Syllabus for

Applied Mathematics- III (EN/ET/EE/Mech)

Scheme (Theory: 4 hrs, Tutorial: 1hr.)

UNIT - I: LAPLACE TRANSFORM (15Hrs)

Definition, Properties, Evaluation of integrals by Laplace Transform, Inverse Laplace Transform and its Properties, Convolution theorem (statement only), Laplace Transform of Periodic Functions (statement only), Unit Step Function and Unit Impulse Function, Applications of Laplace Transform to solve Ordinary Differential Equations, Simultaneous Differential Equations, Integral Equations & Integro-Differential Equations.

UNIT – II: FOURIER SERIES & FOURIER TRANSFORM (08 Hrs)

Periodic functions and their Fourier Expansions, Even and Odd functions, Change of interval, Half Range Expansions.

Fourier Transform: Definition and Properties (excluding FFT), Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform to Solve Integral Equation.

UNIT – III: CALCULUS OF VARIATIONS(05 Hrs)

Functionals, Maxima and minima of functionals, Euler's equation(statement only), Functionals dependent on First & Second order derivatives, Isoperimetric Problems, Solution of Boundary Value problems by Rayleigh-Ritz method.

UNIT- IV: FUNCTIONS OF COMPLEX VARIABLE (12 Hrs)

Analytic function, Cauchy- Riemann Conditions, Harmonic Functions (excluding orthogonal system), Milne-Thomson Method, Cauchy Integral Theorem & Integral Formula (Statement only), Taylor's & Laurent's series (Statement only), Zeros and Singularities of Analytic function, Residue Theorem (Statement only), Contour integration (Evaluation of real definite integral around unit circle and semi-circle).

UNIT - V: PARTIAL DIFFERENTIAL EQUATIONS(08Hrs)

Partial Differential Equations of First Order First Degree i.e. Lagrange's form, Linear Homogeneous Equations of higher order with constant coefficients. Method of separations of variables, Simple Applications of Laplace Transform to solve Partial Differential Equations (One dimensional only).

UNIT –VI: MATRICES(12Hrs)

Linear and Orthogonal Transformations, Linear dependence of vectors, Characteristics equation, Eigen values and Eigen vectors, Statement and Verification of Cayley Hamilton Theorem [without proof], Reduction to Diagonal form, Reduction of Quadratic form to Canonical form by Orthogonal transformation, Sylvester's theorem [without proof], Solution of Second Order Linear Differential Equation with Constant Coefficients by Matrix method.

Text Books

1. Higher Engineering Mathematics by B.S. Grewal, 40th Edition, Khanna Publication
2. Advanced Engineering Mathematics by Erwin Kreysizig, 8th Edition, Wiley India
3. Applied Mathematics for Engineers & Physicist by L.R. Pipes and Harville,
4. Calculus of variation by Forrey

Reference Books

1. A Text Book of applied Mathematics, Volume II , by P.N. Wartikar & J.N. Wartikar, Poona Vidyarthi Griha Prakashan
2. Introductory methods of Numerical Analysis, by S.S. Sastry, PHI
3. Mathematics for Engineers by Chandrika Prasad
4. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication.

Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur

Faculty of Engineering and Technology

B.E. (MECHANICAL ENGINEERING): THIRD SEMESTER

BEME302T: KINEMATICS OF MACHINE (Theory)

CREDITS: 04

Teaching Scheme
Lectures: 3 Hours/Week
Tutorial: 1 Hour/Week

Examination Scheme
Duration of Paper: 03 Hours
University Assessment: 80 Marks
College Assessment: 20 Marks

Course Objectives and Expected Outcomes: The study of kinematics is concerned with understanding of relationships between the geometry and the motions of the parts of a machine. The overall objective of this course is to learn how to analyze the motions of mechanisms, design mechanisms to give desired motions. This course includes relative motion analysis, design of gears, gear trains, cams and linkages, graphical and analytical analysis of position, velocity and acceleration, clutches, brakes & dynamometers. Students will be able to understand the concepts of displacement, velocity and acceleration of simple mechanism, drawing the profile of cams and its analysis, gear kinematics with gear train calculations, theory of friction, clutches, brakes & dynamometers.

