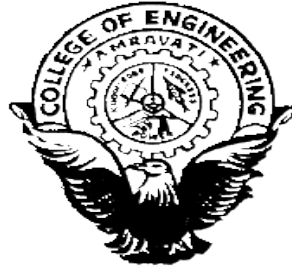


Govt. College of Engineering Amravati

(An Autonomous Institute of Govt. of Maharashtra)



Curriculum
for
VII and VIII Semesters

of
B. Tech. in Mechanical Engineering

Department of Mechanical Engineering

(2009-10)

**TEACHING AND EVALUATION SCHEME OF FOUR-YEAR B.Tech.
(MECHANICAL)**

Semester: - III												
Course Code	Name of the Course	Teaching Scheme (Hrs./week)				Evaluation scheme						
		L	T	P	Total Hours/Week	Theory				Practical		Credits
						Sessional		TA	ESE	Int.	Ext.	
						CT1	CT2					
ME 301	Mechanics of Materials	04	-	-	04	15	15	10	60	-	-	04
ME 302	Material science and Engineering	04	-	-	04	15	15	10	60	-	-	04
ME 303	Fluid Mechanics	04	-	-	04	15	15	10	60	-	-	04
ME 304	Engineering Thermodynamics	04	01	-	05	15	15	10	60	-	-	05
ME 305	Electrical Drives and Control	04	-	-	04	15	15	10	60	-	-	04
ME 306	General Proficiency-I	-	-	02	02	-	-	-	-	50	-	02
ME 307	Mechanics of Materials Lab.	-	-	02	02	-	-	-	-	25	25	01
ME 308	Material science Lab.	-	-	02	02	-	-	-	-	50	-	01
ME 309	Fluid Mechanics Lab.	-	-	02	02	-	-	-	-	50	-	01
ME 310	Electrical Drives & Control Lab.	-	-	02	02	-	-	-	-	25	25	01
		20	01	10	31	75	75	50	300	200	50	27

Semester: - IV												
Course Code	Name of the Course	Teaching Scheme (Hrs./week)				Evaluation scheme						
		L	T	P	Total Hours/Week	Theory				Practical		Credits
						Sessional		TA	ESE	Int.	Ext.	
						CT1	CT2					
ME 401	Kinematics of Machines	04	-	-	04	15	15	10	60	-	-	04
ME 402	Engineering Mathematics-III	04	01	-	05	15	15	10	60	-	-	05
ME 403	Thermal Engineering	04	-	-	04	15	15	10	60	-	-	04
ME 404	Manufacturing Processes	04	-	-	04	15	15	10	60	-	-	04
ME 405	Machine Drawing	04	-	-	04	15	15	10	60	-	-	04
ME 406	General Proficiency-II	-	-	02	02	-	-	-	-	50	-	02
ME 407	Kinematics of Machines Lab.	-	-	02	02	-	-	-	-	50	-	01
ME 408	Manufacturing Processes Lab.	-	-	04	04	-	-	-	-	25	25	02
ME 409	Computer Aided Drafting Lab.	-	-	02	02	-	-	-	-	25	25	01
		20	01	10	31	75	75	50	300	150	50	27

Semester: - V												
Course Code	Name of the Course	Teaching Scheme (Hrs./week)				Evaluation scheme						Credits
		L	T	P	Total Hours/Week	Theory				Practical		
						Sessional		TA	ESE	Int.	Ext.	
						CT1	CT2					
ME 501	Machine Design – I	04	-	-	04	15	15	10	60	-	-	04
ME 502	Dynamics of Machines	04	-	-	04	15	15	10	60	-	-	04
ME 503	Heat Transfer	04	-	-	04	15	15	10	60	-	-	04
ME 504	Measurement System	03	-	-	03	15	15	10	60	-	-	03
ME 505	Machining Processes	04	-	-	04	15	15	10	60	-	-	04
ME 506	Industrial Engineering	03	-	-	03	15	15	10	60	-	-	03
ME 507	Machine Design – I Lab.	-	-	02	02	-	-	-	-	25	-	01
ME 508	Dynamics of Machines Lab.	-	-	02	02	-	-	-	-	25	25	01
ME 509	Heat Transfer Lab.	-	-	02	02	-	-	-	-	25	25	01
ME 510	Measurement System Lab.	-	-	02	02	-	-	-	-	25	-	01
ME 511	Machining Processes Lab.			02	02	-	-	-	-	25	25	01
		22	-	10	32	90	90	60	360	125	75	27

Semester: - VI												
Course Code	Name of the Course	Teaching Scheme (Hrs./week)				Evaluation scheme						Credits
		L	T	P	Total Hours/Week	Theory				Practical		
						Sessional		TA	ESE	Int.	Ext.	
						CT1	CT2					
ME 601	Hydraulic Machines	04	-	-	04	15	15	10	60	-	-	04
ME 602	Machine Design-II	04	-	-	04	15	15	10	60	-	-	04
ME 603	Metrology and Quality Control	04	-	-	04	15	15	10	60	-	-	04
ME 604	Control Systems Engineering	04	01	-	05	15	15	10	60	-	-	05
ME 605	Energy Conversion	04	-	-	04	15	15	10	60	-	-	04
ME 606	Hydraulic Machines Lab.	-	-	02	02	-	-	-	-	25	25	01
ME 607	Machine Design-II Lab.	-	-	02	02	-	-	-	-	25	25	01
ME 608	Metrology and Quality Control Lab.	-	-	02	02	-	-	-	-	25	25	01
ME 609	Energy Conversion Lab.	-	-	02	02	-	-	-	-	25	25	01
ME 610	Minor Project	-		02	02	-	-	-	-	50	-	02
		20	01	10	31	75	75	50	300	150	100	27

Semester: - VII												
Course Code	Name of the Course	Teaching Scheme (Hrs./week)				Evaluation scheme						
		L	T	P	Total Hours/Week	Theory			Practical		Credits	
						Sessional		TA	ESE	Int.		Ext.
CT1	CT2											
ME 701	Industrial Management and costing	04	-	-	04	15	15	10	60	-	-	04
ME 702	Mechatronics	04	-	-	04	15	15	10	60	-	-	04
ME703	Automobile Engineering	04	-	-	04	15	15	10	60	-	-	04
ME704	Computer Aided Design	03	-	-	03	15	15	10	60	-	-	03
ME705	Elective-I	04	-	-	04	15	15	10	60	-	-	04
ME 706	Mechatronics Lab.	-	-	02	02	-	-	-	-	25	25	01
ME707	Computer Aided Design Lab.	-	-	04	04	-	-	-	-	25	25	02
ME708	Elective-I Lab.	-	-	02	02	-	-	-	-	25	25	01
ME709	Seminar and Project stage-I	-	-	02	02	-	-	-	-	100	-	04
		19	-	10	29	75	75	50	300	175	75	27

Semester: - VIII												
Course Code	Name of the Course	Teaching Scheme (Hrs./week)				Evaluation scheme						
		L	T	P	Total Hours/Week	Theory			Practical		Credits	
						Sessional		TA	ESE	Int.		Ext.
CT1	CT2											
ME801	Computer Integrated Manufacturing	04	-	-	04	15	15	10	60	-	-	04
ME802	Operation Research Technique	04	01	-	05	15	15	10	60	-	-	05
ME803	Elective-II	04	-	-	04	15	15	10	60	-	-	04
ME804	Elective-III	04	-	-	04	15	15	10	60	-	-	04
ME805	Computer Integrated Manufacturing Lab.	-	-	02	02	-	-	-	-	25	25	01
ME806	Elective-III Lab.	-	-	02	02	-	-	-	-	25	25	01
ME807	Project	-	-	06	06	-	-	-	-	100	100	08
		16	01	10	27	60	60	40	240	150	150	27

The ESE duration for all courses shall be 2hrs 30 min except courses ME405, ME501 and ME602 for which the ESE duration will be 3hrs.

