Gondwana University, Gadchiroli
Faculty of Engineering & Technology
Course and Examination Scheme of Bachelor of Engineering (Mechanical Engineering)

III Semester B.E. (Mechanical Engineering)

Subject Code	Subject	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory						Practical			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional MSE	Max. Marks Sessional IE	Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
ME301	Applied Mathematics – III	3	1	-	4	3	80	10	10	100	40	-	-	-	-
ME302	Fluid Mechanics	3	1	-	4	3	80	10	10	100	40	-	-	-	-
ME303	Kinematics of Machines	3	1	-	4	3	80	10	10	100	40	-	-	-	-
ME304	Machining Processes	3	1	-	3	3	80	10	10	100	40	-	-	-	-
ME305	Engineering Metallurgy	3	1	-	3	3	80	10	10	100	40	-	-	-	-
Laboratory															
ME306	Machine Drawing	-	1	2	3	-	-	-	-	-	-	50	50	100	50
ME307	Machining Processes	-	-	3	2	-	-	-	-	-	-	25	25	50	25
ME308	Engineering Metallurgy	-	-	3	2	-	-	-	-	-	-	25	25	50	25
ME309	Industrial Visit	-	-	2	Audit Course										
Total		15	6	10	-	-	400	50	50	500	-	100	100	200	-
Semester Total		**31**			**25**	**700 Marks**									

Gondwana University, Gadchiroli
Faculty of Engineering & Technology
Course and Examination Scheme of Bachelor of Engineering (Mechanical Engineering)

IV Semester B.E. (Mechanical Engineering)

Subject Code	Subject	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory						Practical			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional MSE	Max. Marks Sessional IE	Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
ME401	Applied Mathematics-IV	3	1	-	4	3	80	10	10	100	40	-	-	-	-
ME402	Engineeering Thermodynamics	3	1	-	4	3	80	10	10	100	40	-	-	-	-
ME403	Mechanics of Material	3	1	-	3	3	80	10	10	100	40	-	-	-	-
ME404	Manufacturing Processes	3	1	-	3	3	80	10	10	100	40	-	-	-	-
ME405	Hydraulic Machines	3	1	-	3	3	80	10	10	100	40	-	-	-	-
Laboratory															
ME406	Manufacturing Processes	-	-	3	2	-	-	-	-	-	-	25	25	50	25
ME407	Hydraulic Machines	-	-	3	2	-	-	-	-	-	-	25	25	50	25
ME408	Mechanics of Material	-	-	3	2	-	-	-	-	-	-	25	25	50	25
ME409	Mini Project	-	-	2	1	-	-	-	-	-	-	50	-	50	25
Total		15	5	11	-	-	400	50	50	500	-	125	75	200	-
Semester Total		**31**			**24**	**700 Marks**									

Gondwana University, Gadchiroli
Faculty of Engineering & Technology
Course and Examination Scheme of Bachelor of Engineering (Mechanical Engineering)

V Semester B.E. (Mechanical Engineering)

Subject Code	Subject	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory						Practical			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional MSE	Max. Marks Sessional IE	Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
ME501	Design of Machine Elements	3	1	-	4	3	80	10	10	100	40	-	-	-	-
ME502	Metrology & Quality Control	3	1	-	3	3	80	10	10	100	40	-	-	-	-
ME503	Industrial Economics & Enterprenuership Development	3	1	-	4	3	80	10	10	100	40	-	-	-	-
ME504	Mechanical Measurement	3	1	-	3	3	80	10	10	100	40	-	-	-	-
ME505	Heat Transfer	3	1	-	3	3	80	10	10	100	40	-	-	-	-
Laboratory															
ME506	Heat Transfer	-	-	3	2	-	-	-	-	-	-	25	25	50	25
ME507	Mechanical Measurement & Metrology	-	-	3	2	-	-	-	-	-	-	25	25	50	25
ME508	Computer Applications – I	-	1	2	3	-	-	-	-	-	-	50	50	100	50
ME509	Seminar	-	-	2	1	-	-	-	-	-	-	50	-	50	25
Total		15	6	10	-	-	400	50	50	500	-	150	100	250	-
Semester Total		**31**			**25**	**750 Marks**									

Gondwana University, Gadchiroli
Faculty of Engineering & Technology
Course and Examination Scheme of Bachelor of Engineering (Mechanical Engineering)

VI Semester B.E. (Mechanical Engineering)

Subject Code	Subject	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory						Practical			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional MSE	Max. Marks Sessional IE	Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
ME601	Control System Engineering	3	1	-	4	3	80	10	10	100	40	-	-	-	-
ME602	Industrial Electronics	3	1	-	3	3	80	10	10	100	40	-	-	-	-
ME603	Operations Research Techniques	3	1	-	4	3	80	10	10	100	40	-	-	-	-
ME604	Thermal Engineering	3	1	-	4	3	80	10	10	100	40	-	-	-	-
ME605	Dynamics of Machines	3	1	-	3	3	80	10	10	100	40	-	-	-	-
Laboratory															
ME606	Industrial Electronics	-	-	3	2	-	-	-	-	-	-	25	25	50	25
ME607	Dynamics of Machines	-	-	3	2	-	-	-	-	-	-	25	25	50	25
ME608	Computer Applications – II	-	1	2	3	-	-	-	-	-	-	50	50	100	50
ME609	Industrial Training or Case Study	-	-	2	1	-	-	-	-	-	-	50	-	50	25
Total		15	6	10	-	-	400	50	50	500	-	150	100	250	-
Semester Total		**31**			**26**	**750 Marks**									