UNIT – I **[8 Hrs.]**

Basic concept of mechanism, link, kinematics pairs, kinematics chain, mechanism, Difference between machine and mechanism, Inversions, machine, simple & compound chain, Degrees of freedom, Estimation of degree of freedom of mechanism by Grubber's criterion and other methods. Harding's notations, Classification of four bar chain , Class-I & Class-II, Kutchbach theory, Various types of mechanism such as Geneva wheel, Pawl and ratchet mechanism, Exact straight line mechanism, Approx. straight line mechanism, Transport mechanism.

UNIT – II **[8 Hrs.]**

Quantitative kinematics analysis of mechanisms: - Displacement, Velocity and Acceleration analysis of planer mechanism by graphical method as well as analytical method. Coriolis component of acceleration, Instantaneous center method, Kennedy's theorem.

UNIT – III **[8 Hrs.]**

Concepts of cam mechanism, Comparison of cam mechanisms with linkages. Types of cams and followers and their applications. Synthesis of cam for different types of follower motion like constant velocity, parabolic, SHM, cycloid etc.

UNIT – IV **[8 Hrs.]**

Concept of motion transmission by toothed wheels, comparison with cams and linkages, various tooth profiles, their advantages and limitations, gear tooth terminologies, concept of conjugate action, law of conjugate action, kinematics of involute gear tooth pair during the contact duration,

highlighting locus of the point of contact, arc of contact, numbers of pairs of teeth in contact, path of approach and path of recess, interference, undercutting for involute profile teeth.

Kinematics of Spiral and helical gears, Kinematic analysis and torque analysis of simple epicyclic gear train.

UNIT – V **[8 Hrs.]**

Synthesis of Mechanism:- Introduction to type, Number and dimensional synthesis, Synthesis of Mechanism by graphical method, Transmission angle, Freudenstein's equation, Roberts Cognate Linkage.

UNIT – VI **[8 Hrs.]**

Laws of friction, Friction of inclined plane, Efficiency of inclined plane, Friction in journal bearing-friction circle, Pivots and collar friction-uniform pressure and uniform wear. Clutches, Brakes & Dynamometers: Single, multiple and cone clutch, Shoe brake, Band brake, Band and Block brake, Absorption and transmission type dynamometers (Numerical are expected on clutches and brakes only).

LIST OF TUTORIALS:

1) Drawing sheets on Inversion of
   i) Class I & Class II four bar chain
   ii) Single slider crank chain
   iii) Double slider crank chain
2) Problem on degree of freedom of mechanisms
3) Problems on kinematic analysis i) Graphical method ii) Analytical method
4) Cam constructions
5) Problem on gears
6) Analysis of epicyclic gear train with torque analysis
7) Problems on synthesis
   i) Graphical method
   ii) Analytical method
8) Study of construction and working with neat sketch of
   i) Clutches
   ii) Brakes
   iii) Dynamometers

TEXT BOOKS:

1. Theory of Machine, S. S. Rattan, Tata McGraw Hill.
2. Mechanism and Machine Theory, J.S. Rao & Dukki Patti, New Age International (P) Ltd, Publishers.
3. Theory of Machines, P L Ballaney, Khanna Publications.

REFERENCE BOOKS:

1. Theory of Machines and Mechanisms, J. E. Shigley and J. J. Uicker, Oxford University Press.
2. Theory of Machines and Mechanism, Ghosh & Mallik, Affiliated East- West Press, New Delhi.
3. Theory of Machine , Thomas Bevan, Pearson publication
4. Advanced Mechanism Design–Analysis and Synthesis, A.G.Erdman and G.N.Sandor, Vol. I and II, Prentice – Hall
5. Theory of Machines, Sadhu Singh, Pearson publications.