Sr. No.	ME 705 ELECTIVE-I	ME803 ELECTIVE-II	ME804 ELECTIVE-III
1	New and Renewable Energy Sources	Internal Combustion Engines	Refrigeration & Air Conditioning
2	Tool Engineering	Production planning and control	Machine Tool Design
3	Experimental Stress Analysis	Mechanical Vibrations	Finite Element Methods
4	Supply Chain Management	Production Management	Entrepreneurship Development and Project Management

Equivalence of Courses Final Year Mechanical Engineering

Courses in Autonomy				Courses in University pattern		
Sr. No.	Sem.	Course Code	Course Name	Sem.	Course Code	Course Name
1	VII	ME 701	Industrial Management and costing	VII	7SMP3	Industrial Management and costing
2	VII	ME 702	Mechatronics	VII	7SM5	Mechatronics
3	VII	ME703	Automobile Engineering	VIII	8SM3	Automobile Engineering
4	VII	ME704	Computer Aided Design	V	5SM1	Computer Software Applications-I
			Elective-I			
5	VII	ME705	New and Renewable Energy Sources	VIII	7SM5	Non-Conventional Energy System
6	VII	ME705	Tool Engineering	VII	7SM5	Tool Engineering
7	VII	ME705	Experimental Stress Analysis			No Equivalence
8	VII	ME705	Supply Chain Management			No Equivalence
9	VII	ME 706	Mechatronics Lab.	VII	7SM5	Mechatronics Practical
10	VII	ME707	Computer Aided Design Lab.	V	5SM1	Computer Software Applications-I Practical
			Elective-I Lab.			
11	VII	ME708	New and Renewable Energy Sources Lab.	VIII	7SM5	Non-Conventional Energy System Practical
12	VII	ME708	Tool Engineering Lab.	VII	7SM5	Tool Engineering
13	VII	ME708	Experimental Stress Analysis Lab.			No Equivalence
14	VII	ME708	Supply Chain Management Lab.			No Equivalence
15	VII	ME709	Seminar and Project stage-I	VIII	8SM5	Project and Seminar
1	VIII	ME801	Computer Integrated Manufacturing	VII	7SM4	Automation Engineering
2	VIII	ME802	Operations Research Technique	VIII	8SMP4	Operations Research Techniques
			Elective-II			
3	VIII	ME803	Internal Combustion Engines	VIII	8SM1	Internal Combustion Engines
4	VIII	ME803	Production planning and control	VIII	8SM1	Production planning and control
5	VIII	ME803	Mechanical Vibrations			No Equivalence
6	VIII	ME803	Production Management			No Equivalence
			Elective-III			
7	VIII	ME804	Refrigeration & Air Conditioning	VIII	8SM2	Refrigeration & Air Conditioning
8	VIII	ME804	Machine Tool Design	VIII	8SM2	Machine Tool Design
9	VIII	ME804	Finite Element Methods	VIII	8SM2	Finite Element Methods
10	VIII	ME804	Entrepreneurship Development and Project Management			No Equivalence
11	VIII	ME805	Computer Integrated Manufacturing Lab.	VII	7SM4	Automation Engineering Lab.
			Elective-III Lab.			
12	VIII	ME806	Refrigeration & Air Conditioning Lab.	VII	8SM2	Refrigeration & Air Conditioning Practical
13	VIII	ME806	Machine Tool Design Lab.	VIII	8SM2	Machine Tool Design Practical
14	VIII	ME806	Finite Element Methods Lab.	VIII	8SM2	Finite Element Methods Practical
15	VIII	ME806	Entrepreneurship Development and Project Management Lab.			No Equivalence
16	VIII	ME807	Project	VIII	8SM5	Project and Seminar

ME 701 INDUSTRIAL MANAGEMENT AND COSTING

Teaching Scheme	: 04 L	Total = 04	Credit	: 04
Evaluation Scheme	: 15 CT1 + 15 CT2 + 10 TA + 60 ESE		Total Marks:	100
Duration of ESE	: 2 hrs. 30 min.			

Introduction:

Concept, principles and techniques of management, evolution of management thoughts, scientific management, modern management, principles of management, management and administration, functions of management, various areas of management. Organization structure and relationship.

Marketing Management:

Concept, different types of market research, various marketing strategies, types of markets, new product development, product life cycle, sales organization structure and responsibilities, advertising media, sales performance objectives, services marketing. Introduction to International marketing decisions, practices and problems of international marketing, import export procedures

Financial Management:

Need for finance, elements of cost, waste and scrap, financial ratios, profit and loss statements, balance sheet, working and fixed capital, different methods of depreciation

Personnel Management:

Functions of Personnel Management, human resources planning, recruitment and training, workers participation in management, collective bargaining, job evaluation and performance appraisal, industrial disputes, industrial safety, labor legislation

Materials Management:

Classes of materials, purchasing methods and procedure, inventory control, stores, EOQ, ABC analysis.

Estimating and Costing:

Objectives of estimating and costing, elements of cost, estimating procedure for weights, material costs, machining time, fabrication cost, foundry cost

Text Books:

1. Essentials of Management, Koontz, Harold, McGraw-Hill Education (India) I, New Delhi, 2004
2. Purchasing and Materials Management, Gopalkrishnan, McGraw-Hill Education (India) I, New Delhi, 2001.

Reference Books:

1. Inventory Management Chandra Bose, PHI, New Dehli 2005.

ME 702 MECHATRONICS

Teaching Scheme	: 04 L	Total = 04	Credit	: 04
Evaluation Scheme	: 15 CT1 + 15CT2 + 10TA + 60ESE		Total Marks	: 100
Duration of ESE:	2 hrs. 30 min.			

Introduction: Scope and applications of Mechatronics

Multiple Cylinder Engine: General considerations, Engine balance, Vibration, Firing order, Road performance curves, Engine maintenance and trouble shooting, Electronic engine Management

Fuel System: Types of Inlet manifold, Fuel pumps, fuel injectors for diesel engine, fuel filters, fuel gauges, Air filters, Basic principles & working of MPFI and CRDI, Auto emission and its control

Cooling system: Purpose, Types of cooling system, Water jacket, cooling water additives, Liquid water pump and radiators, By pass recirculation system, Closed System, Temperature indicator, Anti-freeze mixtures, Troubles and remedies of cooling system, Heating and air conditioning

Ignition System: Battery: construction, Types, Rating, Battery coil and magneto ignition system, Ignition timing and its effect on engine performance, Ignition advance mechanisms, Electronic ignition system. Intelligent ignition system in two and four wheelers

Electrical Setup: Battery Capacity, Standard capacity rating, Battery life, battery testing, recharging of battery, starter motor drive - Bendix drive, Over running clutch drive, Solenoid switch

