BACHELOR OF ENGINEERING (FOUR YEARS DEGREE COURSE)
FACULTY OF SCIENCE & TECHNOLOGY
TEACHING AND EXAMINATION SCHEME WITH CHOICE BASED CREDIT SYSTEM (CBCS)

Course and Examination Scheme of Bachelor of Engineering (Mechanical Engineering) VII Semester B.E. (Mechanical Engineering)

Course Code	Course Title	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory						Practical			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks	Max. Marks (Sessional)		Total	Min. Passing Marks	Max. Marks	Max. Marks	Total	Min. Passing Marks
							ESE	MSE	IE			TW	POE		
ME701	I.C. Engines & Gas Turbines	3	1	-	3	3	80	10	10	100	40	-	-	-	-
ME702	Automation in Production	3	1	-	3	3	80	10	10	100	40	-	-	-	-
ME703	Design of Mechanical Drives	3	1	-	3	3	80	10	10	100	40	-	-	-	-
ME704	Industrial Engg.	3		-	3	3	80	10	10	100	40	-	-	-	-
ME705	Program Elective-III	4		-	4	3	80	10	10	100	40	-	-	-	-
ME706	I.C. Engines and Gas Turbines.	-	-	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	Minor Project Work & Seminar	-	-	2	2							50	-	50	25
		16	3	11	8	-									
		30			24	-	400	50	50	500	-	125	75	200	100
						700									

Note: Student shall opt one Program Elective-III = 04 Credits. Refer Table: III

Table: III

1. ME7051 Power Plant Engineering
2. ME7052 Finite Element Methods
3. ME7053 Tool Design

BACHELOR OF ENGINEERING (FOUR YEARS DEGREE COURSE)
FACULTY OF SCIENCE & TECHNOLOGY
TEACHING AND EXAMINATION SCHEME WITH CHOICE BASED CREDIT SYSTEM (CBCS)

Course and Examination Scheme of Bachelor of Engineering (Mechanical Engineering) VIII Semester B.E. (Mechanical Engineering)

Course Code	Course Title	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory						Practical			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks	Max. Marks (Sessional)		Total	Min. Passing Marks	Max. Marks	Max. Marks	Total	Min. Passing Marks
							ESE	MSE	IE			TW	POE		
ME801	Industrial Management	3	1	-	3	3	80	10	10	100	40	-	-	-	-
ME802	Refrigeration & Air Conditioning	3	1	-	3	3	80	10	10	100	40	-	-	-	-
ME803	Computer Aided Design	3	1	-	3	3	80	10	10	100	40	-	-	-	-
ME804	Program Elective -IV	3	1	-	3	3	80	10	10	100	40	-	-	-	-
ME805	Program Elective-V	3	1	-	3	3	80	10	10	100	40	-	-	-	-
ME806	Refrigeration & Air Conditioning	-	-	3	2	-	-	-	-	-	-	25	25	50	25
ME807	Computer Aided Design	-		3	2	-	-	-	-	-	-	25	25	50	25
ME808	Major Project	-	-	6	6	-	-	-	-	-	-	75	75	150	75
		15	3	12	10	-									
		30			25	-	400	50	50	500	-	100	125	250	125
						750									

Note: Student shall opt one Program Elective -IV and Program Elective –V = 3+3= 06 Credits. Refer Table: IV & Table=V

Table IV 1. ME8041 Automobile Engineering
2. ME8042 Machine tool Design
3. ME8043 Synthesis of Mechanism

Table IV 1. ME8051 Unconventional Energy Systems
2. ME8052 Stress Analysis
3. ME8053 Project Evaluation and Management

Gondwana University, Gadchiroli

Faculty of Science and Technology

B.E. (MECHANICAL ENGINEERING): SEVENTH SEMESTER

ME701: I.C. ENGINE AND GAS TURBINES (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.]

Engines types & their operations, Introduction, Engine classification. Engine operating cycles. Engine components. Engine friction, lubrication, & cooling, lubrication systems.

Automobile Fuels. Rating of engine fuels, I. C. Engine fuels - Petrol, diesel, CNG, LPG, Alcohols, Vegetable oils fuel supply systems.

S. I. Engine, Carburetors, Modern carburetor, S.P.F.I., MPFI, Direct injection.

C.I. Engines : Fuel injection pump, Reciprocating, rotary, fuel injector, High pressure
D.I. systems, fuel distribution systems. CROI.

UNIT – II [9 Hrs.]

S. I. Engines. Charge motion within the cylinder swirl, squish, combustion stages, flame propagation. Cyclic variations in combustion, ignition fundamentals, conventional ignition system, abnormal combustion, knock and surface ignition, knock fundamentals, turbo-charging, supercharging and scavenging in engines.

C.I. Engines. Combustion in direct and indirect injection, fuel spray behavior, combustion in C.I. Engines, ignition delay, auto ignition, factors affecting delay. Effects of fuel properties. Abnormal combustion, supercharging & turbo charging in engines.

UNIT – III [9 Hrs.]

Measurement of Power, IP, BP, Speed fuel and air combustion, calculation of indicated and brake thermal efficiency, volumetric efficiency, mechanical efficiency, percentage of excess of air heat balance sheet, performance characteristics and factors influencing the performance of I.C. Engines.

UNIT- IV [9 Hrs.]

Rotary Compressors:- Principle, operation, parts, indicator diagram, work done, Roots efficiency, Vanes efficiency (No analytical treatment expected)

Centrifugal Compressor :- Principle, Operation, parts, velocity diagram, static & total head quantities, work done by impeller, isentropic efficiency of compressor, slip factor, pressure coefficient, power input factor.

Axial Flow Compressor :- Principle, operation, parts, velocity diagram, work done, degree of reaction, stage efficiency, compressor characteristics, surging & chocking, Polytropic efficiency.

UNIT- V [9 Hrs.]

Gas Turbine :- Ideal cycles, isentropic & small stage efficiency, application of gas turbine, pressure losses, effect of inter-cooling, reheat & regeneration, Fuel-air ratio, combustion efficiency, performance calculation, open cycle & closed cycle gas turbine plants, cogenerations & combined power cycles.

Jet Propulsion :- Principles & working of turbojet, turboprop, Ramjet & pulse jet, simple turbojet cycle. Thrust power, propulsive power. Thermal efficiency, propulsive efficiency, overall efficiency.

