and acceleration diagram for simple and complex mechanism

To develop competency in graphical and analytical method for solving problems in static and dynamic force analysis

Course outcome
1. Analyze and evaluate nrrd based mechanism for printing industry application.
2. Measure, analyze and evaluate power transmitted and absorbed by friction clutches.
3. Measure, analyze and evaluate power transmitted and absorbed by brakes.
4. Measure, analyze and evaluate power transmitted and absorbed by belt, rope and chain drives.
5. draw, analyze and evaluate velocity and acceleration diagram for simple and complex mechanism
6. apply, analyze and evaluate graphical and analytical method for solving problems in static and dynamic force analysis

Course contents

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: 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 III: 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 IV: 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.

Unit V: Velocity and Acceleration Analysis of Simple Mechanisms: Graphical Methods – I [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 VI: Velocity and Acceleration Analysis of Mechanisms: Graphical Methods – II [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

Term Work
Term Work shall consist of following **Eight** experiments
1. Study of inversions of one of the kinematics chains.
2. Study of belt drive.
3. Selection procedure of belt from manufacturer's catalogue.
4. Study of clutches.
5. Study of brakes.
6. Study of Belt and chain drive.
7. Velocity and acceleration diagrams: Two problems on velocity and acceleration analysis using Graphical methods (based on Unit-V).
8. Velocity and acceleration diagrams: Two problems on velocity and acceleration analysis using Graphical methods (based on Unit-VI).

Text Books
1. Thomas Bevan, "Theory of Machines" CBS Publisher and Distributors, Delhi.
2. S. S. Ratan, "Theory of Machines", Tata McGraw Hill.
3. Ashok G. Ambekar, "Mechanism and Machine Theory", Prentice Hall, India
4. Sadhu Singh, "Theory of Machines", Pearson

Reference Books:
1. Shigley J. E., and Uicker J.J., "Theory of Machines and Mechanism", McGraw Hill Inc.
2. Ghosh Amitabh and Mallik A. K. "Theory of Machines and Mechanism", East- West Press.
3. Hall A. S., "Kinematics and Linkage Design", Prentice Hall.
4. Wilson C.E., Sandler J. P. Kinematics and Dynamics of Machinery", Person education.
5. Erdman A.G. and Sandor G.N., "Mechanism Design, Analysis and Synthesis" Volume-I, Prentice – Hall of India.

203283: Electrical Machines & Utilization

Teaching Scheme:	*Credits:*	*Examination Scheme:*
Lectures: 4 Hrs/Week	*Theory: 4*	In-Sem: 50 Marks
Practical: 2 Hrs/Week	*Practical: 1*	End-Sem: 50 Marks
		Term work: 25 Marks

Course Objectives

1. Study and differentiate between AC and DC machines and Learn about the purpose of starter, different types of starters and speed control methods for motors, losses and efficinecy of motor.

2. Understand the construction & working principle of transformer.

3. Learn special purpose machines and Study and differentiate between stationaryand rotating machines

4. Understand different types of electrical heating, their applications, various laws of illumination, design of lighting scheme and analyze the methods of lighting calculation

5. Learn drives and components such as switches, relays, contactors used in printing industry

Understand the concept of energy conservation, safety and maintenance in printing industry.

Course Outcome

1. Get knowledge of working principle of dc motor, generator, induction motor and their types and Draw various characteristics for DC motors, generator and 3 phase induction motors.

2. Demonstrate speed control methods employed for DC motors and 3 phase induction motor. Solve various numerical on power stages in AC and DC machines.

3. Estimate regulation and efficiency of transformer by direct and indirect methods

4. Understand various laws of illumination and perform the calculation of lighting load for a given area.

5. Get knowledge of working principle of electric heating and its applications.

6. Identify particular electrical machine, electric drives and components for a   specific application by studying various characteristics and learn the concept of energy conservation, safety and maintenance in printing industry.

Course contents

UNIT I: D.C. Machines   [8 Hrs]
   a. D.C. Generator:
   b. Construction & Principle of working, Types of D.C. Generator, EMF Equation
   c. D.C. Motors:
   d. Working Principle, Back EMF, Types of motors, Torque Equation,
   e. 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 motors.

UNIT II: Special Purpose Motors and Single phase Transformer.   [8 Hrs]
   a. Special Purpose Motors- Servo Motors, Stepper Motor and Universal Motor
   b. (Construction & Applications), Introduction to Synchronous motors
   c. Single phase Transformer: Construction and working principle of transformer, Types of Transformer, Transformer Rating, Losses in a transformer and their variation with load. Efficiency

and condition for maximum efficiency. Open circuit and short circuit tests for determination of equivalent circuit parameters and determination of voltage regulation and efficiency.

UNIT III: Three Phase Induction Motor   [8 Hrs]

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.