Transmission System: Clutch, Construction, Operation, Types, Requirements, Maintenance and trouble shooting, Gear Boxes, Sliding mesh, Constant mesh and synchromesh gear box, Double synchromesh type, over drives, Automatic transmission system, Trouble shooting and remedies, Hotchkiss drive, Torque tube drive, Differential, Propeller shaft and universal joint rear axle assembly, steering and front axle, Function, Types of steering, Linkages, Steering gears, Steering gear ratio, Power steering

Wheels and Tyres: Alignment, Balancing, Camber, Castor, King pin inclination, Toe-in & Toe-out effects, Types of tyres, Tyre thread maintenance

Brakes: Mechanical, hydraulic brakes, disc brakes, Air brakes, and Vacuum brakes, Fault finding and maintenance of brakes, antiskid brake control system

Suspension System: Introduction, Need of suspension, Types, Maintenance and Trouble shooting

Text Book:

1. Automobile Engineering, K. K. Jain and R. B. Asthana, 2nd Edition, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2005
2. Automotive Mechanics, Willam H. Crouse, Donald L. Anglin, 1st Edition, Tata McGraw Hill Publishing Co. New York, 2002

Reference Books:

1. Automotive Mechanics, Joseph Heitner, 2nd Edition, CBS Publisher, New Delhi, 2004
2. Automobile Engineering, G. B. S. Narang, 2nd Edition, Khanna Publication, New Delhi, 2006

ME 704 COMPUTER AIDED DESIGN

Teaching Scheme	: 03 L	Total = 03	Credit	: 03
Evaluation Scheme	: 15 CT1 + 15 CT2 + 10 TA + 60 ESE	Total Marks	: 100	
Duration of ESE	: 2 hrs. 30 min.			

Fundamentals of CAD: Definition of CAD, implementation CAD, Design Process, Application of computers for design, Benefits of CAD.

Hardware in CAD: Design Workstation, Graphics terminal, Operator Input Devices, Plotters and other output devices, Central Processing Unit, Secondary Storage Devices

Computer Graphics Software: Ground rules for Graphics Software, The Software Configuration of a Graphics System, and Functions of a Graphics System, Constructing the Geometry, Transformation, Database Structure and Contents.

Automated Drafting: Configuration of typical drafting packages, layers, entities, editing, display commands, hatching, dimensioning, Text plotting, Script files, DXF and IGES files, blocks, Parametric programming, Customization of drafting packages and graphic standards.

Wire Frame, Surface and Solid Modeling: Modeling of curves and surfaces, Techniques of splining, cubic splines, Bezier splines Schemes for representing solid objects, Construction, Solid geometry and boundary representation, Feature of solid modeling packages.

Finite Element Methods: Introduction, Importance, and Applications of FEA, Fundamental concepts, Discrimination, Numbering, Stress strain equilibrium, Stress – Strain relationship, Boundary and support conditions, and general steps of finite element method.

1D/2D Problems: Coordinate and Linear Shape Functions, The potential energy approach, The Galerkin approach, The global stiffness matrix, Boundary conditions , Penalty and Elimination Methods, Quadratic Shape Functions, Constant Strain Triangle CST, Isoperimetric representations, Development of Truss equations, Introduction to FEA packages.

Text Books:

1. Computer Aided Design and Manufacturing , Groover,M.P., Prentice-Hall of India , 5th Edition ,2005
2. CAD/CAM Theory and Practice, Zeid Ibrahim, Tata McGraw Hill,4th edition,2001.
3. An Introduction to the Finite element Methods, Reddy, J.N., Tata McGraw Hill, 3rd Edition, 2005

Reference Books:

1. Automation Production Systems and Computer Integrated Manufacturing, Groover, M. P., Prentice-Hall of India, 2nd Edition.

2. CNC Machines , Pabla, B.S., New Age International Publications, 1st Edition , Reprint 2005.
3. CAD/CAM Principals and Applications, Rao, P.N. Tata McGraw Hill, 2002.

ME705 ELECTIVE - I

A) NEW AND RENEWABLE ENERGY SOURCES

Teaching Scheme	: 04 L	Total	= 04	Credit	: 04
Evaluation Scheme	: 15 CT1 + 15 CT2 + 10 TA + 60 ESE	Total Marks	:100		
Duration of ESE	: 2 hrs. 30 min.				

Introduction:

The Energy Scenario – Global and National Productions and Reserves of Commercial Energy Sources, Energy Alternatives

Solar Energy:

Solar Energy Option – devices for Thermal Energy Collection and Storage. Solar Radiation – Solar Radiation outside the Earth’s Atmosphere & at the Earth’s Surface, Measuring Instruments for Solar Radiation and Sunshine, Solar Radiation Data, Solar Radiation Geometry, Empirical Equations for Predicting the Availability of Solar Radiation, Solar Radiation on Tilted Surfaces. Radiation Characteristics of Opaque Materials, Radiation Transmission through Glazing: Absorbed Radiation.

Liquid Flat Plate Collectors: Performance Analysis, Overall Loss Coefficient and Heat Transfer Correlations, Collector Heat efficiency and Heat Removal Factor, Concentrating Collectors – Cylindrical and Compound Parabolic Collector, Constraints in utilization and feasibility aspects, economic considerations

Solar Energy Utilisation:

Thermal Energy Storage, Solar Pond. Applications of Solar Energy – Solar Air Heaters, Water Heaters, Solar Cooling, Drying and Refrigeration. Constraints in utilization and feasibility aspects

Direct Energy Conversion:

Direct Energy Conversion Processes for Thermoelectric, Magneto Hydro Dynamic (MHD), Wave Energy, Photovoltaic and Fuel Cells. Constraints in utilization and feasibility aspects

Wind and Ocean Energy:

Wind, Tidal, Ocean, Geothermal energy Sources – Concept, Conversion Process Details, Analysis and Design, Present Status of Development, Constraints in utilization and feasibility aspects, Economic considerations

Bio Mass Energy Resources:

Bio energy Conversion Processes – Biomass Energy Source, Biological Conversion to Gaseous and Liquid Fuels, Gasifiers, Constraints in utilization and feasibility aspects

Text Books:

1. Solar Energy: Principles of Thermal Collection and Storage, Sukhatme & Nayak, 3rd Edition, Tata McGraw-Hill Publications, 2005.
2. Power Plant Technology, M.M. El-Wakil, 1st Edition, McGraw-Hill Publications, 2004

Reference Books:

1. Solar Engineering of Thermal Processes, John A. Duffie, William A. Beckman, 3rd Edition, John Wiley & Sons Publications, 2006.
2. Renewable Energy Conversion, Transmission, and Storage , Brent Sorensen, Elsevier Publications, 2005.

ME705 ELECTIVE - I
B) TOOL ENGINEERING

Teaching Scheme	: 04 L	Total = 04	Credits	: 04
Evaluation Scheme	: 15 CT1 + 15 CT2 + 10 TA + 60 ESE		Total Marks	:100
Duration of ESE	: 2 hrs. 30 min.			

Introduction: Introduction to metal cutting, merchant cutting force circle, energy Consideration in metal cutting, tool wear mechanism, its parameters, tool life estimation, Taylor's equation, mach- inability criteria, Effect of process parameter on tool life, thermal aspect of machining operations, cutting fluid, tool material properties and type, Newly invented tool material and their type

Cutting Tools:

Single point cutting tool: Geometry, classification, nomenclature, shank design, tool selection for an appropriate machining.