TEXT BOOKS

1. Internal Combustion Engine, Fundamentals - John B. Heywood.
2. Internal Combustion Engines & Air Pollution - Edward F. Obert.

REFERENCE BOOKS

1. Internal Combustion Engines - N. Ganesan
2. Internal Combustion Engines - V. M. Domkundwar
3. Internal Combustion Engines - M. C. Mathur, R. D. Sharma.
4. Internal Combustion Engines - R.K.Rjput

ME702: AUTOMATION IN PRODUCTION (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.]

Automation - Definition, types, reasons for automating. functions in manufacturing. Organization and information processing in manufacturing.

Automated Flow Lines :- Methods of work part transport, Transfer mechanisms, Buffer storage, Analysis of flow lines. General terminology and analysis of transfer lines without storage, partial automation, automated flow lines with storage buffers, manual assembly lines. Line balancing problem, Methods of line balancing. Automated Assembly systems - Types, parts delivery system.

UNIT – II [9 Hrs.]

Numerical Control Production Systems - Basic concepts, coordinate system and machine motion - Types of NC systems - Point to point, straight cut & continuous path. Machine control unit & other components. Tape & tape readers.

NC part programming - Punched tape & tape formats, NC words, methods of part programming, manual part programming. Introduction to APT (Programming not expected), Direct numerical control. Computer Numerical Control. Adaptive control. Applications & economics of NC.

UNIT – III [9 Hrs.]

Industrial Robotics - Introduction, Robot anotomy, Robot control systems, accuracy and repeatability and other specifications, end effectors, sensors, introduction to robot programming, safety monitoring.

Robot Applications - Characteristics of robot applications, work cell layout, robot applications in material handling, processing, assembly and inspection. Computer aided manufacturing - Manufacturing planning, manufacturing control, Computer integrated manufacturing.

Flexible manufacturing systems - Components, Types of systems, FMS layout configuration computer functions, data files, system reports, FMS benefits.

Computer aided process planning :- Retrieval CAPP systems, generative CAPP systems, benefits of CAPP. Shop floor control.

UNIT – IV [9 Hrs.]

Automated material handling & storage – Introduction to Material Handling equipments, Automated Guided vehicle Systems.

Types :- Driverless trains, AGVS pallet trucks, AGVS unit-load carriers, Vehicle guidance & Routing, Traffic control & safety, System management, Analysis of AGVS systems, AGVS applications.

Automated Storage & Retrieval System - Types :- Unit load AS / RS, mini load AS / RS, man on board AS/RS, automated item retrieval system, deep lane AS/RS - Basic components & special features of AS/Rs, Carrousel storage systems, work in process storage, quantitative analysis.

UNIT – V [9 Hrs.]

Automated Inspection:- Automated inspection principles & methods - 100% automated inspection, off-line & on-line inspection, distributed inspection & final inspection, Sensor technologies for automated inspection, coordinate measuring machines- construction, operation & benefits, Machine vision image acquisition, image processing & analysis, interpretation, machine vision applications.

Group Technology :- Part families, parts classification & coding, Opitz classification systems, production flow analysis, Machine cell design - composite part concept, types of cell design, best machine arrangement, benefits of group technology.

TEXT BOOKS:

1. Automation, Production Systems - M. P. Groover – PHI & CIMS
2. CAD / CAM - Zimmers & Groover – PHI

REFERENCE BOOKS :

1. Numerical Control & - Kundra, Rao & Tewari – TMH Computer Aided Manufacturing
2. Computer Control of Manufacturing - Yoram Koren - McGraw Hill. Systems

ME703: DESIGN OF MECHANICAL DRIVES (Theory)

CREDITS: 03

Teaching Scheme
Lectures: 3 Hours/Week

Examination Scheme
Duration of Paper: 03 Hours

Tutorial: 1 Hour/Week

University Assessment: 80 Marks
College Assessment: 20 Marks

UNIT – I ` [12 Hrs.]

Coupling: - Types of shaft coupling, design of rigid flange coupling, flexible bush coupling

Flywheel: - Coefficient of fluctuation of energy and coefficient of fluctuation of speed, energy stored in flywheel, stresses in flywheel, design of flywheel.

Bearings :- Surface finish, friction, wear, lubrication, oil seals, design of journal bearings for radial and thrust loads, selection of ball & roller bearings for radial and thrust loads. Failures of anti friction bearing, design of hydrostatic pocket type thrust bearing such as circular step thrust bearing, bearing housing.

UNIT – II [12 Hrs.]

Flat belt drive :- Types of belts & belt material, analysis of belt tension, condition for transmitting maximum power, design of flat belt & flat belt pulley.

V Belt drive :- Types of V-belt, analysis of V-belt tension, design of V-belt & pulley.

Roller Chain drive :- Velocity ratio, length of chain, chordal action, selection of chain, dimensions of tooth profile & sprocket.

UNIT – III [12 Hrs.]

Spur & Helical Gear drive :- Review of kinematics of gear & terminology, interference, tooth profiles, formative number of teeth etc., Buckingham equation, design of spur gear drive, helical gear drive.

Worm Gear Drive :- Types & proportion of worm & worm gear, force analysis, beam strength of worm gear teeth, dynamic tooth load, wear load, thermal rating of worm gear, design of worm & worm gear.

Bevel Gear drive:- Types of bevel gear, proportions of bevel gear, force analysis of bevel gear drive, design of bevel gear drive.

UNIT – IV [12 Hrs.]

Kinematics of friction drives such as brakes & clutches.

Design of friction clutches:- Design of single plate, multiple plate, cone & centrifugal clutch.

Design of brake: -Design of Shoe brake, band brake & internal expanding brake. Introduction to haulage system, Design of wire rope, sheave and drum. Types of motor like AC, DC, their characteristics, controls & selection of motors.

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TEXT BOOKS:

1. Mechanical Design of Machines - Maleev, Hartman
2. Machine Design - P. H. Black
3. Mechanical Engineering Design - Shigley
4. Design of Machine elements - V. B. Bhandari
5. Design Data Book - B.D.Shiwalkar
6. Design Data Book - PSG
7. Machine Design - R.S.Khurmi
8. Machine Design - Pandey & Shah

REFERENCE BOOKS:

1. Hand Book of Machine Design - Shigley & Mischke.

ME704: INDUSTRIAL ENGINEERING (Theory)

CREDITS: 03

Teaching Scheme
Lectures: 3 Hours/Week

Examination Scheme
Duration of Paper: 03 Hours

Tutorial: 1 Hour/Week

University Assessment: 80 Marks
College Assessment: 20 Marks

UNIT-I [9 Hrs.]