UNIT IV: Illumination   [8Hrs]

Laws of Illumination, Inverse Square law, Lambert's Cosine Law, Requirements of Good Lighting Scheme, Special Purpose Lighting: Street Lighting, Flood Lighting, different sources of light: mercury lamp, fluorescent lamp, sodium lamp, compact fluorescent lamp, electroluminescent lamp-LEDs

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: Special Components, Drives and Safety & Maintenance of Printing Industry   [8 Hrs]
   a. Special Components in Printing Industry Introduction, Various
   b. Types of Relays, Contractor, Limit Switches, Proximity Switches, Micro Switches, Solenoids, Photocells, Electric Encoders etc.
   c.   Advantages of Electrical Drives, Individual & Group Drive, Selection of
   d. motors depending on load characteristics
   e. 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
Any 7 Experiments from 1-8 experiments from list below. 1Compulsory report of industrial visit.
   1) Speed control of D.C. Shunt Motor by variation of armature voltage and field current.
   2) Brake test on D.C. Shunt Motor
   3) Load test on D.C. Series Motor
   4) Study of special purpose machines.
   5) O.C. and S.C. test on single phase Transformer
   6) Load Test on single phase transformer.
   7) To study of various starters used for Three Phase Induction Motors.
   8) Load test on Three Phase Induction Motor
   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.
5) B. H. Deshmukh, Electrical Technology, Nirali Prakashan.

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.
3. B. L. Theraja, A. K. Theraja, "A text book of Electrical Technology- Vol II", S. Chand and Company Ltd.

208289: Soft Skills

Teaching Scheme: *Credits:*   **Examination Scheme:**

Practicals: 2 Hrs/Week   *Practical: 1*   Term work: 25 Marks

Course Objectives
1. To know the basic requirements of Self awareness and self development
2. To understand the importance of communication, types, barriers of communication for effective communication
3. To understand the etiquettes for corporate grooming & dressing, Email & telephone etiquettes, etiquettes in social and office setting
4. To understand the various types of leadership skills
5. To understand and develop the time management and stress management skills

Course Outcome
1. Apply the SWOT analysis for evaluation of Self Awareness & self Development
2. Analyze the importance of communication, different types and barriers of communication for effective communication
3. Apply the various etiquettes for social and Corporate grooming
4. Analyze the interpersonal skills to develop the interpersonal relationship to work in Team
5. Analyze the leadership skills to organize the events.
6. Apply the professional approach to solve practical issues and time and stress management

Course contents

UNIT I: Self Awareness & self Development (04 Hrs)

a) Self Assessment , Self Appraisal, SWOT, Goal setting - Personal & career - Self-Assessment, Self-Awareness, Perceptions and Attitudes, Positive Attitude, Values and Belief Systems, Self-Esteem, Self appraisal, Personal Goal setting,

b) Career Planning, Personal success factors, Handling failure, Depression and Habit, relating

SWOT analysis & goal setting, prioritization.

UNIT II: Communication Skill (06 Hrs)

a) Importance of communication, types, barriers of communication, effective communication

b) Speaking Skills – Public Speaking, Presentation skills, Group discussion- Importance of

speaking effectively, speech process, message, audience, speech style, feedback, conversation and oral skills, fluency and self expression, body language phonetics and spoken English, speaking techniques, word

stress, correct stress patterns, voice quality, correct tone, types of tones, positive image projection techniques.

c) Listening Skills: Law of nature- you have 2 ears and 1 tongue so listen twice and speak once is the best policy, Empathic listening, Avoid selective listening

d) Group Discussion - characteristics, subject knowledge, oral and leadership skills, team management, strategies and individual contribution and consistency

e) Presentation skills - planning, preparation, organization, delivery.

f) Written Skills – Formal & Informal letter writing, Report writing, Resume writing -

Sentence structure, sentence coherence, emphasis. Paragraph writing. letter writing skills – form

and structure, style and tone. Inquiry letters, Instruction letters, complaint letters,

Routine business letters, Sales Letters etc.

UNIT III: Corporate / Business Etiquettes   (02 Hrs)

Corporate grooming & dressing, Email & telephone etiquettes, etiquettes in social & office setting- Understand the importance of professional behaviour at the work place, Understand and Implement etiquettes in workplace, presenting oneself with finesse and making others comfortable in a business setting. Importance of first impression, Grooming, Wardrobe, Body language, Meeting etiquettes (targeted at young professionals who are just entering business environment) , Introduction to Ethics in engineering and ethical reasoning, rights and responsibilities,

UNIT IV: Interpersonal relationship   (04 Hrs)

a) **Team work, Team effectiveness, Group discussion, Decision making -** Team Communication. Team, Conflict Resolution, Team Goal Setting, Team Motivation Understanding Team Development, Team Problem Solving, Building the team dynamics. Multicultural team activity
b) **Group Discussion**- Preparation for a GD, Introduction and definitions of a GD, Purpose of a GD, Types of GD, Strategies in a GD , Conflict management, Do's and Don'ts in GD