Gondwana University, Gadchiroli
Faculty of Engineering & Technology
Course and Examination Scheme of Bachelor of Engineering (Mechanical Engineering)

VII Semester B.E. (Mechanical Engineering)

Subject Code	Subject	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory						Practical			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional MSE	Max. Marks Sessional IE	Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
ME701	Elective-I	3	1	-	3	3	80	10	10	100	40	-	-	-	-
ME702	Industrial Engineering	3	1	-	4	3	80	10	10	100	40	-	-	-	-
ME703	Refrigeration & Air Conditioning	3	1	-	3	3	80	10	10	100	40	-	-	-	-
ME704	Automation in Production	3	1	-	3	3	80	10	10	100	40	-	-	-	-
ME705	Design of Mechanical Drives	3	1	-	3	4	80	10	10	100	40	-	-	-	-
Laboratory															
ME706	Refrigeration & Air Conditioning	-	-	3	2	-	-	-	-	-	-	25	25	50	25
ME707	Automation in Production	-	-	3	2	-	-	-	-	-	-	25	25	50	25
ME708	Design of Mechanical Drives	-	-	3	2	-	-	-	-	-	-	25	25	50	25
ME709	Project Spade Work & Seminar	-	-	3	2	-	-	-	-	-	-	50	-	50	25
Total		15	5	12	-	-	400	50	50	500	-	125	75	200	-
Semester Total		**32**			**24**	**700 Marks**									

Gondwana University, Gadchiroli
Faculty of Engineering & Technology
Course and Examination Scheme of Bachelor of Engineering (Mechanical Engineering)

VIII Semester B.E. (Mechanical Engineering)

Subject Code	Subject	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory						Practical			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional MSE	Max. Marks Sessional IE	Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
ME801	Industrial Management	3	1	-	4	3	80	10	10	100	40	-	-	-	-
ME802	I.C. Engines & Gas Turbines	3	1	-	3	3	80	10	10	100	40	-	-	-	-
ME803	Elective – II	3	1	-	3	3	80	10	10	100	40	-	-	-	-
ME804	Elective – III	3	1	-	3	3	80	10	10	100	40	-	-	-	-
ME805	Computer Aided Design	3	1	-	3	3	80	10	10	100	40	-	-	-	-
Laboratory															
ME806	I.C. Engines & Gas Turbines	-	-	3	2	-	-	-	-	-	-	25	25	50	25
ME807	Computer Aided Design	-	-	3	2	-	-	-	-	-	-	25	25	50	25
ME808	Project	-	-	6	6	-	-	-	-	-	-	75	75	150	75
Total		15	5	12	-	-	400	50	50	500	-	125	125	250	-
Semester Total		**32**			**26**	**750 Marks**									

List of Electives:

Elective –I		
	ME7011: Automobile Engineering	ME7014: Thermal System Design
	ME7012: Finite Element Method	ME7015:: Mechanical System Design
	ME7013: Tool Design	ME7016: Industrial Robotics

Elective – II		
	ME8031: Power Plant Engineering	ME8034:Oil Hydaulics & Pneumatics
	ME8032: Product Design & Development	ME8035: Synthesis of Mechanisms
	ME8033: Machine Tool Design	ME8036:Maintenance Engineering

Elective –III		
	ME8041: Unconventional Energy Systems	ME8044: Energy Audit & Management
	ME8042:Stress Analysis	ME8045:Design of Material Handling Systems
	ME8043: Project Evaluation & Management	ME8046:Statistical Quality Control

Gondwana University, Gadchiroli

Faculty of Engineering and Technology

B.E. (MECHANICAL ENGINEERING): THIRD SEMESTER

ME301: APPLIED MATHEMATICS – III (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

UNIT – I Laplace Transform *[12 Hrs.]*

Definition, Properties (statements only). Periodic functions and unit step function, Inverse Laplace transform by partial fractions and convolution theorem. Solution of ordinary linear differential equations with constant coefficients by Laplace transform.

UNIT - II Matrices **[9 Hrs.]**

Inverse of matrix by adjoint and partitioning method, Rank of a matrix and consistency of system of linear simultaneous equations. , Linear dependence, Linear and orthogonal transformation, Eigen values and eigen vectors, Reduction to diagonal form.

UNIT – III Matrices **[9 Hrs.]**

Cayley-Hamilton Theorem, Sylvester's Theorem (statements only) Solution of second order linear differential equation with constant coefficient by matrix method. Reduction of quadratic form to canonical form.

UNIT - IV Partial Differential Equations **[10 Hrs.]**

Linear Partial Differential Equations first order and first degree i.e. Lagrange's form, Linear homogeneous equations of higher order with constant coefficients Method of separation of variables. . Application to one dimensional heat flow.

UNIT – V Fourier series and Fourier Transforms **[10 Hrs.]**

Periodic functions and their Fourier series expansion, Fourier Series for even and odd functions, Change of interval, Half range expansions, Fourier integrals and Fourier Transforms.