Production Planning and Control :- Definition, objectives of PPC, functions of PPC, types of production. Value analysis and value Engineering. Introduction, steps involved in value analysis. Applications in Manufacturing.

Forecasting :- Need for forecasting, classification of forecasting methods, like judgmental technique, time series analysis, least square method, moving averagemethod, exponential smoothing method.

UNIT-II [9 Hrs.]

Work Study :- Productivity - Concept & objectives of productivity, Types of productivity, factors affecting productivity. Tools & techniques to improve productivity, Measurement of productivity.

Work study & Method study :- Definitions, objectives, steps in method study, process charts, string diagram, motion study, micro motion study, SIMO chart.

UNIT-III [9 Hrs.]

Work Measurement :- Objectives, definition, stop watch study, work sampling, PMTs, MTM & work factor method.

Ergonomics : Objectives, Human factors in engg., Man machine system, Display design, design controls. Principles of motion economy, work place design.

UNIT-IV [9 Hrs.]

Plant Layout :- Objectives, principle, Types of plant layout, Material handling, objectives, principles and selection of material handling equipments, Unit load concept, material flow pattern.

UNIT-V [9 Hrs.]

Maintenance :- Objectives, Types of maintenance, preventive, predictive, break down maintenance. Reliability and maintainability analysis. Failure data analysis, reliability, MTBT, MTTR, Batch tub curve, series, parallel and stand by system.

BOOKS RECOMMENDED:

1. Work Study - By ILO

2. Motion & Time Study - By Bames
3. Ergonomics - By Murell
4. Production Planning & Control - By Jain & Agrawal
5. Industrial Engineering & - By Martand & Telsang Project Management
6. Reliability Engineering ` - By Balguruswami
7. Plant Layout & Material Handling - By James Apple.

ME105 : PROGRAM ELECTIVE III

ME7051: POWER PLANT ENGINEERING (Theory)

CREDITS: 04

Teaching Scheme
Lectures: 3 Hours/Week

Examination Scheme
Duration of Paper: 03 Hours

Tutorial: 1 Hour/Week

University Assessment: 80 Marks
College Assessment: 20 Marks

UNIT – I [9 Hrs.]

Steam Power Plant (Coal Based) Layout, Coal Handling, Ash handling, feed water, cooling water, Pulverized fuel firing; dust collection, draught system, Fuel Burners.

UNIT – II [9 Hrs.]

Important component of Coal Based steam power plant Steam generator (Boilers), Types, High pressure boiler, Super critical boilers, Steam turbines; types and governing of steam turbines, Condensers (Numerical); cooling towers.

UNIT – III [9 Hrs.]

Nuclear Reactor Nuclear reactor material; Breeder reactor; CANDU; PWR (Pressurised Water Reactor); Liquid metal cooled reactor; Radiation shielding; waste disposal of Nuclear reactor; economics of Nuclear Power Plant.

UNIT – IV [9 Hrs.]

Hydroelectric Power plants Runoff; Hydrograph and flow duration curve; mass curve; selection of site; types of hydro electric power plant such as storage plant, runoff river plant, pumped storage power plant; Water turbines & its types; Draft tube; surse tank; governing of turbine; combine operation of hydro electric power plant with steam, nuclear, diesel & gas turbine power plant (working)

UNIT – V [9 Hrs.]

Economics of Power Plant Cost analysis, load curves; tariffs, economics of combine power plant, economic loading of power plant, capacity scheduling and energy problems, epreciation and various methods of calculation, waste heat recovery system, compressed air storage plant.

BOOKS RECOMMENDED:

1) Power Plant Engineering by D.K.Nag
2) Power Plant Engineering by Domkundwar

ME105 : PROGRAM ELECTIVE III

ME7051: FINITE ELEMENT METHODS (Theory)

CREDITS: 04

Teaching Scheme
Lectures: 3 Hours/Week

Examination Scheme
Duration of Paper: 03 Hours

Tutorial: 1 Hour/Week

University Assessment: 80 Marks
College Assessment: 20 Marks

UNIT – I [12 Hrs.]

Fundamentals of stress & strain, Stress & strain components, Stress strain relationship Elastic constants, Plane stress, Plane strain, Differential equation of equilibrium, Compatibility quations, Boundary conditions, Saint Venant`s principle, Airy`s stress function. (Only introduction is expected)

Fundamental concepts of FEM - Historical background, Scope of FEM in engineering applications, Principles of minimum potential energy, Concept of virtual work, Raleigh- Ritz Method, FEM analysis procedure. Mathematical understanding required for FEM, Matrix algebra & operations, Eigen values & Eigen vectors, Methods for solution of simultaneous equations, like Gauss elimination, Matrix decomposition method. Concept of discritization of body into elements, degrees of freedom, bandwidth, Basic types of 2-D & 3-D elements, Displacement models, Convergence requirements, shape functions. Commercial FE Softwares.

UNIT – II [12 Hrs.]

Finite element modeling & analysis using Bar & Beam elements - Stiffness matrix, Assembly, Boundary conditions, Load vector, Temperature effects. Two dimensional plane truss - Local & Global co-ordinate system, element stiffness matrix, assembly, boundary conditions, load vector, force & stress calculations.

UNIT – III [12 Hrs.]

Two dimensional problems using CST & LST - Formulation of CST & LST elements, Elemental stiffness matrix, assembly, boundary conditions, load vector, stress calculations, temperature effect. Axi-symmetric solids subjected to axi-symmetric loading - Axi-symmetric formulation using CST ring element, stiffness matrix, boundary conditions, load vector, calculation of stresses.

UNIT – IV [12 Hrs.]