UNIT V: Leadership skills   (02 Hrs)

Leaders' role, responsibilities and skill required - Understanding good Leadership behaviours, Learning the difference between Leadership and Management, Gaining insight into your Patterns, Beliefs and Rules, Defining Qualities and Strengths of leadership, Determining how well you perceive what's going on around you, interpersonal Skills and Communication Skills, Learning about Commitment and How to Move Things Forward, Making Key Decisions, Handling Your and Other People's Stress, Empowering, Motivating and Inspiring Others, Leading by example, effective feedback

UNIT VI: Other skills   (02 Hrs)

a) **Time management**- The Time management matrix, apply the Pareto Principle (80/20 Rule) to time management issues, to prioritise using decision matrices, to beat the most common time wasters, how to

plan ahead, how to handle interruptions , to maximise your personal effectiveness, how to say "no" to time wasters, develop your own individualised plan of action

b) Stress management- understanding the stress & its impact, techniques of handling stress

c) Problem solving skill, Confidence building Problem solving skill, Confidence building

Term Work/Assignments

Term work will consist the record of any 8 assignments of following exercises

1. SWOT analysis
2. Personal & Career Goal setting – Short term & Long term
3 Presentation Skill
4. Letter/Application writing
5. Report writing
6. Listening skills
7. Group discussion
8. Resume writing
9. Public Speaking

10. Stress management

11. Team Activity-- Use of Language laboratory

 * Perform any 8 exercises out of above 11 with exercise no. 11 as compulsory.

Teaching Methodology

Each class should be divided into three batches of 20-25 students each. The sessions should be activity based and should give students adequate opportunity to participate actively in each activity. Teachers and students must communicate only in English during the session. Specific details about the teaching methodology have been explained in every activity given below.

Practical Assignments (Term work)

Minimum 8 assignments are <u>compulsory</u> and teachers must complete them during the practical sessions within the semester. The teacher should explain the topics mentioned in the syllabus during the practical sessions followed by the actual demonstration of the exercises. . Students will submit report of their exercise (minimum 8) assignments as their term work at the end of the semester but it should be noted that the teacher should assess their assignment as soon as an activity is conducted. The continual assessment process should be followed.

1. SWOT analysis

The students should be made aware of their goals, strengths and weaknesses, attitude, moral values, self confidence, etiquettes, non- verbal skills, achievements etc. through this activity. The teacher should explain to them on how to set goals, SWOT Analysis, Confidence improvement, values, positive attitude, positive

thinking and self esteem. The teacher should prepare a questionnaire which evaluate students in all the above areas and make them aware about these aspects.

2. **Personal & Career Goal setting – Short term & Long term**

3 **Presentation Skills**

Students should make a presentation on any informative topic of their choice. The topic may be technical or non-technical. The teacher should guide them on effective presentation skills. Each student should make a presentation for at least 10 minutes.

4**. Letter/Application writing**

Each student will write one formal letter, and one application. The teacher should teach the students how to write the letter and application. The teacher should give proper format and layouts.

5. **Report writing**

The teacher should teach the students how to write report .. The teacher should give proper format and layouts. Each student will write one report based on visit / project / business proposal etc.

6**. Listening skills**

The batch can be divided into pairs. Each pair will be given an article (any topic) by the teacher. Each pair would come on the stage and read aloud the article one by one. After reading by each pair, the other students will be asked questions on the article by the readers. Students will get marks for correct answers and also for their reading skills. This will evaluate their reading and listening skills. The teacher should give them guidelines on improving their reading and listening skills. The teacher should also give passages on various topics to students for evaluating their reading comprehension.

7. **Group discussion**

Each batch is divided into two groups of 12 to 14 students each. Two rounds of a GD for each group should be conducted and teacher should give them feedback.

8. **Resume writing**

Each student will write one formal letter, and one application. The teacher should teach the students how to write the letter and application. The teacher should give proper format and layouts.