TEXT BOOKS:

1. Higher Engineering Mathematics By B.S.Grewal
2. Higher Engineering Mathematics By H.K.Dass

REFERENCE BOOK:

A Text Book of Engineering Mathematics by N.P. Bali and Manish Goyal

ME302: FLUID MECHANICS (Theory)

CREDITS: 04

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hours/Week	Duration of Paper: 03 Hours
Tutorial: 1 Hour/Week	University Assessment: 80 Marks
	College Assessment: 20 Marks

UNIT – I **[9 Hrs.]**

Introduction to Fluid Mechanics: - Properties of fluids, Types of fluids, Newton's law of viscosity & its applications, Surface tension & capillarity.
Pascal's law, Hydrostatic law, Fluid pressure & its measurements (simple & Differential Manometers)
Hydrostatics: - Pressure variations in compressible & incompressible fluids, Forces on submerged plane surfaces & curved surfaces.

UNIT – II **[9 Hrs.]**

Buoyancy, centre of Buoyancy, Metacentre, Metacentric height, Stability of floating and submerged bodies.
Kinematics of fluid flow:- Types of flow, Pathline, stream line, stream tube streak line, Continuity equation, Velocity Potential function & Stream function.
Dynamics of fluid flow: - Euler's equation of motion, Derivation of Bernoulli's equation for incompressible flow.

UNIT – III **[9 Hrs.]**

Measurement of Fluid Flow: - Through ducts: Venturimeter, Through Reserviors: Large Orifice & through open channels: Discharge over triangular, Rectangular & Trapezoidal notch
Viscous Flow:- Flow of Viscous fluid through circular pipe, Flow of viscous fluid between two parallel plates, Kinetic energy Correction factor & Momentum Correction factor.

UNIT – IV **[9 Hrs.]**

Turbulent flow: - Reynold's experiment, frictional loss in pipe flow.
Flow through pipes:- Equations of pipe flow, Losses in pipes & fittings, Hydraulic Gradient Line & Total energy Line, Syphon, Flow through pipe in series and parallel, Flow through branched pipes, Power transmission through pipe, Flow through nozzle, Water Hammer.

UNIT – V **[9 Hrs.]**

Dimensional Analysis: - Dimensional Homogeneity, Rayleigh's method, Buckingham's π-Theorem.
Boundary Layer flow:- Boundary Layer concepts, Boundary Layer thickness, Displacement thickness, Momentum thickness, energy thickness, Momentum Integral equation for boundary layer (Von Karman), Separation, Drag and Lift on immersed bodies.

TEXT BOOKS:

1. Fluid Mechanics & hydraulic Machines - Dr. V.M. Domkundwar

2. Fluid Mechanics & Fluid Power Engineering - D.S.Kumar

3. Fluid Mechanics & hydraulic Machines - R.K.Bansal

ME303: KINEMATICS OF MACHINES (Theory)

CREDITS: 04

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hours/Week	Duration of Paper: 03 Hours
Tutorial: 1 Hour/Week	University Assessment: 80 Marks
	College Assessment: 20 Marks

UNIT - I **[9 Hrs.]**

Basic concept of mechanism , Kinematic link , kinematic pairs , kinematic chain , mechanism , machine, Inversions of slider crank chain, Inversions of Double slider crank chain, Harding`s notation, classification of four bar chain ( class -I & class - II ), inversion of four- bar- chain. Degree of freedom , estimation of degree of freedom of mechanism by Grubbler`s criterion and other methods. Various types of mechanism such as Pantograph, Geneva wheel, Pawal and ratchet mechanism, Exact straight line mechanism, Approx. straight line mechanism, steering mechanism, Transport mechanism.

UNIT - II **[9 Hrs.]**

Quantitative kinematic analysis of mechanism: - Displacement, Velocity, and Acceleration analysis of planner mechanism by graphical method, Coriolis component of acceleration, Instantaneous center method, Kennedy`s theorem.

UNIT - III **[9 Hrs.]**

Concepts of cam mechanism. Types of cams and followers and applications. Synthesis of cam for different types of follower motion like constant velocity , parabolic , SHM , cycloidal etc.
Analysis of follower motion for cams with specified contours like, tangent cam and Pressure angle in cam.

UNIT - IV **[9 Hrs.]**

Concepts of motion transmission by toothed wheels, comparison with cam 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 pairs 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.

UNIT - V **[9 Hrs.]**

Kinematics of helical, bevel, spiral, worm gear, rack & pinion gears, kinematic analysis, & torque analysis of simple epicyclic gear trains.

TEXT BOOKS:

1. Theory of mechanisms & machines, Shigley J. E.
2. Theory of Machine, S.S.Ratan
3. Theory of Machines, P.S.Ballani
4. Theory of Machines, Thoman Beven CBS publication

REFERENCE BOOKS:-

1. Theory of Machines - Sandor & Erdman.
2. Theory of mechanisms & machines - Ghosh & Mallik
5. Mechanism & Machine Theory - J. S. Rao & Dukki Patti

ME304: MACHINING PROCESSES (Theory)

CREDITS: 03

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

UNIT- I **[9 Hrs.]**

Lathe: Introduction , type , construction of simple lathe , mechanism & attachments for various operations , machine specifications , basis for selection of cutting speed , feed and depth of cut , time estimation for turning operations such as facing , step turning , taper turning , threading , knurling. Introduction to Capstan & Turret Lathe.

UNIT- II **[9 Hrs.]**

Shaper: Introduction, type, specification, description of machines, hydraulic drives in shapers, cutting parameters. Mechanism of shaper: Quick return mechanism, Crank & slotted link mechanism, Table feed mechanism, attachments for shaper, work holding devices, shaper operations, time estimation for shaping operations.