BEME303T: FLUID MECHANICS (Theory)

CREDITS: 04

Teaching Scheme
Lectures: 3 Hours/Week
Tutorial: 1 Hour/Week

Examination Scheme
Duration of Paper: 03 Hours
University Assessment: 80 Marks
College Assessment: 20 Marks

Course Objectives and Expected Outcomes: This course is designed to develop an understanding of the behavior of fluids at rest or in motion and the subsequent effects of the fluids on the boundaries as the mechanical engineers has to deal with fluids in various applications. This course will also develop analytical abilities related to fluid flow. It is expected that students will gain conceptual understanding of fluids and their properties and will be able to apply the analytical tools to solve different types of problems related to fluid & fluid flow.

UNIT – I **[8 Hrs.]**

Fluid Properties :- Types of fluids, Mass Density, Specific Weight, Specific Gravity, Newton's Law of Viscosity, Dynamic Viscosity, Stroke's Theorem, Surface Tension, Capillarity, Compressibility, Vapour pressure.

Fluid Kinematics :- Types of Flow- steady, unsteady, uniform, non-uniform, laminar, turbulent, one, two and three dimensional, compressible, incompressible, rotational, irrotational, stream lines, path lines, streak lines, velocity components, convective and local acceleration, velocity potential, stream function, continuity equation in Cartesian co-ordinates.

UNIT – II **[8 Hrs.]**

Fluid Statics :- Pressure, Measurement of pressure using manometers, Hydrostatic law, Pascal's law, Pressure at a point, Total pressure, Centre of pressure, Pressure on a plane (Horizontal, vertical, Inclined) and Curved Surfaces, Archimedes's principle, Buoyancy and stability of floating and submerged bodies, Metacentric height.

UNIT – III **[8 Hrs.]**

Fluid Dynamics :- Introduction to Navier-Stroke's Equation, Euler equation of motion along a stream line, Bernoulli's equation, application of Bernoulli's equation to pitot tube, venturi meter, orifices, orifice meter.

UNIT – IV **[8 Hrs.]**

Laminar And Turbulent Flow :- Definition, Relation between pressure and shear stresses, Laminar flow through round pipe, Fixed parallel plates, Turbulent flow and velocity distribution.

Dimensional Analysis: - Dimensional Analysis, Dimensional Homogeneity, Rayleigh method & Buckingham's pi Theorem.

UNIT – V **[8 Hrs.]**

Flow Through Pipes :- TEL, HGL, Energy losses through pipe, Darcy-Weisbach equation, Minor losses in pipes, TEL, HGL, Moody diagram, pipes in series and parallel, Siphons, Transmission of power.

UNIT – VI **[8 Hrs.]**

Boundary Layer Theory :- Development of Boundary Layer on a flat plate, Laminar and Turbulent Boundary Layers, Laminar Sub Layer, Separation of Boundary Layer.

Flow around Immersed Bodies: - Lift and Drag, Classification of Drag, Flow around circular cylinder and Aerofoil, Development of lift on Aerofoil.

LIST OF TUTORIALS:

1) Applications based on fluid properties such as block sliding over an inclined plane, capillary phenomenon etc.
2) Study of Manometers
3) Study of stability of floating bodies and submerged bodies
4) Determination of coefficient of discharge of flow meters
5) Verification of Bernoulli's equation
6) Stokes Law
7) Case study of pipe network
8) Reynold number & its significance
9) Losses in pipes (Hagen Pois. Equation)

TEXT BOOKS:

1. Fluid Mechanics, Dr. R.K. Bansal, Laxmi Publication (P) Ltd. New Delhi
2. Engineering Fluid Mechanics, Kumar K.L.,S. Chand & company Ltd. Eurasia Publication House
3. Fluid Mechanics & Hydraulic Machines, R.K. Rajput, S. Chand & Company Ltd.
4. Hydraulic and Fluid Mechanics, Modi P.N. and Seth S.M., Standard Book House.