Introduction to Isoparametric & Higher order elements. Introduction to Numerical Integration. Introduction to dynamic analysis, formulation of mass matrix for one dimensional bar element, free vibration analysis using one dimensional bar element. Torsion of prismatic bars using triangular elements. Steady state one dimensional & two dimensional heat conduction problems using I-D & triangular elements respectively. Programming aspects of FEM - Algorithms for, reading Finite Element modeling data, formation of elemental stiffness matrix, formation of elemental load vector, assembly of individual elemental stiffness matrix into global stiffness matrix, assembly of individual

elemental load vector into global load vector, application of boundary conditions, solution of equations, determination of stresses & strains. Pre & Post processing in FEA

BOOKS RECOMMENDED:

1. Introduction to Finite Elements in Engineering - Chandrupatla & Belegundu
2. Theory of Elasticity - S. P. Timoshenko
3. Concept and Applications of Finite Element Analysis - R. D. Cook.
4. The Finite Element Method - A Basic Introduction to Engineers. D. W. Griffiths, D.A. Nethercot, Granada Publishing.

ME105 : PROGRAM ELECTIVE III

ME7051: FINITE ELEMENT METHODS (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 [9 Hrs.]

Design of Single Point Cutting Tool Form tools- Introduction, Types, design of form tools. Drills- Introduction, Types, Geometry, Design of drill. Milling cutters -Introduction, Types, Geometry, Design of milling cutters, Reamers Taps & Broaches - constructional features only

UNIT-II [9 Hrs.]

Press Tool Design Introduction, Press tool equipments, arrangement of guide posts . Press selection , press working terminology, Working of a cutting die, Types of dies- Simple dies, inverted die, compound dies, combination dies, progressive dies, Transfer dies, Multiple dies. Principle of metal cutting, strip layout, clearance, angularclearance, clearance after considering elastic recovery, cutting forces, method of reducing cutting forces, Die block, Die block thickness, Die opening. Fastening of die block, back up plate, Punch, Methods of holding punches, Strippers. Stoppers, Stock stop, Stock guide, Knock cuts, Pilots. Blanking & Piercing die design - Single & progressive dies.

UNIT – III [9 Hrs.]

Bending Forming & Drawing dies Bending methods - Bending Terminology, VBending, Air bending, bottoming dies, Wiping dies, spring back & its prevention, channel dies. Design Principles - Bend radius, Bend allowance, Spanking, width of die opening, Bending pressure.
Forming Dies- Introduction. Types - solid form dies, pad type form dies, curling dies, Embossing dies, coining dies , Bulging dies, Assembly dies. Drawing Dies -Introduction. Difference between blending, forming & drawing, Metal flow during drawing, Design, Design consideration - Radius of draw die.. Punch radius, Draw clearance, Drawing speed, Calculating blank size, Number of draws, Drawing pressure, Blank holding pressure.

UNIT – IV [9 Hrs.]

Forging Die Design & mould Design Forging Die Design: Introduction, Classification of forging dies, Single impression dies, Multiple Impression dies. Forging design factors - Draft, fillet & corner radius, parting line, shrinkage & die wear, mismatch. finish allowances, webs & ribs Preliminary forging operation-fullering, edging, bending, drawing, flattering, blacking finishing, cutoff. Die design for machine forging - determination of stock - size in closed & open die forging. Tools for flash trimming & hole piercing, materials & manufacture of forging dies .Mould Design: of Simple Blow Moulds for Articles such as bottles, cans Design of simple two plate injection moulds , Mould Materials.

UNIT-V [9 Hrs.]

Design of jigs & fixture:- Introduction, locating & clamping - locating devices, radial or angular location, V - location, bush location, design principle for location purpose, principle for clamping purposes, design principles common to jigs & fixtures. Drilling Jigs :- Design principles, drill bushes, design principles for drill bushings, Types of drilling jigs - Template jig, plate type jig, open type jig, swinging leaf jig, Box type jig, channel type jig. Jig feet. Milling Fixtures: - Essential features of a milling fixtures, milling machine vice, Design rinciples for milling fixtures, Indexing jig & fixtures, Automatic clamping devices.

BOOKS RECOMMENDED:

1. Production Engineering - P.C. Sharma S. Chand Publication
2. Tool Design - Donaldson TMH

ME706: I.C. ENGINE AND GAS TURBINES (Laboratory)

CREDITS: 03

Teaching Scheme
Practical: 3 Hours/Week

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

LIST OF PRACTICALS:

Minimum Eight experiments out of following should be performed.

1. Trial on reciprocating air compressor.
2. Assembling & disassembling the internal combustion engine.
3. Study of carburetors like Solex, Carter, Zenith & S.U. carburetor.
4. Performance testing of single cylinder internal combustion engine (diesel).
5. Trial on Multi cylinder petrol engine.
6. Morse test on Multi-cylinder petrol engine.
7. Heat balance on Multi-cylinder diesel engine.
8. Study of gas turbines
9. Trial on Steam Turbine
10. Performance testing of computerized multi cylinder Diesel Engine.
11. Performance testing of computerized multi cylinder Petrol Engine.

A Journal/Report on practicals 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.

ME707: AUTOMATION IN PRODUCTION (Laboratory)

CREDITS: 03

Teaching Scheme
Practical: 3 Hours/Week

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

LIST OF PRACTICALS:

Minimum Eight experiments out of following should be performed.

1. Performance. Simulation on CNC Lathe.
2. Performance, Simulation of CNC Milling Machine.
3. Manual Part Programming
4. Study of Automated Storage & Retrieval system
5. Study of Robot configurations.
6. Study of Group Technology.
7. Study of Flexible Manufacturing System.
8. Study of Automated Guided Vehicle System
9. Study of Machine Vision System.
10. Study of Computer Aided Process Planning System.

A Journal/Report on practicals 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.

ME708: DESIGN OF MECHANICAL DRIVES (Laboratory)

CREDITS: 03

Teaching Scheme
Practical: 3 Hours/Week

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

LIST OF PRACTICALS:

(A) Minimum Six to Eight designs out of following shall be carried out.

1. Design of Rigid flange coupling drive / Design of Flexible bush pin coupling drive
2. Design of Flat belt drive / Design of V-Belt drive
3. Design of Chain drive
4. Design of Journal Bearing
5. Design of Spur / Helical gear drive
6. Design of Bevel gear drive / Design of Worm gear drive
7. Design of Single / Multiple plate clutch
8. Design of Cone clutch drive / Design of Centrifugal clutch drive
9. Design of Flywheel
10. Design of Wire Rope, Sheave & Drum

(B) Student shall submit one assembly design report along with the drawing for assembly / sub-assembly for any mechanical system consisting of not less than four machine element included in the syllabus.