Slotter: Introduction, specifications, description, type of drives for slotter, types of slotting machines - production slotter, puncher slotter, tool room slotter, slotter tools.

Planer: Mechanism for planner: Driving mechanism, feeding mechanism, planner cutting tools, cutting parameters.

UNIT- III **[9 Hrs.]**

Milling : Introduction , specifications , types , column & knee type milling machine ,fixed bed type milling machine , production milling machine , special purpose milling machines such as thread milling machines , profile milling machine , Gear Milling / Hobbing machines. Mechanisms & Attachments for Milling, Cutting parameters, Types of milling operations, Types of milling cutters, Tool geometry & their specifications. Indexing - Simple, compound & differential.

Grinding operations , grinding wheel , specifications & selection , cylindrical & center less grinding operations , surface grinding , tool & cutter grinding , time estimation for grinding operations. Super finishing process, Honing, Lapping, Super finishing, Polishing, Buffing, Metal spraying, Galvanizing & electroplating.

UNIT - IV **[9 Hrs.]**

Drilling : Introduction , tools for drilling , classification of drills , twist drill , drill size & specifications , carbide tipped drills , types of drilling machines - Portable drilling machine , bench drilling machine , upright drilling machine , radial drilling machine , universal drilling machine, multi spindle drilling machine. Drilling machines operations, time estimation for drilling.

Reaming: Introduction, description of reamers, types of reaming operations.
Boring: Introduction, types of boring machines, horizontal boring machine, vertical boring machine, jig boring machine, micro boring, boring operations.
Broaching: Introduction, types of broaches, nomenclature of broaches, types of broaching machines.

UNIT – V **[9 Hrs.]**

Theory of metal cutting: Introduction, Orthogonal and oblique cutting. Mechanics of Metal Cutting, Metal Cutting, Shear plane, Stress, Strain & Cutting Forces, Merchant Circle, Chip Formation, Cutting Force Calculations, Determination of Torque and Power Required for Turning, Drilling and Milling, Influence of tool angle, Cutting Fluids, Cutting speed, Feed and depth of cut on power requirement, Estimation of tool life.

TEXT BOOKS:

1. Manufacturing Technology (Metal Cutting & Machine Tools), P. N. Rao
2. Manufacturing Science, Ghosh & Mallik
3. Work shop Technology (Volume - II), Hajra Choudhary

REFERENCE BOOKS:

1. Manufacturing Engineering & Technology, S. Kalpakjian & S R Schmid
2. Technology of machine tools, Krar & Oswald
3. Manufacturing Processes, M. Begman
4. Processes & Materials of Manufactures, R. Lindberg
5. Production Technology, HMT
6. Work shop Technology (Volume I & II), Bawa

ME305: ENGINEERING METALLURGY (Theory)

CREDITS: 03

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

UNIT – 1 **[9 Hrs.]**

METALS: - Introduction, Difference between metals & non metals, Mechanical & physical properties of metals.

CRYSTAL STRUCTURE:-Introduction, Unit cell, Crystal systems - BCC, FCC, HCP;

Polymorphism & allotropy, Effect of crystal structure on the properties of metal, Imperfections in crystal - Point Defect, Line Defect, Surface Defect, Volume Defects; Effect of imperfection on the properties of metal, Miller indices - For Plain, For Direction.

UNIT - II **[9 Hrs.]**

SOLID SOLUTION:- Introduction, Alloy, Mechanical Mixture, Type of solid solution -Ordered solid solution, Disordered solid solution; Substitute solid solution, Hume Rothery Rule, Solidification of metal (For pure metal & alloys), Ingot structure, Dendritic solidification, Effect of grain size on the properties of metals.

UNIT – III **[9 Hrs.]**

PHASE DIAGRAMS:- Binary equilibrium diagram, Isomorphus system - Monotectic, Eutectic, Eutectoide, Peritectic, Peritectoid; Study of Fe Fe-C diagram – Introduction, α - Ferrite, Austenite, δ - Ferrite, Cementite, Pearlite, Ledeburite, Bainite, Martensite, Uses, Limitation; TTT Curve - Introduction, Procedure for construction, Critical cooling rate, Uses, Limitations.

HEAT TREATMENT:- Introduction, Principles, Purpose; Annealing - Stress Relief Annealing, Process Annealing, Spheroidising, Full Annealing; Normalizing, Tempering:- Austempering, Martempering; Overheated Steel, Burnt Steel, Hardening, Maraging, Patenting, Age hardening, Surface hardening - Carburising, Nitriding, Cyaniding, Induction hardening, Jomini End quench test, Precautions For Heat Treatment.

UNIT – IV **[9 Hrs.]**

PLAIN CARBON STEEL:- Introduction, Classification: Based on Carbon Percent:- Hypo-Eutectoid Steel, Eutectoid Steel, Hyper-Eutectoid Steel; Based on Application:- Dead mild steel, Mild steel, Medium carbon steel, High carbon steel; Limitations of Plain Carbon Steel, Effect of impurities – S, P, Si, Mn.

ALLOY STEEL: -Introduction; Effect of alloying elements - Chromium, Nickel, Vanadium, Carbon, Silicon, Titanium, Molybdenum, Tungsten, Manganese, Copper, Boron, Cobalt, Aluminium; Tool steel - Carbon Steel, Alloy Steel, Non-Ferrous Alloys, Cemented Carbide, Ceramic Tools, Diamond Tools; Red hardness, Stainless steel - Ferritic Stainless Steel, Martensitic Stainless Steel, Austenitic Stainless Steel; Hadfield Manganese steel, Maraging Steel, O.H.N.S. Steel; Selection of steel - Wood cutting saw, Hacksaw Blade (Ordinary), Drill & Reamer , Good hacksaw blade, Hot forging Die, Ball Bearing Balls, Steam Turbine Blades, Food processing Equipment, Leaf Spring, Gears.