REFERENCE BOOKS:

1. Introduction to Fluid Mechanics, James E.A., John and Haberm W.A., Prentice Hall of India
2. Fluid Mechanics, Jain A.K., Khanna Publication
3. Engineering Fluid Mechanics, Garde R.J. and Miraj Goankar, Nem chand & Bros, Roorkee, SCITECH, Publication (India) Pvt. Ltd.
4. Fluid Mechanics and Fluid Power Engineering, Dr. D.S. Kumar, S.K. Kataria & sons
5. Fluid Mechanics, Frank M. White, McGraw Hill Publication
6. Introduction to Fluid Mechanics, James A. Fay
7. Fluid Mechanics, Cengel & Cimbla, Tata McGraw Hill
8. Fundamentals of CFD, Anderson, McGraw Hill, International Edition, Mechanical Engineering series
9. Fluid Mechanics, Streeter V.L. and Wylie E.B., McGraw Hill International Book co.

BEME304T: MANUFACTURING PROCESSES (Theory)

CREDITS: 04

Teaching Scheme
Lectures: 3 Hours/Week
Tutorial: 1 Hour/Week

Examination Scheme
Duration of Paper: 03 Hours
University Assessment: 80 Marks
College Assessment: 20 Marks

Course Objectives and Expected Outcomes: This course is designed to provide students with an overview of a wide variety of manufacturing processes for processing of engineering materials. Students will learn principles, operations and capabilities of various moulding, metal casting, metal forming, press working, metal joining processes & also processing on plastics. Upon completion of this course, students shall understand the importance of manufacturing processes and be able to select and apply suitable processes for an engineering product.

UNIT – I **[8 Hrs.]**

Pattern Making & Moulding: - Pattern making: Types, materials used, Pattern making allowances, color codes. Core making: - Types, core material & its properties. Moulding: Types of sand moulds, moulding sand composition. moulding sand properties, moulding machines. Shell moulding, CO_2 moulding.

UNIT – II **[8 Hrs.]**

Gating System & Casting Processes: - Gating design -Elements of gating systems, pouring equipments, riser design Melting furnaces -Types, Electric furnace, Induction furnace, Cupola-construction & operation. Cleaning, inspection & casting defects. Foundry mechanizing Special casting processes such as investment Casting, Centrifugal Casting, Slush Casting and Die Casting.

UNIT – III **[8 Hrs.]**

Joining Processes: - Introduction to metal Joining- Types of Welding. Arc Welding & Gas Welding Processes, Defects & Inspection of Welding Joints, Electrodes, weldability of Metals, Welding equipments. Fixtures, TIG Welding, MIG Welding, Spot Welding.

UNIT – IV **[8 Hrs.]**

Forming Process for metals:- Rolling, Forging, Extrusion, Drawing, Mechanics of forming process, Determination of Rolling pressure and roll specification force, drive force and torque, power loss in bearing, Determination of forging forces and stresses, Equipment (hammer/press) capacity required. (No analytical treatment)

UNIT – V **[8 Hrs.]**

Press Working: - Classification, types of presses, press terminology, Force analysis in press working, Die cutting operation, types of dies, Die and punch allowance, introduction to shaping operations, bending, forming and drawing.

UNIT – VI **[8 Hrs.]**

Introduction to Plastics, Properties & types, applications, Forming & Shaping of plastics – Extrusion, injection moulding, Blow moulding, wire drawing, Compression moulding, Transfer moulding, Embossing, Calendaring.

Introduction to Joining of Plastics- Mechanical Fastening, Spin Welding, Solvent Bonding, Ultrasonic welding, Induction welding, Dielectric welding, Hot Plate welding, Vibration welding, Hot gas welding.