Twist drill and Reamers: Geometry, types, cutting force, power, and torque

Broach: Introduction and geometry of broach, designing of broach, cutting force and Power

Milling Cutter: Geometry of plain milling cutter, types of milling cutters, milling process, force acting on plain milling cutter

Threaded cutting tools: geometry of tap and dies

Press Tools: Classification of Mechanical, Hydraulic, and Pneumatic presses, Press characteristics, safety devices, principles of feeding and unloading, Design principals of presses

Design of dies: Introduction, types of dies, shear action in die cutting operation, clearance, cutting forces, shear on punch and die, Blanking die design, center of pressure, Design of drawing dies, Design of bending dies

Jigs and Fixtures: Design economics, principles of locations, degree of freedom, reference surfaces, types of locators, prevention of jamming, problems of chip and dust in location, use of dowels, Redundant location, principles of clamping, types of clamps. Screw clamp, toggle clamp, pivoted clamp, quick acting clamp, drill bushes, type of drill jig, turning fixture, milling fixture, indexing methods

Text Books:

1. Fundamentals of Metal Cutting & M/c Tools, Juneja B. L., Sekhon G. S. and Seth Nitin, New Age Int. Publishers, 2nd Edition.

2. Fundamental of Tool Engineering, Basu, Mishra, and Mukharjee, Oxford and IBH Publishing Co.

Reference Books:

1. Tool Design, Donaldson, C., Tata McGraw Hill, 3rd Edition, 2006
2. Metal Cutting Theory and Practice, Bhattacharya, A. Central Book Publisher, 2rd Edition.

ME705 ELECTIVE - I
C) EXPERIMENTAL STRESS ANALYSIS

Teaching Scheme	: 04 L	Total = 04	Credit	: 04
Evaluation Scheme	: 15 CT1 + 15 CT2 + 10 TA + 60ESE		Total Marks	: 100
Duration of ESE	: 2 hrs. 30 min.			

Basic equations in elasticity: state of strain, brittle coating method, and crack patterns produced by direct loading, refrigeration method, releasing method, effect of coating thickness and environment

Photoelasticity methods: behaviour of light, plane polarised and circular polariscope, isochromatic and isoclinic fringe patterns for two dimensional photoelasticity, three dimensional photoelasticity, model slicing and shear difference method, birefringent coating method

Strain measurement methods: types of gauges, electric strain gauge, strain rosette analysis, three element, delta, four element rosette, strain gauge circuits and recording instrument

Moire fringe technique: surface strain measurements and flexural studies. Grid analysis. X-ray techniques and holography. Motion measurements

Text Books:

1. Experimental Stress Analysis, Dove and Adam, Tata McGraw Hill Publications, Third edition Reprint 2004.
2. Experimental Stress Analysis, Dally and Riley, Tata McGraw Hill Publications Fourth edition 2006.

Reference Books:

- 1 Modern Experimental Stress Analysis, Doyle James, Johan Wiley Publications First edition 2007.

ME705 ELECTIVE - I
D) SUPPLY CHAIN MANAGEMENT

Teaching Scheme	: 04 L	Total = 04	Credit	: 04
Evaluation Scheme	: 15 CT1+15 CT2+10 TA+60 ESE		Total Marks	: 100
Duration of ESE	: 2 hrs. 30 min.			

Introduction to Supply Chain Management:

Supply chain, objectives, importance, decision phases, process view–Competitive and supply chain strategies–achieving strategic fit–supply chain drivers, obstacles, framework, facilities, inventory, transportation information, sourcing–pricing

Designing the Supply Chain Network:

Designing the distribution network, role of distribution, factors influencing distribution, design options, e-business and its impact, distribution networks in practice, network design in the supply chain, role of network, factors affecting the network design decisions, modeling for supply chain

Designing and Planning Transportation Networks:

Role of transportation, modes and their performance, transportation infrastructure and policies–design options and their trade–offs, tailored transportation

Sourcing and Pricing:

Sourcing, In-house or Outsource, 3rd and 4th Product Lines supplier, scoring and assessment, selection, design collaboration, procurement process, sourcing planning and analysis, Pricing and revenue management for multiple customers, perishable products, seasonal demand, bulk and spot contracts

Information Technology in the Supply Chain:

Information Technology Framework, customer relationship management, internal supply chain management, supplier relationship management, transaction management

Coordination in a Supply Chain:

Lack of supply chain coordination and the Bullwhip effect, obstacle to coordination, managerial levers, building partnerships and trust, continuous replenishment and vendor managed inventories, collaborative planning, forecasting and replenishment

Dimensions of Logistics:

A macro and micro dimension, logistics interfaces with other areas, approach to analyzing logistics systems, techniques of logistics system analysis, factors affecting the cost, and importance of logistics

Text Books:

1. Supply Chain Management Strategy, Planning and Operation, Sunil Chopra and Peter Meindl, Prentice Hall of India, 3rd Edition, 2007.
2. The Management of Business Logistics–A supply Chain Perspective, Coyle, Bardi, Longley, Cengage Publishers, 2nd Edition, 2006.
3. Principles of Supply chain Management, Wisner, Cengage Publishers, 3rd Edition, 2008.

Reference Books:

1. Supply Chain Logistics Management, Donald J Bowersox and Bixby Coluper, Tata McGraw Hill, 2nd Edition, 2008.
2. Supply Chain Management, Janat Shah, Pearson Publication, 4th Edition, 2008.
3. Managing the Supply Chain, D. Sinchi, McGraw Hill Publication, 2nd Edition, 2006.

ME 706 MECHATRONICS LAB

Teaching Scheme: 02 P

Total = 02

Credit: 01

Evaluation Scheme: 25 Internal + 25 External

Total Marks: 50

It is representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire content of the course) from the list or otherwise.

Minimum 6 experiments should be performed:

1. Design and construction of Printed Circuit Board for confirmation of the sensor signal processing function.
2. Study the use of Proximity sensors to control the motion of objects using Mechatronics cube Assembly for conveyor system.
3. Performance of various elements of Mechatronics Cube Assembly for processing system
4. Performance of various elements of Mechatronics Cube Assembly for Automated Storage and Retrieval System.
5. Design of control algorithm to generate a “Traffic sequence” with appropriate timing.
6. PLC programming to sequentially moving parts on the conveyor system.
7. PLC programming to coordinate the functions in ASRS.-2 experiments.

ME 707 COMPUTER AIDED DESIGN LAB

Teaching Scheme: 04 P

Total = 04

Credit: 02

Evaluation Scheme: 25 Internal + 25 External

Total Marks: 50

It is representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire content of the course) from the list or otherwise.

Minimum 6 experiments should be performed:

1. Study and introductory training on 3-D Modeling software packages like CATIA, PRO-E, and SOLID EDGE etc.
2. Creation of 2-D drawing (sketching) of any three machine components using 3-D product modeling software package.- 2 experiments
3. Creation of 3-D drawing of any two machine parts using 3-D product modeling software package.- 2 experiments
4. Creation of 3-D detailed part of any two sheet metal components using 3-D product modeling software package.
5. Creation of any one assembly design using 3-D product modeling software package.
6. Study and performance on FEA software package for structural, Thermal and flow analysis.