UNIT – V **[9 Hrs.]**

CAST IRON:- Introduction, Grey cast iron, White cast iron, Nodular cast iron, Malleable cast iron, Mottled cast iron, Ni – hard cast iron, Ni – Resist cast iron, Meehanite Alloy,

STUDY OF NON FERROUS METALS:- Brasses - Cartridge Brass, Admiralty Brass, High Tensile Brasses, Manganese Brasses, Nickel Silver; Bronzes - Phosphor Bronzes, Aluminium Bronzes, Silicon Bronzes, Beryllium Bronzes; Gun Metal, Muntz Metal, Babbits, Bearing Metals, Soldering & Brazing Metals.

TEXT BOOKS:

1. Introduction to Physical Metallurgy, Sidney H. Avner, Tata McGraw-Hill Edition
2. Introduction to Engineering Materials, B.K.Agrawal, Tata McGraw-Hill Edition
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

ME306: MACHINE DRAWING (Practical)

CREDITS: 03

Teaching Scheme	**Examination Scheme**
Practical: 2 Hours/Week	University Assessment: 50 Marks
Tutorial: 1 Hour/Week	College Assessment: 50 Marks

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

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. Sah, PHI Learning Pvt. Ltd

ME307: MACHINING PROCESSES (Practical)

CREDITS: 02

Teaching Scheme
Practical: 3 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 Single Point Cutting Tool.
2. Study of multiple point cutting tools (milling, drilling)
3. Study of Lathe Machine.
4. Study of shaper mechanisms.
5. Study of Broaching machines.
6. One Job/operation on Milling.
7. One Job/operation on Drilling, Boring
8. One Job/operation on Thread Cutting, Taper Turning.
9. One Job/operation on Surface Grinding.
10. One Job/operation on Shaper.

A Journal/Report on experiments conducted shall be submitted by each student. University Practical examination shall be on viva-voce of 10 marks and practical performance or objective test of 15 marks.

ME308: ENGINEERING METALLURGY (Practical)

CREDITS: 02

Teaching Scheme
Practical: 03 Hour/Week

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

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.

A Journal/Report on experiments conducted shall be submitted by each student. University Practical examination shall be on viva-voce of 10 marks and practical performance or objective test of 15 marks.

ME309: INDUSTRIAL VISIT

CREDITS: Nil (Audit Course)

Teaching Scheme	**Examination Scheme**
Practical: 02 Hour/Week	Audit Course

Students should be taken for visit to Industries. Visit to minimum two different types of industries is expected. Student should submit a visit report in the format given below. Preferably they should also make a presentation.

Report should consist of

1. Name of Industry
2. Nature of ownership
3. Year of establishment
4. List of finished products
5. Annual turnover of company
6. Number of employees
7. List of departments / sections
8. Classification of Industry - a) Based on turnover
   b) Based on product / process
9. List of major machines / equipment
10. List of raw material used
11. Sequence of operation (with brief description of operations) of at least one product / Process.

Gondwana University, Gadchiroli

Faculty of Engineering and Technology

B.E. (MECHANICAL ENGINEERING): FOURTH SEMESTER

ME401: APPLIED MATHEMATICS - IV (Theory)

CREDITS: 04

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hours/Week	Duration of Paper: 03 Hours
Tutorial: 1 Hour/Week	University Assessment: 80 Marks
	College Assessment: 20 Marks

UNIT - I Z- Transform [10 Hrs.]

Definition and properties, Inverse Z-transform by partial fractions and convolution theorem. Application to solve difference equation with constant coefficients.

UNIT - II Complex Variables [12 Hrs.]

Analytic functions Cauchy Riemann conditions, Conjugate functions, Singularities, Cauchy's Integral theorem and Cauchy's Integral Formula (statements only).
Laurent's Theorem (statement only) Residue Theorem and application of residuals to evaluate Real integral of the form $\int_0^{2\pi} f(sin\theta, cos\theta)d\theta$ and $\int_{-\infty}^{\infty} \frac{f(x)}{F(x)}dx$ where F(x) has no zeros on real axis.

UNIT - III Numerical Methods [9 Hrs.]

Soltion of algebraic and transcendental equations by False position method,
Newton-Raphson method. Non linear simultaneous equations by Newton-Raphson Method. Solution of system of simultaneous linear equations by Gauss Jordan method, Gauss Seidel method, Crouts method.

UNIT - IV Numerical Methods [9 Hrs.]

Solution of ordinary first order first degree differential equation by Taylor's series method, Runge-Kutta 4th order method, Euler's modified method, Milne's Predictor Corector method. Largest eigen values and corresponding eigen vector by iteration method.

UNIT - V Random Variables, and Probability Distribution [12 Hrs.]

Random variables Distribution functions of discrete and continuous random variables, Joint distributions, Mathematical Expectations, Moments, Moments generating function and Characteristic function. Coefficient of skewness and Kurtosis.