TEXT BOOKS:

1. Workshop Practice, H. S. Bawa, Tata Mc-Graw Hill
2. Manufacturing Engineering & Technology, Kalpakjian, Pearson
3. Modern Materials and Manufacturing Process, R. Gregg Bruce, John E. Neely, Pearson Education
4. Workshop Technology (Volume I), Hajra Chaudhary, Media Promoters & Publishers
5. Workshop Technology (Vol. I & II), B. S. Raghuwanshi, Dhanpat Rai & Co.
6. Manufacturing technology (Vol. I), P. N. Rao, Tata Mc-Graw Hill
7. Manufacturing Science, Ghosh & Malik, East West Press.
8. Textbook of Production Engineering, P.C. Sharma, S. Chand & Co.

REFERENCE BOOKS:

1. Workshop Technology, Vol I & II, WAJ Chapman, Elsevier Butterworth-Heinemann.
2. Manufacturing Processes, M. Begman.
3. Processes & Materials of Manufacturing, R. Lindberg, Allyn & Bacon.

BEME304P: MANUFACTURING PROCESSES (Practical)

CREDITS: 01

Teaching Scheme
Practical: 2 Hours/Week

Examination Scheme
University Assessment: 25 Marks
College Assessment: 25 Marks

LIST OF PRACTICALS:

Minimum Eight out of the following shall be performed:

1. Study of Cupola Furnace
2. Study of Moulding Techniques
3. Study of Casting Process
4. Study of Pattern Making
5. Study of Joining Processes
6. Study of Forming Processes
7. Study of Drawing Processes
8. One Job – Pattern Making
9. One Job – Casting
10. One Job – Welding

BEME305T: ENGINEERING METALLURGY (Theory)

CREDITS: 04

Teaching Scheme
Lectures: 3 Hours/Week
Tutorial: 1 Hour/Week

Examination Scheme
Duration of Paper: 03 Hours
University Assessment: 80 Marks
College Assessment: 20 Marks

Course Objectives and Expected Outcomes: This course is designed to develop fundamental concepts of crystallography, phase transformation and heat treatment processes. Students will learn the atomic structure of metals, imperfections, diffusion mechanisms and mechanism of plastic deformation, various ferrous & non ferrous metals & their alloys. They will also understand equilibrium diagrams, time-temperature transformation curves and heat treatment processes. Upon completion of this course, students will be able to understand the concepts of crystal structure, microstructure and deformation. They will also acquire the knowledge of phase diagrams which are useful for design and control of heat treating processes, various ferrous & non ferrous metals & alloys with engineering applications, non-destructive tests & powder metallurgy with applications.

UNIT – I **[8 Hrs.]**

Introduction to engineering materials their classification, properties & application. Difference between metals & non metals, Mechanical properties of metal, Study of crystal structure, Polymorphism & allotropy, Macroscopic & microscopic examination; Imperfections in crystal, Miller indices, Mechanism of plastic deformation, slip, dislocation & twinning.

UNIT – II **[8 Hrs.]**

Solidification of pure metal, nucleation & grain growth, directional & progressive solidification, Ingot structure, Dendritic solidification, Solid solution & their types, Alloy & their formation, Mechanical Mixture, Hume Rothery Rule, grain shape & size, its effect on the properties. Binary equilibrium diagrams, Isomorphus system, Study of Fe Fe-C diagram - uses & limitations, Invarient reactions.

UNIT – III **[8 Hrs.]**

TTT Curve – Construction & limitations, Heat treatment – Principle, purpose, Annealing & its types, Normalizing, Tempering, Austempering, Martempering, Hardening, Retained austenite & its elimination, Maraging, Patenting; Surface hardening such as Carburising, Nitriding, Induction hardening, Jomini End quench test for hardenability

UNIT-IV **[8 Hrs.]**

Plain carbon steel, Classification based on Carbon Percent & application; Limitations, Effect of impurities; Alloy steel, Effects of various alloying elements, Tool steel & its classification, Red hardness; Stainless steel – Classification, composition & application; Hadfield Manganese steel, Maraging Steel, O.H.N.S. Steel, Selection of steel for various applications.