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

ME709: MINOR PROJECT WORK AND SEMINAR

CREDITS: 02

Teaching Scheme	**Examination Scheme**
Practical: 3 Hours/Week	College Assessment: 50 Marks

It is expected to select project topic as per the guidelines of the project to be undertaken in the 8th semester. Also it is expected to carry out the literature survey for the project work, to finalize the

methodology and schedule of the project. Each student of the concerned project batch shall work on project topic under the Project guide and shall present a seminar using audio-visual aids of about 15 minutes duration. Seminar delivery shall be followed by question-answer session. A report shall be submitted.

Gondwana University, Gadchiroli
Faculty of Science and Technology
B.E. (MECHANICAL ENGINEERING): EIGHTH SEMESTER

ME801: INDUSTRIAL MANAGEMENT (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.]

Principles of Management:
Concepts of management, development of scientific management, Principles of Management.

UNIT – II [9 Hrs.]

Functions of Management:
Functions such as planning, organizing, leading, motivating, communicating, controlling, decision making,

UNIT – III [9 Hrs.]

Personnel Management:
Meaning, functions of personnel management, manpower planning, collective bargaining, wages & salary administration, labor welfare, training, trade unions, Introduction to Industrial Factories Act, Industrial Boils Act, Trade Union Act.

UNIT- IV [9 Hrs.]

Marketing Management:
Definition, Importance & scope, selling & modern concepts of marketing, market research, product launching, sales promotion, pricing, channels of distribution, advertising, market segmentation, marketing mix.

UNIT- V [9 Hrs.]

Financial Management:
Sources of finance, financing organizations, types of capital, elements of costs & allocation of indirect expenses, cost control, budgets & budgetary control, balance sheet, ratio analysis, profit & loss statement.

REFERENCE BOOKS

1. Principles of Management - Koontz & O. Denial
2. Industrial Organization & - T. R. Banga & S. C. Sharma.
3. Elementary Economic Theory – Dewett K.K., Varma J.D.
4. Financial Management - Kuchal
5. Principles of Marketing Management - Philip Kotler & William Stau

ME802: REFRIGERATION & AIR CONDITIONING **(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.]

Vapour Compression Refrigeration Systems :

Refrigeration Principles, Methods, Applications, Reverse Carnot Refrigeration Cycle, Analysis of Single Vapour Compression Refrigeration Cycle, Effect of Sub cooling Superheating, Pressure Drops, Non-isentropic Compression on the Performance of cycle. Actual Cycle.

Multiple Compressor and Multi Evaporator Systems, Cascade Refrigeration Systems (Elementary)

UNIT – II [9 Hrs.]

Refrigerants and System Components :

Nomenclature of refrigerants, refrigerant properties, mixture refrigerants, global warming potential & Ozone depletion potential, Montreal & Kyoto protocol, alternate refrigerants. Compressors –reciprocating and rotary (Introduction), Types of Condensers, Evaporators, Expansion Devices, Refrigeration Controls.

UNIT – III [9 Hrs.]

Vapour Absorption, Air Cycle Refrigeration & Cryogenics :

Vapour Absorption Refrigeration Principles, Aqua - Ammonia, Li-Br2 System and Three Fluid Refrigerator, Air Cycle Refrigeration, Air Craft Refrigeration Systems (Elementary treatment)

Joule – Thomson Coefficient, Inversion Curve, Methods of Liquification, Application of Cryogenics, Thermoelectric Refrigeration, Vortex Tube.

UNIT – IV [9 Hrs.]

Psychrometry and Air conditioning Systems :

Airconditioning Principles and application Psychrometric properties of moist Air , Psychometric Chart, Psychometric processes, Concept of ADP, Bypass Factor, Air Conditioning System, RSHF, GSHF, ESHF.

UNIT – V [9 Hrs.]

Heat Load Calculation & Air Distribution Principles :

Human Comfort, Mechanisms of Body Heat Losses, Factors Affecting Human comfort, Effective Temperature, Comfort Chart, Inside and Outdoor Design Conditions. Data Collection for Heat Load Calculations, Various Components of Heat Load Estimation, Cooling Load and Heating Load Calculations.

Methods of Duct Design, Air Outlets Types & Selection, Air Conditioning Controls.

TEXT BOOKS:

1. A text book of Refrigeration - R. S. Khurmi & J. K. Gupta & Air-conditioning (S. Chand Publication)
2. Refrigeration & Air-conditioning - Dr. P. L. Ballany (Khanna Publication)
3. Refrigeration & Air-conditioning - C. P. Arora (TMH Publication)
4. Refrigeration & Air-conditioning - Manohar Prasad (New Age Int. Pub.)
5. Refrigeration & Air-conditioning - S.V. Domkundwar (Dhanpat Rai & Sons)
6. Refrigeration & Air-conditioning - Dr. R.C.Arora (PHI)

REFERENCE BOOKS :

1. Refrigeration & Air-conditioning - Stocker & Jones(McGraw Hill Pub.)
2. Principles of Refrigeration - Roy J. Dossat (Pearson Edu.)
3. Refrigeration & Air-conditioning - Jordon & Priester (PHT Publication)
4. Thermal Environmental Engineering - James Threlkeld
5. Modern Refrigeration Practice - Guy R. King.
6. Modern Air-conditioning Practice - Norman Harris (McGraw Hill Publications)
7. ASHRAE hand books - McGrawHill Publication
8. Carriers Air-conditioning - McGraw Hill Publication Design data book
9. Air-conditioning Principles & System - E.G. Pita - Pearson An Energy Approach
10. Refrigeration Principles & Systems, – E.G. Pita An Energy Approach
11. Audels Series on Air-conditioning, - D. B. Taraporewala & Sons. Home Refrigeration & Air-conditioning & Commercial Refrigeration
12. Principles of Refrigeration - By Marsh Olivo (CBS Publications)
13. Principles of Air-conditioning - By Paul Lang CBS Publications)
14. Basic Refrigeration & Air-conditioning - By P.N. Ananthnarayanan - TMH Pub.

ME803: COMPUTER AIDED DESIGN (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.]

Definition of CAD, CAD software modules (Operating system, Graphics, Applications, Programming, Communication). Rasterization principle, Rasterization of line, frame buffer, N-bit plane buffers, Simple color frame buffer.

Line generation using Bresenham`s & DDA algorithms for line, circle, ellipse.