TEXT BOOKS:

1. Higher Engineering Mathematics, B. S. Grewal

2. Theory & Problems of Probability & Statistics, Schaum Series, M. R. Spiegal (McGraw Hil)

3. Introductory methods of numerical analysis, S. S. Sastri

4. Higher Engineering Mathematics, H.K.Dass

REFERENCE BOOKS:

1. Advanced Engineering Mathematics, Kreyszig

2. Mathematics for Engineers, Chandika Prasad

3. Advanced Mathematics for Engineers, Chandrika Prasad

4. Applied Mathematics for Engineering & Physics, L. A. Pipes & Harvile.

5. Calculus of Variation, Forrey

ME402: ENGINEERING THERMODYNAMICS (Theory)

CREDITS: 04

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hours/Week	Duration of Paper: 03 Hours
Tutorial: 1 Hour/Week	University Assessment: 80 Marks
	College Assessment: 20 Marks

UNIT - I **[9 Hrs.]**

Introduction to Thermodynamics :- Basic concepts of Thermodynamics, Thermodynamics Systems, Properties of system, State & Equilibrium, Processes & Cycles, Quasi-static Process, Thermodynamic Equilibrium, Temperature & Zeroth Law of Thermodynamics. Work Transfer, Mechanical forms of work, Non-Mechanical forms work (Electrical, Shaft, Magnetic etc.) Heat Transfer, The Ideal Gas equation of state, Difference between Gas & Vapor, Compressibility factor, Avagadro's Hypothesis, Universal Gas Constant, Internal energy & specific heats of gases.

UNIT- II **[9 Hrs.]**

First Law of Thermodynamics :- Closed Systems (Control mass system) undergoing a cycle and change of state, Energy, Different forms of Energy, PMM-I, Work done, Change in internal energy, Heat transferred during various thermodynamic processes, P-V diagrams. Application of First Law to Steady Flow, (Control volume systems), Thermodynamic analysis of control volumes, Conservation of energy principle, Flow work & enthalpy, The steady flow process applied to i) Nozzles & Diffusers ii) Turbine & Compressors iii) Throttle Valves, iv) Pump, Boiler, etc.

UNIT - III **[9 Hrs.]**

Second Law of Thermodynamics :- Introduction (Law of degradation of energy), Thermal energy reservoirs, Heat engines, Refrigerator & Heat pump, Kelvin-Plank & Clausius statements, Perpetual motion machine-II, Reversible & Irreversible processes, Carnot cycle, Carnot Theorem, Thermodynamic temperature scale.

Entropy: - The Clausius inequality, Entropy, Principle of increase of entropy, Change in entropy for Closed & Steady flow open systems. T-S diagrams.

.

UNIT - IV **[9 Hrs.]**

PROPERTIES OF STEAM :- Formation of steam, Sensible heat, Latent heat, Super heat, Wet steam, Dryness fraction, Critical state, Internal energy of steam, External work done during evaporation, T-S diagram, Mollier chart, Work & Heat transfer during various thermodynamics processes with steam as working fluid. Determination of dryness fraction using various calorimeters.

UNIT - V **[9 Hrs.]**

Air Standard Cycles :- Otto cycle, Diesel cycle, Dual cycle, Stirling & Ericsson cycle, Brayton cycle (Thermal efficiencies and mean effective pressure) Vapour cycles :- Rankine cycle (work done and efficiency, specific steam consumption).

TEXT BOOKS:

1. Engineering Thermodynamics, P.K.Nag
2. Thermodynamics - An engineering approach, Yunus Cengal, M.A.Boles, Tata Mc-Graw Hill Publication
3. Fundamentals of classical Thermodynamics, Gorden J.V.Wylen, Sonntag
4. Basic Engineering Thermodynamics, Reiner Joel.
5. Fundamentals of engineering Thermodynamics, E. Rathakrishan, PHI

ME403: MECHANICS OF MATERIAL (Theory)

CREDITS: 03

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hours/Week	Duration of Paper: 03 Hours
Tutorial: 1 Hour/Week	University Assessment: 80 Marks
	College Assessment: 20 Marks

UNIT - I **[9 Hrs.]**

Concept of simple stresses & strains :- Introduction, stress, strain, types of stresses, stress-strain diagram for brittle & ductile material, elastic limit, Hooks law, modulus of elasticity, modulus of rigidity, factor of safety, analysis of tapered rod, analysis of composite section, thermal stress & strain, thermal stresses with heat flow in cylinders & plates, Hertz`s contact stresses.

Longitudinal strain & stress, lateral stresses & strains, Poisson`s ratio, volumetric stresses & strains with uni-axial, bi-axial & tri-axial loading, bulk modulus, relation between Young`s modulus & modulus of rigidity, Poisson`s ratio & bulk modulus.

Principle stresses & strains :- Definition of principle planes & principle stresses, analytical method of determining stresses on oblique section when member is subjected to direct stresses in one plane in mutually perpendicular two planes, when member is subjected to shear stress &direct stresses in two mutually perpendicular planes, Mohr`s circle for representation of stresses. Derivation of maximum & minimum principle stresses & maximum shear stresses when the member is subjected to different types of stresses simultaneously (i.e. combined stress)

UNIT - II **[9 Hrs.]**

Shear force & bending moment: - Types of beams (cantilever beam, simply supported beam, overhung beam etc.) Types of loads (Concentrated & UDL), Shear force & bending moment diagrams for different types of beams subjected to different types of loads, Sign. Conventions for bending moment & shear force, shear force & bending moment diagrams for beams subjected to couple, Relation between load, shear force & bending moment.