UNIT-V **[8 Hrs.]**

Cast iron – Classification, gray cast iron, white cast iron, nodular cast iron, malleable cast iron, Mottled cast iron, Ni – hard & Ni – Resist cast iron, Meehanite Alloy;

Study of non- ferrous alloys – Brasses, its types, Cu-Zn diagram; Bronzes, its types, Cu-Sn diagram; Al-Si diagram.

UNIT-VI **[8 Hrs.]**

Principles of hardness measurement, Hardness Test – Brinell, Rockwell, Vicker

Non-destructive tests – Ultrasound Test, Die Penetration Test, radiography test

Powder metallurgy – Introduction, metal powder & its production, blending & mixing, compaction, sintering, Hot Isostatic Pressing, Secondary processes, Advantages, limitations & application of powder metallurgy, few products such as self Lubricating Bearing, Gears & Pump Rotors, Electric Contacts & Electrodes, Magnets, Diamond Impregnated Tools etc.

TEXT BOOKS:

1. Introduction to Physical Metallurgy, Sidney H. Avner, Tata McGraw-Hill
2. Introduction to Engineering Materials, B.K.Agrawal, Tata McGraw-Hill
3. Heat Treatment – Principles & Techniques, T.V.Rajan, C.P. Sharma, Ashok Sharma, Prentice – Hall India
4. Materials Science & Metallurgy, Dr. V.D.Kotgire, Everest Publishing House
5. Text Book of Materials Science & Metallurgy, O.P.Khanna , Dhanpat Rai Publication
6. Engineering Materials & Metallurgy, Srinivasan, Tata Mc-Graw Hill

REFERENCE BOOKS:

1. Materials Science, Willium Callister, John Wiley & Sons
2. Material Science, Narula & Gupta, Tata Mc-Graw Hill
3. Material Science & Metallurgy, Parashivamurthy, Pearson
4. A First course on Material Science, Raghavan, PHI Learning
5. Introduction to Material Science for Engineers, Shakeford & Murlidhara, Pearson
6. Engineering Physical Metallurgy and Heat Treatment, Yu M Lakhtin, CBS Publisher
7. Metallurgy for Engineers, E C Rollason, ButterWorth & Heineman Ltd.
8. Engineering Metallurgy, R A Higgins, Viva Books
9. Fundamentals of Solidification, W Kurtz and D J Fisher, Springer
10. Physical Metallurgy, Clark, CBS Publisher

BEME305P: ENGINEERING METALLURGY (Practical)

CREDITS: 01

Teaching Scheme
Practical: 2 Hours/Week

Examination Scheme
University Assessment: 25 Marks
College Assessment: 25 Marks

LIST OF PRACTICALS:

Minimum Eight out of following shall be performed:

1. Study of crystal structure
2. Study of metallurgical Microscope
3. Specimen Preparation
4. Metallography (Study & drawing of microstructure) of plain carbon steel
5. Metallography of cast iron
6. Metallography of non-ferrous metals.
7. Metallography of heat-treated specimen.
8. Effect of annealing & normalizing on microstructure & hardness of steel.
9. Hardenability Test
10. Hardness Test by i) Brinell ii) Rockwell test.

BEME306P: MACHINE DRAWING (Practical)

CREDITS: 04

Teaching Scheme	**Examination Scheme**
Practical: 2 Hours/Week	University Assessment: 50 Marks
Tutorial: 2 Hour/Week	College Assessment: 50 Marks

Course Objectives and Expected Outcomes: The objective of this course is to make students understand the principles and requirements of machine & production drawings. This course will provide a way to learn how to assemble and disassemble important parts used in major mechanical engineering applications. After going through this course, students shall be able to draw & understand the drawings of mechanical components and their assemblies.