9. **Public Speaking**

Any one of the following activities may be conducted :

a. **Prepared speech** (topics are given in advance, students get 10 minutes to prepare the speech and 5 minutes to deliver.

b. **Extempore speech (**students deliver speeches spontaneously for 5 minutes each on a given topic)

   c. **Story telling (Each student narrates a fictional or real life story for 5 minutes each)**

   d. **Oral review** (Each student orally presents a review on a story or a book read by them)

10. **Team Activity**-- Use of Language laboratory

Text Books

1. Communication Skills : Sanjay Kumar and Pushpa Lata , Oxford University Press
2. Developing Communication Skill : Krishna Mohan, Meera Banerji,- McMillan India Ltd.
3. English for Business Communication : Simon Sweeney , Cambridge University Press

Reference Books

1. 1.NASSCOM-Global Business Foudation Skills: Accenture,Convergys,Dell et.al. Foundation Books : Cambridge University Press

2. Basic Managerial Skills for all E. H. McGrath, Eastern Economy Edition, Prentice hall India.
3. Personality Development and Group Discussions,Barun K. Mitra, Oxford University Press

4. Group Dissussions and Interview Skills : Priyadarshi Patnaik : Foundation Books : Cambridge University Press

5. Thinks and Grow Rich: Napoleon Hill, Ebury Publishing, ISBN 9781407029252

6. Awaken the Giant Within: Tony Robbins HarperCollins Publishers, ISBN-139780743409384

7. Change Your Thoughts, Change Your Life: Wayne Dyer, Hay House India, ISBN-139788189988050

8. Habits of Highly Effective People: Stephen Covey Pocket Books, ISBN-139781416502494
9. The Power of Your Subconscious Mind: Dr Joseph Murphy Maanu Graphics , ISBN-13 9789381529560
10. The new Leaders: Daniel Coleman Sphere Books Ltd , ISBN-139780751533811
11. The 80/20 Principal: by Richard Koch, Nicholas Brealey Publishings ,ISBN-13 9781857883992

12. Time management from inside out: Julie Morgenstern, Owl Books (NY), ISBN-13 9780805075908
13. Wonderland of Indian Manageress: Sharu Ranganekar, Vikas Publishing Houses, ISBN-13 9788125942603

14. You can win: Shiv Khera, Macmillan, ISBN-139789350591932
15. The Ace of Soft Skills: Attitude, Communication and Etiquette for Success: **Gopalaswamy Ramesh**, **Mahadevan Ramesh**

Audit Course

In addition to credits course, it is recommended that there should be audit course (non-credit course) preferably in each semester from second year. The student will be awarded grade as AP on successful completion of audit course. The student may opt for one of the audit courses per semester, starting in second year first semester. Though not mandatory, such audit courses can help the student to get awareness of different issues which make impact on human lives and enhance their skill sets to improve their employability. List of audit courses offered in each semester is provided in curriculum. Each student has to choose one audit course from the list per semester. Evaluation of audit course will be done at institute level. Method of conduction and method of assessment for audit courses is suggested.

The student registered for audit course shall be awarded the grade AP and shall be included such grade in the Semester grade report for that course, provided student has the minimum attendance as prescribed by the SavitribaiPhule Pune University and satisfactory in-semester performance and secured a passing grade in that audit course. No grade points are associated with this 'AP' grade and performance in these courses is not accounted in the calculation of the performance indices SGPA and CGPA. Evaluation of audit course will be done at institute level itself.

(Ref-http://www.unipune.ac.in/Syllabi_PDF/revised-
2015/engineering/UG_RULE_REGULATIONS_FOR_CREDIT_SYSTEM-2015_18June.pdf)

Guidelines for Conduction and Assessment (Any one or more of following but not limited to)

- Lectures/ Guest Lectures
- Visits (Social/Field) and reports
- Demonstrations
- Surveys
- Mini Project
- Hands on experience on specific focused topic

Guidelines for Assessment (Any one or more of following but not limited to)

- Written Test
- Demonstrations/ Practical Test
- Presentations
- IPR/Publication
- Report

- **List of courses under Audit Course1**

Course Code	Audit Course Title
208290A: AC1-III	Advance Photography
208290B: AC1-IV	Personalized Printing II

Students can opt for audit course from the list of Audit Course of any branch of engineering.

208290A : AC1-III   Advance Photography

1. Various Camera Modes and their uses
2. Flash Modes
3. ISO settings
4. White Balance
5. Drive Modes
6. Lens Focal Length
7. Exposure Compensation
8. Focusing Options
9. Depth of Field (Depth of Focus)
10. Macro Photography
11. Portraiture
12. Landscape
13. Action Photography
14. Still Life
15. Candid Photography
16. Indoor Photography
17. Fine Art Photography
18. Black and White (Monochrome)
19. Basic Techniques of Lighting (Including: Front, Side, Back, Defused, etc.)
20. Basic Photo Composition (Including: Rule of 3rds, Leading Lines, Framing Subjects, etc.)
21. Basic Photo Editing (Using Photoshop and Picasa)
22. Special Photoshop Creative Ideas involving use of layers
23. High Dynamic Range (H.D.R.) Photography
24. Knowledge of Pixels, Mega Pixels, DPI, PPI

208290B: AC1-IV   Personalized Printing II

1. Page Composition and Imposition
2. Machine Operation and Basic Maintenance
3. Printing Materials – Substrate, Ink
4. Print Settings
5. Production of Various Jobs
6. Costing and Estimation