Two dimensional geometric and co-ordinate transformations like scaling, translation, rotation, reflection, shear. Concepts of homogeneous representation and concatenated transformations. Inverse transformations. (Enumeration of entity on graph paper)

UNIT – II [9 Hrs.]

Three dimensional geometric and co-ordinate transformation like scaling, translation, rotation & reflection. Reflection about on arbitrary line, Bezier Curve (for Control points).

Algorithms for windowing and clipping.

UNIT – III [9 Hrs.]

Fundamental concept of finite element method: Plane stress and strain, Compatibility condition, Minimum potential energy principle, Displacement function, shape function for linear & quadratic bar element, Stiffness matrix, Force Matrix.

UNIT – IV [9 Hrs.]

Truss problems (Linear shape functions only), Shape functions for CST, Two dimensional problems using constant strain triangle.

UNIT – V [9 Hrs.]

Objectives of optimum design, adequate and optimum design, Johnson’s Method of optimum design, primary design equation, subsidiary design equations and limit equations, optimum design with normal specifications of simple machine elements like: tension bar, transmission shaft, pressure vessel, helical spring etc. Introduction to redundant specifications with suitable examples.

BOOKS RECOMENDED:

1. CAD / CAM , Theory & Practice - Ibrahim Zeid
2. Procedural Elements for Computer Graphics - D. Rogers
3. Introduction to Finite Elements in Engineering - Chandrupatla & A. D. Belegudu
4. Optimization for Engineering Design - Kalyanmoy Deb
5. Johnson R.C., "Mechanical Design Synthesis with Optimisation Applications". Von Nostrand – Reynold Pub.

ME804: PROGRAM ELECTIVE -IV (Theory)

ME8041 : AUTOMOBILE ENGINEERING

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.]

Production Planning and Control :- Definition, objectives of PPC, functions of PPC, types of production. Value analysis and value Engineering. Introduction, steps involved in value analysis. Applications in Manufacturing.

Forecasting :- Need for forecasting, classification of forecasting methods, like judgmental technique, time series analysis, least square method, moving averagemethod, exponential smoothing method.

UNIT-II [9 Hrs.]

Work Study :- Productivity - Concept & objectives of productivity, Types of productivity, factors affecting productivity. Tools & techniques to improve productivity, Measurement of productivity.

Work study & Method study :- Definitions, objectives, steps in method study, process charts, string diagram, motion study, micro motion study, SIMO chart.

UNIT-III [9 Hrs.]

Work Measurement :- Objectives, definition, stop watch study, work sampling, PMTs, MTM & work factor method.

Ergonomics : Objectives, Human factors in engg., Man machine system, Display design, design controls. Principles of motion economy, work place design.

UNIT-IV [9 Hrs.]

Plant Layout :- Objectives, principle, Types of plant layout, Material handling, objectives, principles and selection of material handling equipments, Unit load concept, material flow pattern.

UNIT-V [9 Hrs.]

Maintenance :- Objectives, Types of maintenance, preventive, predictive, break down maintenance. Reliability and maintainability analysis. Failure data analysis, reliability, MTBT, MTTR, Batch tub curve, series, parallel and stand by system.

BOOKS RECOMMENDED:

1. Work Study - By ILO
2. Motion & Time Study - By Bames
3. Ergonomics - By Murell
4. Production Planning & Control - By Jain & Agrawal
5. Industrial Engineering & - By Martand & Telsang Project Management
6. Reliability Engineering ` - By Balguruswami
7. Plant Layout & Material Handling - By James Apple.

ME804 : PROGRAM ELECTIVE III

ME8042: MACHINE TOOL DESIGN (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 [9 Hrs.]

DESIGN OF MACHINE TOOL DRIVES

1) Selection of Electric Motor

2) Stepped Regulation of Speed, Laws of Stepped Regulation, Why Geometric Progression is used against Arithmetic, Harmonic & Logarithmic despite shortcomings, Relation between Range ratio, Geometric Progression Ratio and No. of Speed Steps

3) Design of Stepped Drives: Break up of Speed Steps, Structural Formulae, Structural Diagram, Selection of Best Structural Diagram, Ray Diagram, Speed Chart, General recommendations for Developing the Gearing Diagram, Determining the number of teeth of Gears

a) Speed Gear box: Limiting Transmission Ratio of Speed Gear Box, Design Case Study of Speed Gear Box for Lathe, Classification of Speed Gear Boxes
b) Feed Gear box: Limiting Transmission Ratio of Feed Gear Box, Design Case Study of Feed Gear Box (with Gear Cone & Sliding Key) for Drilling Machine, Classification of Feed Gear Boxes, Study of Application of Norton's & Meander's Mechanism for Thread Cutting

4) Step less Drives : Step less Regulation of Speed & Feed Rates through Hydraulic, Electric & Mechanical means, Positively Infinitely Variable Drive, Case Study of CNC Lathe with Electronic Controller for Speed & Feed Step less Regulation

UNIT – II

[9 Hrs.]

DESIGN OF MACHINE TOOL STRUCTURE

Function & Requirement of Machine Tool Structure, Design Criteria from Strength & Stiffness considerations, Concept of Unit Rigidity, Unit Strength under Tension, Unit Strength under Torsion & Unit Strength under Bending for Material of Machine Tool Structures, Compare Steel & Cast Iron on the basis of Material Properties, Manufacturing Problems and Economy, Role of Static & Dynamic Stiffness in the design of elements of machine tools, Profiles of Machine Tool Structures, Factors affecting stiffness of machine tool structures & methods of improving it, Basic Design procedure of machine tool structures. Design Case Studies of a) Bed of Lathe, b) Column & Base of Milling Machine, c) Housing of Speed Gear box.

UNIT – III [9 Hrs.]

DESIGN OF GUIDEWAYS Function & Types of Guideways, Types of Slideways & Antifriction Ways,

Functional features of Slideways, its Shapes & Materials, Methods of adjusting Clearance, Design Criteria (Wear Resistance & Stiffness) and Calculations for Slideways operating under semi liquid friction condition, 'Stick Slip' phenomena affects accuracy of setting & working motions.

Comparison of Design & stiffness of Hydrodynamic, Hydrostatic & Aerostatic Slideways, Design of Antifriction Guideway, Concept of Combination Guideways

UNIT – IV **[9 Hrs.]**

DESIGN OF POWER SCREWS

Design of Sliding friction Power Screw for Wear Resistance, Strength, Stiffness, & Buckling Stability.

