S.E. (PRINTING), 2008 COURSE
Part I

207004 ENGINEERING MATHEMATICS – III (2008 Course)
Teaching Scheme:   Examination Scheme:
Lectures: 4 hrs./week Paper: 100 marks
Duration: 3 hrs.

Section I

Unit I: Linear Differential Equations (LDE)  
Solution of n\textsuperscript{th} order LDE with Constant Coefficients, Method of Variation of Parameters, Cauchy’s 
& Legendre’s DE, Solution of Simultaneous & Symmetric Simultaneous DE.

Unit II: Applications of DE  
Applications of LDE to chemical engineering problems involving batch reactions and mass spring 
systems.

Solution of Partial Differential Equations (PDE)
(1) \(\frac{\partial u}{\partial t} = a^2 \frac{\partial^2 u}{\partial x^2}\), (2) \(\frac{\partial^2 u}{\partial t^2} = a^2 \frac{\partial^2 u}{\partial x^2}\) and (3) \(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2}\) = 0 
by separating variables only. Applications of PDE to problems of Chemical and allied engineering.

Unit III: 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.

Section II

Unit IV: Laplace Transform (LT)  
(09 Hours)
Definition of LT, Inverse LT. Properties & theorems. LT of standard functions. LT of some special 
functions viz. error, 1\textsuperscript{st} order Bessel’s, Periodic, Unit Step, Unit Impulse, ramp, jump, parabolic, Si(t) 
and Ei(t). Problems on finding LT & inverse LT.

Unit V: Vector Calculus  
(09 Hours)
Physical Interpretation of Vector Differentiation. Radial, Transverse, Tangential & Normal 
components of Velocity and Acceleration. Vector differential operator. Gradient, Divergence & 
Conservative, Irrotational & Solenoidal fields. Scalar potential. Green’s Lemma, Gauss’s 
Divergence and Stoke’s Theorem.

Unit VI: Applications of Laplace Transforms & Vector Calculus  
(09 Hours)
Applications of Vectors to problems in Fluid Mechanics, Continuity equations, Stream lines, 
Equations of motion, Bernoulli’s equations.
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).

Text Books:
Reference Books:
SECTION – I

UNIT - I  Simple stresses & strains
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
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
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
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

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

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

Reference Books
Basic Elements of Printing Technology (208282)

Teaching Scheme
Lectures - 4 Hours/Week
Marks
Practical - 2 Hours/Week

Examination Scheme
Paper - 100
Term Work - 25 Marks
Practical - 50 Marks

50 Marks

SECTION - I
UNIT - I Pre-Press
Printing Workflow, Typography – 2D & 3D Type faces, Family, Series of type, legibility readability of type, type measurement, type alignment & arrangement, DTP Conversion to film output – negative, positive & tracing Surface preparation for letterpress lithography screen gravure flexo.

UNIT - II Press
Principles of printing, different printing processes Configuration of machines, machine parts & accessories. Introduction to non-conventional printing processes – pad printing, dry offset, waterless offset.

UNIT - III Post –Press
Finishing techniques-Punching, embossing, foiling, lamination, varnishing, spot UV, Binding techniques- Hard Binding, Paper back Binding, Mechanical loose leaf binding

SECTION -II

UNIT - IV Basics Of design
Introduction to graphic design, fundamental of design, principle of design Division of design – natural, conventional, decorative, geometric, abstract

UNIT - V Layout and color.
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 Visualization and advertising agency
Visualizing 3D effects from 2D effect drawing, vector and raster images, and softwares for print designing – data entry, illustrations and images. Advertising art, advertising agency structure, functions, services.
Term Work

Term Work shall consist of following Eight experiments;

1) To prepare screen and cut stencil method
2) To print single color job by screen printing process
3) To prepare the screen by photographic method.
4) To print multicolor job by screen printing process
5) Study of Corel Draw
6) To reproduce a typographical logo
7) To reproduce graphical logo
8) To reproduce designer logo

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. Alaistair Campbell, The Designers handbook
5. N. N. Sarkar, Art and Production. Revised edition Sagar publication
6. Krishnamurthy, Modern printing processes
7. Mulvihil, Flexography primer
Printing Digital Electronics (208283)

Teaching Scheme                                    Examination
Lectures - 4 Hours/Week                             Paper - 100
Marks                                               Term Work - 25
Practical - 2 Hours/Week                            
Marks                                               

SECTION - I
UNIT - I    Introduction of number system
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
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
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.