Stresses in beams: - Pure bending, theory of simple bending with assumptions & expressions for bending stress, derivation of bending equation, bending stresses in symmetrical sections, section modulus for various shapes of beam sections.

Shear stresses in beams: - Concept, derivation of shear stress distribution formula, shear stress distribution diagram for common symmetrical sections, maximum & average shear stress.

UNIT - III **[9 Hrs.]**

Deflection of beams: - Derivation of differential equation of elastic curve with the assumptions made in it. Deflection & slope of cantilever, simply supported, overhung beams subjected to concentrated load, UDL, Relation between slope, deflection & radius of curvature. Macaulay`s method, area moment method to determining deflection of beams.

UNIT - IV **[9 Hrs.]**

Torsion of circular shafts: - Derivation of torsion equation with the assumptions made in it. Torsion, shear stress induced in the shaft, when it is subjected to torque. Strength & rigidity criterion for design of shaft. Torque transmitted by solid & hollow circular shaft. Derivation of maximum, minimum principle stresses & maximum shear stress induced in shaft when it is subjected to bending moment, torque & axial load.

Column & struts:- Failure of long & short column, slenderness ratio, assumptions made in Euler`s column theory, end conditions for column. Expression for crippling load for various end conditions of column. Effective length of column, limitations of Euler`s formula, Rankine formula, Johnson`s parabolic formula.

UNIT - V **[9 Hrs.]**

Introduction to fracture mechanics: - Modes of fracture, stress intensity factors, crack propagation. Paris law, creep phenomenon, design of creep.

Strain energy & impact loading: - Definition of strain energy stored in a body when it is subjected to gradually applied load, suddenly applied loads & impact loads. Strain energy stored in bending & torsion. Castingliano`s theorem.

TEXT BOOKS:

1. Strength of Material, S. Ramamurtham
2. Strength of Material, R. K. Rajput
3. Strength of Material, F. L. Singer
4. Mechanics of Material, Beer & Johnson
5. Design of m/c elemental, V. B. Bhandari
6. Design data book for M/c elements, B.D. Shiwalkar
7. Strength of Material, Dr. R.K.Bansal

REFERENCE BOOKS:

1. Strength of materials, Timoshenks
2. Machine Design, Black & Adam
3. Machine Design, J. E. Shigley

ME404: MANUFACTURING PROCESSES (Theory)

CREDITS: 03

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

UNIT- I **[9 Hrs.]**

Casting Process: - Introduction. Pattern making: - Types, materials used, Pattern making allowances, color codes. Core making: - Types, core materials &its properties.
Moulding: - Types of sand moulds, moulding sand composition, moulding sand properties, moulding machines.

UNIT- II **[9 Hrs.]**

Gating design: - Elements of gating systems, pouring time, riser design (Analytical treatment)
Melting furnaces: - Types, Electric furnace, Induction furnace, Cupola - construction & operation. Cleaning, inspection & casting defects.
Foundry mechanism: - Special casting processes such as investment casting, centrifugal casting, shell moulding, CO moulding, Slush casting, Die casting.

UNIT – III **[9 Hrs.]**

Rolling, Forging, Extrusion & Wire Drawing.
Press Working: Die cutting operation, classification, types of presses, press terminology, introduction to shaping operations, bending, forming & drawing.

UNIT- IV **[9 Hrs.]**

Non-conventional Machining Processes: - Characteristics, Operation, Applications, Limitations and Selection of Process Parameters of the following Processes. Abrasive Jet Machining, Ultrasonic Machining, Water Jet Machining, EDM, ECM.

UNIT - V ` **[9 Hrs.]**

Joining Processes: - Introduction to Welding, Soldering, Brazing Processes. Types of Welding, Arc Welding & Gas Welding Processes, Defects & Inspection of Welding Joints, Electrodes, Weldability of Metals, Welding equipments of Fixtures.

TEXT BOOKS:

1. Manufacturing Technology (Foundry Forming & Welding), P. N. Rao
2. Manufacturing Science, Gosh & Mallik.
3. Work Shop Technology (Volume - I), Hajra Choudhary.
4. Manufacturing Engineering & technology, S. Kalpakjian & SR Schmid.

REFERENCE BOOKS:

1. Work Shop Technology, Vol. I – III, WAJ Chapman.
2. Manufacturing Processes, M. Begman
3. Processes & Materials of Manufacture, R. Lindberg.
4. Work Shop Technology (Volume - I & II), Bawa
5. Work Shop Technology (Volume - I & II), B. S. Raghuvanshi

ME405: HYDRAULIC MACHINES (Theory)

CREDITS: 03

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

UNIT - I IMPACT OF JETS & IMPULSE TURBINE [9 Hrs.]

Impulse Momentum Principle, Dynamic Action of Jets on Fixed and Moving Flat Plates and Curved Vanes. Velocity Triangles, Introduction to Jet Propulsion of Ships. Theory of Turbo machinery, Euler's Equation, Classification of Hydraulic Machines. Elements of Hydroelectric Power Plant.

Pelton Turbines: Principle, Constructional Features, Velocity Diagrams and Analysis, Working Proportions, Design Parameters, Draft Tube Theory, Cavitation in Turbines. Performance Characteristics, Selection Criterion and Governing.

UNIT – II REACTION TURBINE [9 Hrs.]

Principle of Operation, Comparison over Pelton Turbines.
Francis & Kaplan Turbines: Constructional Features, Velocity Diagrams and Analysis, Working Proportions, Design Parameters, Performance Characteristics, Selection Criterion and Governing.