ME708 ELECTIVE – I LAB

A) NEW AND RENEWABLE ENERGY SOURCES LAB

Teaching Scheme : 02 P

Total = 02

Credit : 01

Evaluation Scheme : 25 Internal + 25 External

Total Marks : 50

It is representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire content of the course) from the list or otherwise. Minimum 6 experiments should be performed:

1. Testing on measurement of global radiation.
2. Trial on a sunshine recorder.
3. Testing of a flat plate collector.
4. Testing on performance of wind mill.
5. Testing of a photovoltaic system.
6. Testing on concentrating collector.
7. Visit to wind mill and submission of report.
8. Visit to a Biogas plant and submission of report.
9. Trial on gasifier

**ME708 ELECTIVE – I LAB
B) TOOL ENGINEERING LAB**

Teaching Scheme : 02P	Total = 02	Credit : 01
Evaluation Scheme: 25 Internal + 25 External		Total Marks: 50

It is representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire content of the course) from the list or otherwise. Minimum 6 experiments should be performed:

1. Design and drawing of single point cutting tool.
2. Design and drawing of form tool.
3. Design and drawing of broach.
4. Design and drawing of milling cutter.
5. Measurement of cutting force in orthogonal cutting by Dynamometer.
6. Design and drawing of press tools.
7. Design and drawing of jigs.
8. Design and drawing of fixtures.

**ME708 ELECTIVE – I LAB
C) EXPERIMENTAL STRESS ANALYSIS LAB**

Teaching Scheme: 02P	Total = 02	Credit: 01
Evaluation Scheme: 25 Internal + 25 External		Total marks: 50

It is representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire content of the course) from the list or otherwise. Minimum 6 experiments should be performed:

1. Electrical Resistance Strain Gages.
2. Static Analysis of a Loaded Ring.

3. Thermoelastic Stress Analysis.
4. Introductory Photoelasticity.
5. Photoelastic Analysis of a Notched Specimen.
6. Photoelastic Analysis of a Crack.

ME708 ELECTIVE – I LAB
D) SUPPLY CHAIN MANAGEMENT LAB

Teaching Scheme: 02P	Total = 02	Credit: 01
Evaluation Scheme: 25 Internal + 25 External		Total Marks: 50

It is representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire content of the course) from the list or otherwise. Minimum 6 experiments should be performed:

1. Supply chain management system in any manufacturing industry.
2. Supplier Chain selection Strategies and Practices.
3. Designing and Planning Transportation Networks.
4. Optimization of Logistics system in any manufacturing industry.
5. Pricing and revenue management in Supply chain management system.
6. Assessment and control to improve Logistics Performance.

Students shall prepare and submit report based on the work done. Marks would be given by the internal and external based on the quality of work, report and presentation.

ME 709 SEMINAR AND PROJECT STAGE – I

Teaching Scheme: 02P	Total = 02	Credit: 04
Evaluation Scheme: 100 Internal		Total Marks: 100

100 marks divided in two parts, 50 marks for Seminar and 50 marks for project work.

A. Seminar:

1. Student shall select a topic for seminar which is not covered in curriculum. Student shall complete the conceptual study of the selected topic and expected to know functional and technical details of selected topic.
2. Before end of semester students shall deliver a seminar and submit seminar report in proper format consisting of
 - Literature Survey
 - Concept
 - Functional and Technical detail.
 - Present Status.
 - Future Scope.
 - Application.
 - Comparison with similar technique.
 - References.
3. Student shall deliver a seminar on report submitted which shall be assessed by two examiner wherein one member should be the guide and the other one

appointed by HOD.

B. Project:

1. Students have to complete project work in VII and VIII semester. In general a group of 4-5 students should be allowed to complete one project.
2. In VII semester, student shall complete literature survey and finalize the topic and project. They shall submit synopsis based on the selected topic to HOD. On approval of the topic of project, they shall complete the design work and procure the required components.
3. Before the end of the semester student shall submit one copy of progress report in proper format covering the total work completed by the group.
4. There shall be oral examination based on report submitted by student. The oral examination shall be conducted by two examiner wherein the guide should be one member and the other one be appointed by HOD.

ME 801 COMPUTER INTEGRATED MANUFACTURING

Teaching Scheme	: 04 L	Total = 04	Credit	: 04
Evaluation Scheme	: 15 CT1 + 15 CT2 + 10 TA + 60 ESE	Total Marks	: 100	
Duration of ESE	: 2 hrs. 30 min			

Automation: Types, Automation for mass manufacturing and assembly, Automation of continuous processing systems, Detroit type automation, Automated flow lines, Methods of work transport, Partial automation, Assembly system and line balancing

Computer Integrated Manufacturing System: Introduction , Integration and Rationalization, Sequence of Functions in CIM, Elements of CIM system, CIM wheel, Benefits of CIM, Applications of CIM system.

Introduction to Various Manufacturing Systems: Single Station Manufacturing Cells, Group Technology, Cellular Manufacturing, Flexible Manufacturing Systems, Manual Assembly Lines, Transfer Lines, Automated Assembly Systems.

Computer Numerical Control: Fundamentals of NC machines, Classification of Numerical Control Machine, Basic components of NC system, Problems in conventional NC, Computer numerical control, CNC system design, direct numerical Control system, Adaptive control system.

Fundamentals of Part Programming: NC words, Rapid Transverse Functions, Linear Interpolation Functions, Circular Interpolation Functions, Dwell Functions, Programming Formats, Writing a Part Program, Cutter Radius Compensation.

Robotics: Robot Terminology, Types of Robots, Robot Characteristics, Robot Controllers, End Effectors, Programming of Robot, Robot Application, Benefits of Robot.

Material Handling Systems: Overview of Material Handling Systems, Material Transport Systems like AGVS, Monorail and other Rail Guided Vehicles, Storage Systems.

Computer Aided Process Planning: Role of Process Planning, Approach of Process Planning, Process Planning System, Benefits of CAPP, Advantages of CAPP.

Text Books:

1. Computer Aided Design and Manufacturing , Groover, M. P. , Prentice-Hall of India , 5th Edition ,2005.
2. Automation Production Systems and Computer Integrated Manufacturing, Groover, M. P., Prentice-Hall of India, 2nd Edition.

Reference Books:

1. CAD/CAM, Zeid Ibrahim, Tata McGraw Hill, 1st revised edition, 2006
2. Robot System and Analysis, Shah S.K., Tata McGraw Hill , 1st edition, 2008

ME 802 OPERATIONS RESEARCH TECHNIQUES

Teaching Scheme	: 04 L + 01 T	Total = 05	Credit	: 05
Evaluation Scheme	: 15 CT1 + 15 CT2 + 10 TA + 60 ESE		Total Marks	: 100
Duration of ESE	: 2 hrs. 30 min			

Introduction: Characteristics, phases, limitations, model building and classification of O. R. Models.

Linear Programming: formulation, simplex methods, primal dual relationship.

Transportation Models: introduction, methods, LP formulation of transportation problems, methods for finding initial solution, Modi method.

Assignment Models: introduction, mathematical statement and solution methods of assignment problems, variations of assignment problems.

Network Models: Network models - Network construction, PERT analysis, CPM analysis, cost analysis, updating, resource smoothing and leveling.

Waiting line models: introduction, classification, analysis of M/M/1 and M/M/S models, application of simulation to waiting line model, and Monte-Carlo technique

Sequencing Models: Processing of n jobs through 2 machines, n jobs through 3 machines, 3 jobs through n machines, n jobs through n machines.