SECTION - II
UNIT - IV    Sequential logic circuits and their applications in printing
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
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.
UNIT - VI  Introduction to Digital Computer
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 Ten experiments;
1. Logic gates – I
   a) Verification of truth-tables for fundamentals and derived gates (AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR)
   b) NAND and NOR gates as universal gates
2. Logic gates - II
   a) Verification of Boolean laws and theorems using logic gates.
   b) Verification of SOP and POS form by K-map (up to 4 variables only) using logic gates.
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
   a) Study of multiplexers and demultiplexers.
   b) Study of Encoders and Decoders
7. Sequential Circuits
   a) Study of flip-flops SR, D, JK, T, M-SJK for both level and Edge triggered clock.
8. Sequential circuits II
   a) Ripple, Ring & Johnson Counter with application related to printing.
   b) Study of mod N counter using IC 7490, IC 7492, IC7493 with application related to printing.
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
    a) LED display (one type only)
    b) LCD display (one type only)
Text Books

Reference Books
1. Malvino and Leach Digital Electronics - Principles and applications - Prentice Hall Publication.
Technology of Printing Materials (208284)

Teaching Scheme
Lectures - 4 Hours/Week
Practical - 2 Hours/Week

Examination Scheme
Paper - 100 marks
Term Work - 25 marks
Practical - 50 marks

SECTION I

UNIT - I Metals, Polymers and Plastics
Metals used as image carriers in Letterpress, Lithography, Gravure and in inking system for Lithography, Flexo and other printing processes. Introduction to polymer, Thermo set & thermoplastic polymer, natural & synthetic polymer, application of polymers in printing industry. Introduction to plastic substrates, grades of plastic substrates for printing and packaging, Properties of plastics used in printing and packaging, methods of identification of plastics.

UNIT - II Printing Chemicals & Consumables
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, adhesives - natural synthetic and their use in printing and packaging.

UNIT - III Printing Inks
Classification & General characteristics of printing inks, ingredients of printing ink pigments, Vehicles and additives etc. Manufacturing of printing ink, general formulation of printing ink

SECTION- II

UNIT – IV Properties & Testing of Printing Inks
Printing ink drying methods, Rheological properties of ink like viscosity, shear, yield, thixotropy, length of ink, tack, set off, trapping, filling, caking, end use properties etc. subjective & objective ink testing methods.

UNIT – V Paper Manufacturing
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.

UNIT -VI Properties & Testing of Paper
Physical properties of paper such as thickness, density, tensile, tearing, folding strength. Chemical properties of paper, Optical properties of paper like gloss, brightness and opacity. Importance of BIS standards for different grades of paper & its relation to printing industry.
Term Work

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 print of paste ink
   4. To take a print of liquid ink by bar coater
   5. To take a print 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
   2. L.C. Young, Materials in Printing Processes
   3. Leach and Pierce, Printing Ink Manual
   4. Dr. Nelson R. Eldred, What Printer Should Know About Ink, GATF
   5. Dr. Nelson R. Eldred, What Printer Should Know About Paper, GATF
   6. E.A. Apps, Printing Ink technology
   7. A. J. Athaley, Plastics in Packaging
   8. R. Holman, Technology of Printing Inks
   9. C.H.Williams, Printing Ink Technology
   10. K.W. Britt, Handbook of Pulp and Paper technology
   11. P.J.Hartsuch, Chemistry of Lithography
Print Layout and Design (208285)

Teaching Scheme

Practical - 2 Hours/Week

Examination Scheme

Term Work - 50 Marks

Term Work

1) Introduction to Adobe CS3
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 CS3
6) To select an image in Adobe Photoshop CS3
7) Image editing in Adobe Photoshop CS3
8) Application of different filters
Workshop Practice I  (211286)

Teaching Scheme
Practical - 2 Hours/Week

Examination Scheme
Term Work - 25 marks

Term Work

Each candidate is required to complete and submit one Composite Job consisting of machining of components covering operations on - Lathe, Drilling, Milling , shaping Machines and essentially consists of Thread Assembly.
Part II

Electrical Machines & Utilization (203287)

Teaching Scheme
Lectures - 4 Hours/Week
Practical - 2 Hours/Week

Examination Scheme
Paper - 100Marks
Term Work - 25 Marks
Oral - 25 Marks

SECTION – I
UNIT – I D.C. Motors
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
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
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
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, Photo Cells, Electric Encoders etc.