UNIT - III ROTODYNAMIC PUMPS [9 Hrs.]

Classification of Hydraulic Pumps and their applications, Centrifugal Pumps Installation and Operation, Priming, Fundamental Equation, Various Heads, Velocity Triangles and Analysis, slip Factor, Vane Shape, Losses and Efficiencies, Multi staging of Pumps, Design Consideration, Working Proportion, N.P.S.H., Cavitation, Performance Characteristics , Pump and System Matching, Introduction to Mixed Flow and Axial Flow Pumps. Self Priming Pumps.

UNIT - IV POSITIVE DISPLACEMENT PUMPS [9 Hrs.]

Reciprocating Pumps: Types, Main Components, Slip, Work done, Theoretical and Actual Indicator Diagrams. Air Vessels, Cavitation, Hand Pumps.

Rotary Pumps: Introduction to Gear Pumps, Sliding Vane Pumps, Screw Pumps.

UNIT - V MODEL TESTING & WATER LIFTING DEVICES [9 Hrs.]

Model Testing: Types of Similarities, Unit and Specific Quantities. Model Testing of Hydraulic Turbines and Pumps.

Miscellaneous water lifting devices: Air Lift Pumps, Hydraulic Ram, Bore Hole Pump, Submersible Pumps, Jet Pumps, Regenerative Pumps.

TEXT BOOKS:

1. Theory & Design of Hydraulic Machines, V. P. Vasandani (Khanna Pub.)
2. Fluid Mechanics, A. K. Jain (Khanna Pub.)
3. Fluid Mechanics & Fluid Power Engineering, D. S. Kumar (Kataria Pub.)
4. Fluid Mechanics & Machines, R. K. Bansal (Laxmi Pub.)

5. Fluid Mechanics & Machines, Banga & Sharma (Khanna Pub)
6. Fluid Mechanics & Machines, R.K. Rjpur (S.Chand)

REFERENCE BOOKS:

1. Fluid Mechanics with Engineering Applications, Daugherty & Franizini (Mc Graw Hill)
2. Theory of Turbo – Machines, A. T. Sayers, (Mc Graw Hill)
3. Fundamentals of Turbomachines, B.K. Vekanna
4. Fluid mechanics & Hydraulic Machines, S. Domkondawar, (Dhanpat Rai & son)
5. Fluid Mechanics & Hydraulic Machines, Som & Biswas (TMH)

BEME406: MANUFACTURING PROCESSES (Practical)

CREDITS: 02

Teaching Scheme	**Examination Scheme**
Practical: 3 Hours/Week	University Assessment: 25 Marks
	College Assessment: 25 Marks

LIST OF PRACTICALS:

Minimum Eight out of the following shall be performed:

1. Study of Melting Furnaces
2. Study of Pattern Making and Moulding
3. Study of Special Casting Processes
4. One job on Gas Welding.
5. One job on Arc Welding
6. Study of various types of Presses
7. Study of Non-conventional machining processes (EDM, ECM and Ultrasonic Machining)
8. One job on Lathe (Threading and Taper turning)
9. One job on Milling Machine (Gear cutting, Key way Machining)
10. One Job on Shaper Machine

A Journal/Report on experiments conducted shall be submitted by each student. University Practical examination shall be on viva-voce of 10 marks and practical performance or objective test of 15 marks.

ME407: HYDRAULIC MACHINES (Practical)

CREDITS: 02

Teaching Scheme
Practical: 3 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. To run the centrifugal pump under various loading conditions and to draw the characteristic curves.
2. To conduct a test on Pelton wheel & plot the characteristic curves.
3. To study the performance of Reciprocating pump and draw the characteristic curves.
4. Determination of the Metacentric height of a floating body.
5. To study status of flow using Reynolds apparatus.
6. Verification of Bernoulli's theorem.
7. Determination of the coefficient of discharge for a given Venturimeter.
8. Determination of the coefficient of discharge for a given Orificemeter.
9. Study and performance of Francis turbine at constant head.
10. To draw the characteristic curves of a Hydraulic Ram at constant valve lift and constant supply head.

A Journal/Report on experiments conducted shall be submitted by each student. University Practical examination shall be on viva-voce of 10 marks and practical performance or objective test of 15 marks.

ME408: MECHANICS OF MATERIAL (Practical)

CREDITS: 02

Teaching Scheme
Practical: 3 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 Universal Testing Machine
2. Tension Test on Mild Steel Bar
3. Compression Test on Concrete block and Cast Iron
4. Shear Test on M.S.Bar
5. Impact Test on M.S.Specimen

6. Determination Critical Buckling load capacity for Coloumn and Studs
7. Torsional Test for Circular M.S.Bar
8. Determination of stiffness of Helical Compression Spring
9. Deflection of Cantilever beam and simply supported beam
10. Fatigue test under completely reverse bending stress.

A Journal/Report on experiments conducted shall be submitted by each student. University Practical examination shall be on viva-voce of 10 marks and practical performance or objective test of 15 marks.

BEME409: MINI PROJECT

CREDITS: 01

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

A group of students (not more than 10 students in a group) should fabricate a working model of any mechanical or electro-mechanical system. Computer / mathematical model or simulation is not acceptable. A brief report and a photograph of the model shall be submitted by the students.

Note: *Syllabus for the V to VIII Semester courses shall be prescribed in due course of time.*