UNIT – I

Drawing Standards for following

Drawing Sheets, Name Blocks, Lines, Sections Dimensioning. Dimensioning of Tolerances, Standard Components, Standard Features, Machining Symbols, Welding Symbols, Surface Finish Symbols, Heat Treatment Manufacturing Instructions, Allowances, Materials

UNIT – II

Orthographic Projections of Elements, Orthographic Projections, Sectional Views, Multiple Views, Missing Views, Profiles, Cross sections, References, Alignments, Dimensioning

UNIT – IIII

Study, qualitative selection of type / size (excluding design calculations) and standard practices for following elements Threads, Bolts, Nuts, Washers , Rivets, Welds, Keys & Keyways, Splines, Couplings

UNIT – IV

Assembly and Dismantling: Principles, Fits and Tolerances (Standards, types, application and selection) Tolerance Charting, Surfaces finish requirement for assembly, Geometries suitable for assembly, Assembly / Dismantling Tools, Bearing Assemblies, Assemblies by fastening

UNIT – V

Study of Some standard Assemblies
Assembly Drawings, Principles, techniques and standards for preparing components drawings Subassembly, Drawings, Full assembly Drawing, Exploded Views

UNIT – VI

Production Drawing Name Plates, Part List, Revisions etc.
Essential Parts / Formats required for production drawing, Process Sheet

LIST OF PRACTICALS (Based on above Syllabus):

Minimum Eight Practicals shall be performed consisting of the following:

1. Conventional representation of Symbols.
2. Pencil Drawings of sectional views of machine components.
3. Pencil Drawings of some standard components. (e.g. Screw Fasteners)
4. Pencil Drawings of standard assemblies with components.(e.g. Couplings)
5. Pencil Drawing of a small assembly with components (e.g. Screw Jack)
6. Pencil Drawings of detailed drawings of Assembly
7. Pencil Drawings of a large assembly with component drawings, subassembly drawings and assembly drawing using all standard formats (e.g. Spring Loaded Safety Valve)
8. Sheet on Blue Print Reading.
9. Sheet on Preparation and explanation on Production Drawing.
10. Process Sheets for one component having maximum five operations.
11. Computer Print out on Three Dimension Modeling using CAD software.

Note:

1. Pencil drawings shall be in Full Imperial Sheet. Computer Printouts shall be on a Laser printer in A3 size. All drawings shall be submitted in one folder.

2. During University practical examination of 50 marks, students are expected to solve TWO problems of 30 marks of two hours duration on,
    - Sectional View / Missing View
    - Assembly Drawing/ Sub assembly Drawing
    - Prepare and explain production drawing

    Oral of 20 marks shall be conducted during University practical examination.

TEXT BOOKS:

1. Machine Drawing, K. L. Narayana , New Age International Publishers
2. Machine Drawing, N. D. Bhatt & V M Panchal, Charoter Publications
3. Engineering Graphics with AutoCAD, D. M.Kulkarni, A.P.Rastogi, A.K.Sarkar, PHI Learning Pvt. Ltd
4. PSG Data book
5. CMTI Data Book
6. Jadaan Data Book, I.K. International.
7. Relevant IS Codes.

REFERENCE BOOKS:

1. Machine Drawing - N.Sidheshwar, Shastry , Kanhaiah, Tata Mcgraw Hill
2. Fundamentals of Machine Drawing, Sadhu Singh, P. L. Shah, PHI Learning Pvt. Ltd

BEME307P: TECHNICAL REPORT & SEMINAR

CREDITS: 02

Teaching Scheme	**Examination Scheme**
Practical: 02 Hour/Week	College Assessment: 50 Marks

Course Objectives and Expected Outcomes: To inculcate the habit of independent learning among students, this course includes identification of a technical topic beyond curriculum, collection of existing literature and report preparation with seminar delivery. Students will be able to familiarize themselves with new technical topics and can participate in technical seminars and paper contests.

Technical report & Seminar shall be based on any relevant technical topic with independent topic for each student. Report shall be based on information collected from Books, Handbooks, Journals, Periodicals, Internet etc. Student is expected to submit the report and shall give a presentation on it.

A teacher shall be allotted for each batch (Max 09 & Min. 05 Students) and the workload shall be 1 hour per batch per week.