Replacement Models: individual and group replacement policies.

Simulation: Introduction, basic nature of simulation, advantages and limitations, role of random numbers in simulations, generation of random numbers.

Dynamic Programming: introduction, characteristics, development of an optimum decision policy, dynamic programming under certainty, application of dynamic programming to linear programming.

Text Books:

1. Operation Research, H. A. Taha, PHI, 7th Edition.
2. Operations Research, Panneerselvan , PHI, 3rd Edition.

Reference Books:

1. Introduction to Operations Research, Billy E. Gillett, Tata McGraw Hill, 2nd Edition
2. Operation Research , Natarajan, Balasubramani, and Tamilarasi, Pearson Education, 3rd Edition, 2008
3. System Simulation with Digital Computer, Narsingh Deo, PHI.

ME803 ELECTIVE - II

A) INTERNAL COMBUSTION ENGINES

Teaching Scheme : 04 L	Total = 04	Credit : 04
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE	Total Marks : 100	
Duration of ESE : 2 hrs. 30 min		

Types of Cycles and their Analysis: Classification of I. C. Engines, Details of two stroke and four stroke cycles; Air standard cycles, Fuel air cycle and actual cycle. Effect of variation of specific heat, dissociation, brief review of other losses

Fuels and alternative fuels: Elementary treatment to conventional and non-conventional fuels, fossil fuels and their limitations, potential alternative fuels-liquids and gaseous, additives and their functions.

Studies of fuel injection pump: Their working, different types of fuel feed systems, studies of injectors, nozzles, bosch type fuel pump.

Combustion SI Engine: Combustion in SI Engine, stages of combustion, Normal and abnormal combustion, Detonation, preignition, Factors responsible for abnormal combustion effect of detonation. Octane rating of fuel, Requirement of combustion chambers for SI engines, important types, relative advantages and disadvantages and application.

Combustion in CI Engine: Stages of combustion in CI Engines, delay period, factor affecting delay period, effect of change in delay period. Diesel knock, cetane rating. Requirements of combustion chamber for CI Engines. Methods of generating turbulence in combustion chamber. Types of combustion chambers for CI engines.

Performance test on IC engines: Methods of determination of BP. Heat balance sheet, Various modes of tests such as 5 mode, 8 mode, and 13 mode test.

Principles of Supercharging: Arrangements for supercharging, Advantages and limitations of supercharging.

Review of Emissions from IC Engines: Effects of emissions on human health, Causes of formation and approaches to control these pollutants, Exhaust gas recirculation, Water injection, After treatment technology, SCR, DPF, Measurement of smoke, CO, Hydrocarbon, various smoke meters, Infra Red detector, study of emission norms, BIS, EURO.

Recent trend's in IC engine technology:

For SI engine: MPFI, Direct in-cylinder injection, After treatment, Multi spark plug technology, Variable valve timing

For CI engine: CRDI, Catalytic convertor, Microprocessor controls.

Text books:

1. Internal Combustion Engines, Ganesan V., Tata McGraw Hill, New Delhi, 1994
2. A course in Internal Combustion Engines, M. L. Mathur and R. P. Sharma, Dhanpat Rai and Sons, Delhi, 1994

Reference Books:

1. Internal Combustion Engines Fundamentals, John B. Heywood, McGrawHill, 1988.
2. Internal Combustion Engines, Colin R Ferguson, John Wiley and Sons, New York, 1986
3. Engineering Fundamentals of the Internal Combustion Engine, Pulkrabek Willard W., PHI, 2007

ME803 ELECTIVE - II

B) PRODUCTION PLANNING AND CONTROL

Teaching Scheme	: 04 L	Total = 04	Credit	: 04
Evaluation Scheme	: 15 CT1 + 15 CT2 + 10 TA + 60 ESE		Total Marks	: 100
Duration of ESE	: 2 hrs. 30 min			

Introduction: Objectives and Advantages of PPC, Production Procedure, functions of PPC, production consumption cycle, Centralized and Decentralized PPC, Pre-requisite of PPC, Types of PPC systems. Scheduling, Inputs of scheduling, loading and scheduling devices, factors influencing scheduling, procedure for scheduling, Techniques of Scheduling.

Production Forecasting: Introduction, importance of forecasts. Types of forecasts: Constant, Linear, Cyclic forecasts Qualitative models, Quantitative models: Least square method, exponential method, Simple moving average, weighted moving average, simple exponential smoothing. Forecasting error, selection of forecasting model. Verification and Controlling

Production Planning : The production order, Procedure for formulating Production order, Master Programmer, Basic problems in production planning, Quantities in Batch production, criteria for batch size determination, minimum cost batch size, Production Range, Maximum profit Batch size, Maximum return, Maximum Rate of return, Economic Batch size.

Machine Output: Machine output, multi-machine supervision by one operator, Machine Interference, Ashcroft tables, average number of consecutive servicing task, the Ashcroft Number.

Analytical Structure of Inventory: Definition of Inventory, Types of inventory and its classification, structure of inventory problems and its analysis, the Relevant cost, objectives of carrying inventories, selective inventory analysis. Static Model: General characteristic, incremental analysis, opportunity cost, decision criteria's under uncertainty. Dynamic

Model: Certainty case: General characteristic, optimum lot size model with constant demand, Quantity discounts. Risk case: General characteristic, p-system and Q - system.

Material Requirement planning (MRP) : Introduction to MRP, Manufacturing Resource Planning (MRP-II), just- in- time, comparison of MRP, MRP-II and Kanban System, Entrepreneurship Resource Planning (ERP).

Text Books:

1. Elements of Production Planning and Control, Simuel Eilon, Universal Book Corporation, 3th Edition (2006).
2. Production Systems : Planning Analysis and Control, J.L. Riggs, John Wiley and Sons , 4th Edition (2006)
3. Inventory Control, Theory and Practice, Starr and Miller, PHI

Reference Books:

1. Production and Operation Management, E.E Adam, and R.J Ebert Jr., Prentice Hall of India, 5th Edition(2004).
2. Operation Management, E. S. Buffa and R. K. Sarin, John Wiley and Sons, 8th Edition.

ME803 ELECTIVE - II

C) MECHANICAL VIBRATIONS

Teaching Scheme : 04 L	Total = 04	Credits : 04
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE		Total Marks : 100
Duration of ESE : 2 hrs. 30 min		

Fundamentals of Vibration:

Basic concepts, combination of springs, masses, types of dampers, combination of dampers, Harmonic motion; harmonic analysis, Fourier series expansion, single degree system –undamped ,with viscous damping, with coulomb damping response to harmonic single degree freedom forced vibration with elastically coupled viscous dampers, frequency response

Transient Vibration of single Degree of freedom Systems: response to impulse, arbitrary excitation, Laplace formulation, shock isolation, numerical methods for irregular forcing

Two Degree of Freedom System: Free vibration of spring, coupled system, mass coupled system, Bending vibration of two degree of freedom system, forced vibration, vibration absorber, Vibration isolation

Introduction to Multi Degree of Freedom Systems: Normal mode of vibration, Lagrange’s equation

Vibration of Continuous Systems: Systems governed by wave equations, vibration of strings, vibration of rods, Lateral vibration of beams, effect of rotary inertia and shear deformation, vibration of membranes