UNIT - V Electrical Heating
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
Illumination- Laws of Illumination, Inverse Square law, Lambert’s Cosine Law, Requirements of Good Lighting Scheme, Special Purpose Lighting

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

Reference Books
1. E.O. Taylor, Utilization of Electrical Energy, Orient Longman
Reproduction Techniques (208288)

Teaching Scheme
Theory: - 4 Hours/Week
Practical - 2 Hours/Week

Examination Scheme
Paper - 100 Marks
Practical - 50 Marks

SECTION – I

UNIT - I  Originals for Reproduction
Study of different types of Artworks Sketches, Paintings, Photographs, Color & Grayscale, High key, low key original, Creating Digital artworks, and Basic properties of originals required for reproduction.

UNIT - II  Films for Reproduction
Line & halftone techniques, Photographic Chemistry and film manufacture, Sensitometry, Review of old techniques of Film processing, Advanced film processing, After treatments, Comparing old and modern prepress techniques.

UNIT – III  Image Reproduction
Basic requirement of Halftones, methods of converting continues tone to Halftone, AM, FM & hybrid screening, Dot reproduction, Separation filters, Filter factor, Filter ratio, CC-Filters, Color separation-Direct & Indirect separation, Color correction- Masking methods, Color correction in DTP – Tonal Gradation Curve, UCR, GCR, UCA., Black Printer, Quality control aids—Gray scale, color control strip, patches, screen angle finder, dot gain, slur, trapping

SECTION - II

UNIT - IV  Understanding Densitometry
Study of Densitometer, Transmission Densitometer, Reflection Densitometer, Density relationship, Characteristics curve, Different types of density – Specular & Diffuse density, Optical dot area, Physical dot area, Dot gain/Loss, Print Contrast, Efficiency, Grayness, Hue error, Ink Trapping, ANSI, DIN standards

UNIT – V  Digital Imaging
Study of Digital Input systems like Scanners- Flatbed scanner, Drum Scanner, Copy dot scanner, X-Y Scanner, CCD, CMOS, Image resolutions, Digital Camera – Camera Resolution, Lenses, Focal length, Iris Diaphragm, Aperture, Shutter, Camera Operation, Camera types – One shot triple matrix,
Multishot single matrix, A/D, D/A converter, Pixel aspect ratio.

**UNIT – VI Retrieval of Graphics on Screen**

Basic CRT structure, Phosphors for additive receiver, Different types of Displays like – LCD, Shadow mask, Laser, Plasma, Trinitron. Beam penetration tubes, LED Display.

**Term Work**

Term Work shall consist of following Eight experiments

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

**Reference Books**

1) Hemlut Kipphan, Handbook of Print Media
2) Leo, Manual of Graphic Design
3) Eric Chambers, Manual of reproduction for Lithography
Print Finishing (208289)

Teaching Scheme
Theory - 4 Hours / Week
Practical - 2 Hours / Week

Examination Scheme
Paper - 100 Marks
Term Work - 25 Marks

SECTION I

UNIT – I  Classification of Binding Techniques
Brief Introduction to Print Finishing, Classification of binding, -Quarter bound, half
bound, full bound / cloth, leather / Foam rexine
Tools & equipment used in finishing operations.

UNIT – II  Materials used in Binding
Materials used in print finishing and properties and standards
Testing of materials, Securing, reinforcing, covering, adhesives, miscellaneous
materials

UNIT – III  Pre-forwarding and Forwarding Operations
Pre-forwarding operations - automation in respective operations. forwarding
operations
Utility operations - Ruling, index cutting, numbering, punching, perforating, corner
cutting, tabbing, calendar rimming, spiral, comb and wire-o binding, eye-letting, tag
stringing etc.