Design of Rolling friction Power Screw for Strength under static loading, Strength under cyclic loading, & Stiffness

UNIT – IV **[9 Hrs.]**

DESIGN OF SPINDLE AND SPINDLE SUPPORTS

Function & Requirements of Spindle Units, their Materials,

Effect of Machine Tool Compliance on Machining accuracy Design of Spindle for Bending Stiffness : Deflection of Spindle Axis due to a)Bending, b) - due to Compliance of Spindle Supports, c) - due to Compliance of the Tapered Joint

Optimum Spacing between Spindle Supports Permissible Deflection & Design for stiffness: Additional Check for Strength like Additional Supports, Location of Bearings and Drive elements, Balancing

Requirements of Spindle Supports Features of Anti-friction Bearings,Load bearing abilities of Ball & Roller Bearings. Parameters which asses the viability of combination of roller & Ball & Roller Bearings in Spindle Units. Preloading of Anti Friction Bearing & its method

Design of Sliding Bearings: Sleeve, Hydrodynamic Journal, Hydrostatic Journal, Air-Lubricated (Aerodynamic, Aerostatic)

TEXT BOOKS:

1. N. K. Mehta, "Machine Tool Design", Tata McGraw Hill, ISBN 0-07-451775-9.

2. D. K Pal, S. K. Basu, “Design of Machine Tool”, 4th Edition. Oxford IBH 2005, ISBN 81-204-0968

REFERENCE BOOKS

1. Bhattacharya and S. G. Sen., “Principles of Machine Tool”, New central book agency Calcutta, ISBN 81-7381-1555.
2. N. S. Acherkan, “Machine Tool”, Vol. I, II, III and IV, MIR publications.
3. F. Koenigsberger, “Design Principles of Metal Cutting Machine Tools”, The Macmillan Company New York 1964. 4. H.C.Town,’The Design and Construction of Machine Tools’.

ME804 : PROGRAM ELECTIVE III

ME8043: SYNTHESIS OF MECHANISMS (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 [12 Hrs.]

Introduction to kinematics, Types of Mechanism, Kinematics synthesis, Science of relative motion, Tasks of kinematics synthesis with practical applications, Degree of freedom, Class-I, Class-II chain, Harding`s notation, Grashof criterion, Grubler`s criterion.

Introduction to position generation problem, concept of pole, two & three position generation synthesis, pole triangle. Relationship between moving & fixed pivots. Four position generation, opposite pole quadrilateral, center point & circle point curve, Burmester`s point. Matrix method for position generation problem, rotation matrix, displacement matrix.

UNIT – II [12 Hrs.]

Introduction to function generation problem, co-ordination of input-output link motion, relative pole technique, inversion technique, overlay technique, graphical synthesis of quick return mechanisms for optimum transmission angle. Types of errors, accuracy points, cheby sher`s spacing, frudenstein`s equation

UNIT – III [12 Hrs.]

Introduction to path generation problem, synthesis for path generation with and without prescribed timing using graphical method. Coupler curves, cognate linkages. Robert`s law of cognate linkages. Complex number method for path generation problem, 3 precision points.

UNIT – IV [12 Hrs.]

Synthesis for infinitesimally separate position, concept of polode and centrod, Euler`s savery equation, inflection circle, Bobbilier and Hartman`s construction.
Optimal synthesis of planer mechanisms, Powell`s search method, least square method, penalty function. Introduction to spatial mechanisms, D-H notations, introduction to kinematic analysis of robot arm.

BOOKS RECOMMENDED:

1. Synthesis of Mechanism - D. C.Tao
2. Synthesis of Mechanism - Hall

ME805 : PROGRAM ELECTIVE III

ME8051: UNCONVENTIONAL ENERGY SYSTEM (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 [12 Hrs.]

Fundamentals of stress & strain, Stress & strain components, Stress strain relationship Elastic constants, Plane stress, Plane strain, Differential equation of equilibrium, Compatibility quations, Boundary conditions, Saint Venant`s principle, Airy`s stress function. (Only introduction is expected)

Fundamental concepts of FEM - Historical background, Scope of FEM in engineering applications, Principles of minimum potential energy, Concept of virtual work, Raleigh- Ritz Method, FEM analysis procedure. Mathematical understanding required for FEM, Matrix algebra & operations, Eigen values & Eigen vectors, Methods for solution of simultaneous equations, like Gauss elimination, Matrix decomposition method. Concept of discritization of body into elements, degrees of freedom, bandwidth, Basic types of 2-D & 3-D elements, Displacement models, Convergence requirements, shape functions. Commercial FE Softwares.

UNIT – II [12 Hrs.]

Finite element modeling & analysis using Bar & Beam elements - Stiffness matrix, Assembly, Boundary conditions, Load vector, Temperature effects. Two dimensional plane truss - Local & Global co-ordinate system, element stiffness matrix, assembly, boundary conditions, load vector, force & stress calculations.

UNIT – III [12 Hrs.]

Two dimensional problems using CST & LST - Formulation of CST & LST elements, Elemental stiffness matrix, assembly, boundary conditions, load vector, stress calculations, temperature effect. Axi-symmetric solids subjected to axi-symmetric loading - Axi-symmetric formulation using CST ring element, stiffness matrix, boundary conditions, load vector, calculation of stresses.

UNIT – IV [12 Hrs.]

Introduction to Isoparametric & Higher order elements. Introduction to Numerical Integration. Introduction to dynamic analysis, formulation of mass matrix for one dimensional bar element, free vibration analysis using one dimensional bar element. Torsion of prismatic bars using triangular elements. Steady state one dimensional & two dimensional heat conduction problems using I-D & triangular elements respectively. Programming aspects of FEM - Algorithms for, reading Finite Element modeling data, formation of elemental stiffness matrix, formation of elemental load vector, assembly of individual elemental stiffness matrix into global stiffness matrix, assembly of individual elemental load vector into global load vector, application of boundary conditions, solution of equations, determination of stresses & strains. Pre & Post processing in FEA

BOOKS RECOMMENDED:

1. Introduction to Finite Elements in Engineering - Chandrupatla & Belegundu
2. Theory of Elasticity - S. P. Timoshenko
3. Concept and Applications of Finite Element Analysis - R. D. Cook.
4. The Finite Element Method - A Basic Introduction to Engineers. D. W. Griffiths, D.A. Nethercot, Granada Publishing.