Experimental Methods in Vibration Analysis

Vibration instruments, vibration exciters, measuring devices, vibration tests, free and forced vibration tests, Examples of vibration tests

Text Books

1. Mechanical Vibrations, Singiresu S. Rao, Fourth Edition 2007, Pearson Education
2. Mechanical Vibrations, G.K. Grover, Seventh Edition, 2003, New Chand & Brothers

Reference Books:

1. Theory of Vibrations with Applications, Willium T. Thomson, Marie Dillon Dahleh, Chandramouli Padmanabhan Fifth Edition 2008 Pearson Education
2. Theory and Practice of Mechanical Vibrations, J.S. Rao, K. Gupta New Age International

ME803 ELECTIVE - II

D) PRODUCTION MANAGEMENT

Teaching Scheme : 04 L	Total = 04	Credits : 04
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE		Total Marks : 100
Duration of ESE : 2 hrs. 30 min		

Production Function: Definition of production, operation management, objectives, Scope and functions, frame work of production management, manufacturing strategy and competitiveness, frame work of manufacturing strategy, operations effectiveness stage, manufacturing excellence, evolving manufacturing perspectives like lean manufacturing, agile manufacturing, material and labor productivity.

Product Design: New product concept, strategies for new product development process, concurrent engineering, designing for costumer, Quality function deployment, designing products for manufacturing and assembly, technology forecasting and technology development process.

Process Design: Choice of technology, process flow characteristics, process selection decisions, process strategies, use of Break-even analysis in process/machine selection, product mix decisions.

Strategic Capacity Planning: Capacity planning concept, long-range and short-range capacity strategies, economics scale, capacity focus and flexibility, capacity planning.

Process Flow Analysis and Layout Design: Types of processes, process flow structures, product-process matrix, process analysis, process flow design, process flow chart, basic layout types, computerized layout planning, travel chart and relationship chart, layout of line processes, assembly line balancing, and various balancing methods.

Investment Analysis: Introduction, Deterministic models , Probabilistic models.

Text Books:

1. Production and Operation Management, E E Adam, R J Ebert, Prentice Hall 5th Edition, 2004

2. Production and Operation Management, P Rama Murthy, New Age International Publisher, 4th Edition, 2006

Reference Books:

1. Operation Management- Barry Shore, McGraw Hill Book Company, New York.
2. Production planning and control, Samuel Eilon, Universal Book Corporation Mumbai, 3rd edition, 2006

ME804 ELECTIVE - III

A) REFRIGERATION AND AIR CONDITIONING

Teaching Scheme : 04 L Total = 04 Credit : 04
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE Total Marks : 100
Duration of ESE : 2 hrs. 30 min

Introduction: History, methods and applications of refrigeration; Types and applications of air conditioning systems; current status and future trends; air cycle refrigeration systems

Vapour compression refrigeration (VCR) systems: Analysis of simple VCR system; Use of $p-h$ and $T-s$ charts; Effect of operating conditions such as condenser and evaporator pressure, superheating and sub-cooling; Actual VCR system

Refrigerants: Classification, desirable properties and designation of refrigerants; merits and demerits of commonly used refrigerants

Multi pressure vapour compression systems: classification; compound compression systems, Choice of intermediate pressure; multi-evaporator systems, individual and multiple expansion valves; cascade systems; Application to cryogenics

Vapour absorption systems: Simple vapour absorption cycle; practical absorption systems, Properties of refrigerants and absorbents; comparison of vapour compression and absorption cycles

Refrigeration system components and controls: Brief description of compressors, condensers, evaporators, defrosting methods, expansion devices, accessories and refrigeration controls

Psychrometry of air conditioning processes: Properties of moist air; Psychrometric chart, Psychrometric processes, Psychrometric processes related to air conditioning. Human comfort: Metabolism of human body

Air conditioning systems: Unitary system, window type and split type air conditioning; Central system: direct expansion system, all water and all air systems; winter, summer and year round air conditioning; transmission and distribution: types of air ducts

Heating and cooling load calculations: Basic considerations, heat gain/losses, sensible and latent, heat due to occupancy, lighting, appliances, products, process; safety factor cooling load estimates, heating load estimates, sensible heat factor, bypass factor, apparatus dew point, effective sensible heat factor

Text Books

1. Refrigeration and air conditioning, Ahmadul Ameen, Prentice Hall of India, New Delhi, 2006
2. Refrigeration and air conditioning, C P Arora, Tata McGraw-Hill, 2nd edition, 2003

Reference Books:

1. Refrigeration and air conditioning, W F Stoecker, JW Jones, McGraw-Hill, 1982
2. The ASHRAE Handbooks with CDs, 2005-2008
3. Air Conditioning Principles and Systems, E G Pita, Prentice Hall of India, 4th edition, 2005.
4. Refrigeration and Air Conditioning Technology, Tomczyk, J. A., Whitman, W. C., Johnson, W. M., Pub: Delmar S. Africa, 4th edition, 2000.
5. Principles of refrigeration, R J Dossat, Pearson Education Asia, 4th edition, 2001.

ME804 ELECTIVE - III

B) MACHINE TOOL DESIGN

Teaching Scheme	: 04 L	Total = 04	Credit	: 04
Evaluation Scheme	: 15 CT1 + 15 CT2 + 10 TA + 60 ESE		Total Marks	: 100
Duration of ESE	: 2 hrs. 30 min			

Introduction: General requirements of Machine Tool Design, Kinematics of machine tool, Various driving systems used in machine tools, Mechanical, Electrical, Hydraulic, Stepless regulation of speeds

Regulation of Speed and Feed Rates: Basic design consideration in the design of variable speed range in the machine tools, Layout of speed in geometric, logarithmic and arithmetic progression, Saw diagram, Range ratio, Graphical representation of speed on Structural and Ray diagram, Design of speed and feed boxes and their classification, Gear box design

Machine Tool Structure (bed, column, cross-rail): Functions and their requirements, design criterion for machine tool structure, design procedure, factors affecting stiffness of machine tool structure and their profile

Machine Tool Spindles: Functions of spindle, Materials and requirements for spindles, Design of spindles, Effect of Machine Tool Compliance on Machine Accuracy, Bearings for spindles

Machine Tool Guide-ways and Slide-ways: Design based on force of beds, slide ways, carriage, tables of Lathes, shapes of guide-ways and slide-ways of Milling machines,

Materials, Methods of adjusting clearance in guide-ways, Design of slide-ways for wear resistance, Hydraulic guide-way, Antifriction guide-way, Protecting devices for slide-way

Vibrations of Machine Tools: Effects of vibration on machine tool on cutting controls, work piece, tool life. Sources of vibrations, Types of vibrations (forced, chatter, stickup vibrations) and its minimization, Shock absorbers

Machine Tools Testing: Static and Dynamic rigidity, Methods of increasing rigidity of structure, Procedure for assessing dynamic stability, Dynamic characteristics, Experimental determination of dynamic characteristics of machine tool, Dynamic characteristics of cutting process, Stability analysis, Static and dynamic testing of machines as per Schlesinger's test and Tobias stability

Text Books:

1. Machine Tool Design and Numerical Control, N. K Mehta, Tata McGraw Hill, Second Edition, 2005
2. Design of Machine Tools, D. K. Pal and S. K. Basu, Oxford-IBH, Second Revised Edition, 2005

Reference Books:

1. Machine Tool Design Handbook, Central Machine Tool Institute, Bangalore, Tata McGraw Hill, First Edition, 2005
2. Principles of Machine Tools, A. Bhattacharya and G. C. Sen, New Central Book Agency, Calcutta, 3rd Edition, 1973
3. Numerical Control and Computer Aided Manufacturing, T. Kundra, P.N. Rao, N. K. Tiwari, Tata McGraw Hill, 3rd Edition, 2000.