SECTION II

UNIT – IV  Imposition Schemes and Inventory Management
Imposition schemes and rules for hand folding and machine folding
Organization and workshop layout, Inventory, storage and stock management

UNIT – V  Costing and Estimation for Finishing Operations
Material calculation and cost estimating for finishing operations Estimation for
finished job including paper, other raw material, processing charges etc.

UNIT – VI  Automation in Print Finishing
Equipments used, Cutting machines, wire stitching machines, Thread sewing,
Perfect Binder, Case making, Wet and heat seal laminations, 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 saddle stitched booklet.
2) To prepare side stitched booklet.
3) To prepare quarter bound book - cutflush - french sewn.
4) To prepare quarter bound book - ASTI - kettle stitch.
5) To prepare half bound book.
6) To prepare full bound book.
7) To prepare folding schemes-portrait
8) To prepare folding schemes-Landscape

Reference Books

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, GATF
Microprocessor & Microcontroller Techniques in Printing (208290)

Teaching Scheme

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<thead>
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<th>Scheme</th>
<th>Examination</th>
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<tr>
<td>Lectures - 4 Hours/Week</td>
<td>Paper - 100 Marks</td>
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<tr>
<td>Practical - 2 Hours/Week</td>
<td>Oral - 25 Marks</td>
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SECTION - I

UNIT - I Introduction of Microprocessor
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 74245, 74139. Block diagram and working of 8085 based microcomputer system.

UNIT - II Programming Concepts of Microprocessor
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 Introduction of Microcontrollers
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.

SECTION - II

UNIT - IV Programming concepts of Microcontroller
Instruction set and programming of 8051. Bus standards such as RS232-C, RS485 and IEEE488

UNIT - V Interfacing Peripheral Devices
Basic Interfacing concepts, Interfacing input keyboard, interfacing output display [LED/LCD], Study of 8279 keyboard / display interface, Memory interfacing, Interfacing Devices study such as 8155 and 8255. Interrupts and Interrupt Handling. Study of Interrupt Controller chip 8259. Study of 8253, 8257, 8251 with Block Diagram and one example of interfacing.

UNIT-VI Microprocessor and Microprocessor 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. Study of Offset Press and Paper Cutting Machine.
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.
4. “Microprocessors and Microcontrollers” Jhadhe, Thavare, Nirali Prakashan
5. Kenneth Ayala,”8051 microcontroller” PHI
7. 8085 peripheral & application manual - Intel.
8 Microcontrollers by Mazidi
9 Ajay Deshmukh ,”Microcontroller Theory and application ” TMH
Theory of Printing Machines (202291)

Teaching Scheme
Theory - 4 Hours/Week
Practical - 2 Hours/Week

Examination Scheme
Paper - 100 Marks (4 hrs)
Term Work - 50 Marks

SECTION I

UNIT I       Introduction
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
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
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
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
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
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, pitch 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.
7. Study of brakes.
8. Study of chain drive.

**Reference Books**

1. Thomas Bevan- Theory of Machines, CBS Publishers
Workshop Practice II (211292)

Teaching Scheme
Practical - 2 Hours/Week

Examination Scheme
Term Work - 25 Marks
Oral - 25 Marks

Term Work:

Part A: Each candidate is required perform one job in each of following::

1. CNC Lathe
2. Welding
3. Pattern Making

Part B: Demonstration of following manufacturing processes: with the help of demonstration models and audio / video facilities

1. Non chip forming processes,
   - Pattern, Pattern making, molding and sand casting
   - Hot working and Cold working processes
   - Welding Processes
2. Chip forming processes
   - Lathe and its operations,
   - Milling Machines and its operations
   - Grinding Machines and its operations
   - CNC machine
   - Machining centre
3. Metrological instruments
   - Vernier Caliper
   - Micrometer
   - Height Gauge
   - Depth Gauge
   - Dial Gauge
4. Material Handling Equipments
• Cranes
• Hoists
• Fork Lifts
• AGV (Automatic Guided Vehicles)

Journal should contain the Four assignments based on above.

Note- Oral shall be based on content of Part- B