ME805 : PROGRAM ELECTIVE III

ME8052: STRESS ANALYSIS (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 **[12Hrs.]**

Two Dimensional Problems in Cartesian Coordinate system – Fundamentals of stress & strain, stress-strain relationship, Elastic constant, Plane stress, Plane strain, differential equation of equilibrium , Boundary conditions, Saint Venant`s principle, Compatibility equation, Airy's stress function, Stress analysis of cantilever subjected to concentrated load, Stress Analysis of simply supported beam subjected to Uniformly Distributed Load..

UNIT-II [12 Hrs.]

Two dimensional problems in polar coordinate systems – General equations of equilibrium in polar coordinate, compatibility equation, stress distribution about symmetric axis, stress analysis of cylinder subjected to internal & external pressure, Pure bending of curved beams, effect of hole on the stress distribution in plates, Stress analysis of rotating circular disk.

UNIT – III [12 Hrs.]

Two Dimensional Photo elasticity – Introduction to basic optics related to photo elasticity, stress optic law, plane & circular polariscope arrangements, effect of stressed model in plane & circular polariscope, Isoclinic & Isochromatics, stress trajectories, calibration of photo elastic material (determination of fringe constant), various photo elastic materials & their properties. Casting of photo elastic models, Tardy`s compensation technique, Separation techniques like shear difference, oblique incidence & electrical analogy.

UNIT – IV [12 Hrs.]

Introduction to 3D photo elasticity – Phenomenon of Stress freezing, Method of stress freezing, slicing techniques, determination of material fringe constant at critical temperature. Scaling Model – Prototype relations.

Introduction to Reflection polariscope, fringe sharpening & fringe multiplication.
Strain gage technique for stress & strain analysis – Introduction to electrical resistant strain gage, gage factor, bridge circuit, bridge balance, output voltage of Wheatstone bridge, temperature compensation, various bridge configurations.

Determination of principle strains & stresses using strain rosettes.

Introduction to Strain measurement on rotating components , Static & Dynamic Strain measurement, Introduction to semiconductor gages, high temperture strain gages & self – temperature compensated gages,

Introduction to commercial strain indicators. Brittle coating method for stress & strain analysis.

BOOKS RECOMMENDED:

1. Theory of Elasticity - S.P. Timoshenko
2. Experimental Stress Analysis - Dalley S.W., Riley W.F.
3. Experimental Stress Analysis - T.K.Ray
4. Experimental Stress Analysis - L.S. Srinath

ME805 : PROGRAM ELECTIVE III

ME8053: PROJECT EVALUATION AND MANAGEMENT (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.]

Need analysis, market survey, characteristics of market , sample survey, demand forecasting, secondary data, accuracy, confidence level, uncertainty.

UNIT-II [9 Hrs.]

Technical feasibility: Process selection, Level of automation, Plant capacity, Acquiring technology, appropriate technology plant location, Equipment selection and procurement, Govt. policies.

UNIT – III [9 Hrs.]

Economic Feasibility: Cost of project, working capital analysis, fixed cost, means of finance, estimation of sales and production price analysis, Break even point, projected cash flow statements, projected balance sheet, profit and loss statement, projected cash flow, rate of return, discounted payback period, cost benefit analysis, return after taxes,.

UNIT – IV [9 Hrs.]

Project Report: Preparation of Project Report, risk analysis, sensitivity analysis, methods of raising capital.

UNIT – V [9 Hrs.]

Project Review: Initial review, performance analysis, ratio analysis, sickness, project revival, environmental and social aspects.

BOOKS RECOMMENDED:

1. Projects, Prasanna Chandra, Tata McGraw Hill Publishing Company Ltd.
2. Projects, P.K.Joy, Macmillon
3. Engineering Economy, H.G. Thuesen, W.J.Fabricky, G.J.Thuersen, Printee Hall of India Pvt. Ltd.

ME806: REFRIGERATION & AIR CONDITIONING (Laboratory)

CREDITS: 02

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

LIST OF PRACTICALS:

Minimum Eight experiments out of following should be performed.

1. To study / demonstration of tools and equipments used by a Refrigeration / A/C mechanic.
2. To study / demonstration of a Window Air-conditioner / Split A/C
3. To study the evacuation, dehydration and charging of a refrigeration system.
4. To study the Refrigeration and Air-conditioning controls.
5. To determine COP of a Vapour Compression Refrigeration System.

6. To determine EER of a Air-conditioning system and to determine capacity and bypass - factor of the coil.
7. To study the COP of a Vapour Absorption Refrigerator.
8. To determine the cooling efficiency of a Desert Cooler
9. To determine the COP of a Thermoelectric Cooler / Vertex tube etc.
10. Technical report on Industrial visit to Refrigeration and Air-conditioning application.

A Journal/Report on practicals 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.

ME807: COMPUTER AIDED DESIGN **(Laboratory)**

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 following shall be performed

1. Development of application program for DDA.
2. Development of application program for Bresenham's Line Generation Algorithm.
3. Development of application program for Bresenham's Circle Generation Algorithm
4. Development of application program for Bresenham's Elli ps Generation Algorithm
5. Development of application program for Scaling, Translation and Rotation

6. Development of application program for standard reflection
7. Development of application program for clipping
8. Solution of 1D FE problems (Linear Bar) using commercial /freeware / self developed application programs.
9. Solution of 1D FE problems (Quadratic Bar) using commercial / freeware / self developed application programs
10. Solution of Truss problems using commercial / freeware /self developed application programs
11. Solution of 2D FE problems based on CST using commercial /freeware / self developed application programs

A Journal/Report on practicals 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.

ME808: PROJECT

CREDITS: 06

Teaching Scheme	**Examination Scheme**
Practical: 6Hours/Week	University Assessment: 75 Marks
	College Assessment: 75 Marks

The project work may conform to anyone of the below stated types of broad based work.

1. Detailed design of some mechanical system. This may comprise of machines, Thermal / Hydraulic / Pneumatic system etc.

2. Detailed experimental / Practical verification of some mechanical engineering systems.

3. Detailed study of some industry/s manufacturing some product/s. This study may comprise of various aspects such as plant layout, mechanical handling systems, assembly shop, quality control system, maintenance system, various service systems, design, development and planning functions, techno-economic studies etc.

Group of students shall be considered for the project work and shall submit the report and give the presentation.