ME804 ELECTIVE - III

C) FINITE ELEMENT METHOD

Teaching Scheme	: 04 L	Total = 04	Credit	: 04
Evaluation Scheme	: 15 CT1 + 15 CT2 + 10 TA + 60 ESE		Total Marks	: 100
Duration of ESE	: 2 hrs. 30 min			

Introduction: Basic concept, Historical background, engineering applications, general description, comparison with other methods, Need for weighted – integral forms, relevant mathematical concepts and formulae, displacement transformation matrix, stiffness matrix, weak formulation of boundary value problems, variational methods, Rayleigh –Ritz method and weighted residual approach

Finite Element Techniques: Model boundary value problem, finite element discretization, element shapes, sizes, and node locations, interpolation functions, shape functions, derivation of element equations, connectivity, boundary conditions, principal of potential energy, FEM solution, post-processing, Compatibility and completeness requirements, convergence criteria, higher order and isoparametric elements, natural coordinates, Langrange and Hermit Polynomials

Applications to solid and structural mechanics problems: External and internal equilibrium equations, one-dimensional stress-strain relations, plane stress and strain

problems, strain displacement relations, boundary conditions compatibility equations, analysis of trusses, frames and solids of revolution, computer programs.

Application to heat transfer problem: Variational approach, Galerkin approach, one-dimensional and two-dimensional steady state problems for conduction, convection and radiation

Application to fluid mechanics problems: In viscid incompressible flow, potential function and stream function formulation, incompressible viscous flow, stream function, velocity-pressure and stream function-vorticity formulation, solution of incompressible and compressible fluid film lubrication problems

Text Books:

1. An Introduction to Finite Element Method, J.N. Reddy, Tata McGraw Hill, New Delhi, 2nd Edition, 2005.
2. Finite Element Analysis, P. Seshu, Prentice Hall India, New Delhi, First Edition, 2006

Reference Books:

1. Introduction to Finite Element Method, C S Desai, J F Abel, CBS Publishers, 2nd Edition, 2005.
2. The Finite Element Method in Engineering, S. S. Rao, Elsevier India, Fourth Edition 2008.

ME804 ELECTIVE - III

D) ENTREPRENEURSHIP DEVELOPMENT AND PROJECT MANAGEMENT

Teaching Scheme : 04 L	Total = 04	Credit : 04
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE		Total Marks: 100
Duration of ESE: 2 hrs. 30 min		

Introduction: Concept, qualities of a successful entrepreneur, types of entrepreneur, factors affecting entrepreneurship role of entrepreneurship in economic development, problems of women entrepreneurs, rural entrepreneurship.

Entrepreneurial Motivation: Motivation theories, motivating factors, achievement motivation, Entrepreneurial competencies and traits, steps in developing competencies, Entrepreneurial mobility.

Entrepreneurship Development Programs (EDPs): Need for EDPs, objectives, course contents, phases of EDPs, evaluation of EDPs, problems faced by EDPs.

Project Report Preparation: Meaning, project identification and selection, project formulation, significance of project report, contents of a good project report, formulation of a project report, specimen of a project report, project appraisal methods.

Project Management: Meaning, Advantages, limitations, basic philosophy, techniques, implementation cost and implementation time

Project Financing: Financing of enterprises, sources of finance, capitalization, venture capital, export financing, institutional financing, lease and hire purchase.

E- Commerce: Meaning, benefits, suitability of E- commerce for SSIs, potential areas , challenges of E- Commerce

Customer Relationship Management: Meaning, basic philosophy, micro level techniques, advantages and limitations

Text Books:

1. Business Entrepreneurship and its Social Setting A. H. Cole, Harvard University Press, Cambridge, 2005.
2. Entrepreneurship, Hisrich, Robert; Peters, Michael; Shepherd, Dean, 6th Edition, McGraw-Hill Education (India) , New Delhi, 2006
3. Global Management Solutions, Dinesh Seth and S C Rastogi, Thomson Publications, First Edition, 2004

Reference Books:

1. **Entrepreneurship 6th Edition, Robert D. Hisrich, Michael P. Peters, Dean A Shephrd**, McGraw-Hill Education (India) , New Delhi, 2006

ME 805 COMPUTER INTEGRATED MANUFACTURING LAB

Teaching Scheme: 02 P

Total = 02

Credit: 01

Evaluation Scheme: 25 Internal + 25 External

Total Marks: 50

It is representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire content of the course) from the list or otherwise. Minimum 6 experiments should be performed:

1. **CAM:** Examples on Manual part programming and Automated Programmed Tool Programming (APT). Writing any two programs and perform on CNC lathe or milling machine.- 3 experiments.
2. **Robotics:** Study of Robot structure and types of Robot.
3. **Robotics:** Demonstration of Robot application.
4. **Robotics:** Robot programming for simple task like Pick-n-Place in assembly line using Robot programming language.- 2 experiments.
5. **Group Technology:** Study of any real world application of group technology.
6. **CAPP:** Case study of CAPP.

ME 806 ELECTIVE - III

A) REFRIGERATION AND AIR CONDITIONING LAB

Teaching Scheme: 02 P

Total = 02

Credit : 01

Evaluation Scheme: 25 Internal + 25 External

Total Marks : 50

It is representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire content of the course) from the list or otherwise.

Minimum 6 experiments should be performed:

1. Trial on vapor compression system.
2. Trial on ice plant.
3. Trial of desert cooler.
4. Trial of Electrolux system.
5. Trial on vortex tube.
6. Performance of household refrigerator.
7. Trial on air conditioning tutor system.
8. To determine the capacity of water cooler.
9. Trial of window/ split air conditioner.
10. Visit and study of cold storage plant.
11. Demonstration of various controls of refrigeration and air conditioning systems.

Practical examination: It shall consist of viva-voce based on syllabus.

ME 806 ELECTIVE - III

B) MACHINE TOOL DESIGN LAB

Teaching Scheme : 02 P	Total = 02	Credit : 01
Evaluation Scheme : 25 Internal + 25 External		Total Marks : 50

It is representative list of practicals. The instructor may choose experiments as per his requirements (so as to cover entire content of the course) from the list or otherwise.

Minimum 6 experiments should be performed:

PRACTICALS:

1. Design of speed box.
2. Design of feed box.
3. Design of combination guideways.
4. Design of slideways.
5. Design of lathe bed.
6. Design of Milling / drilling machine columns.
7. Design of Cross rails, arms, saddles.
8. Experiment on Testing of Machine Tool.

Note: Practical from above list should be done using the Machine Tool Design Handbook given in the reference books.

ME 806 ELECTIVE - III

C) FINITE ELEMENT METHOD LAB

Teaching Scheme: 02 P	Total = 02	Credit : 01
Evaluation Scheme: 25 Internal + 25 External		Total Marks : 50

The following assignments should be carried out using any of the FEM codes such as ANSYS / NASTRAN / ASKA / FEMAP / MATLAB etc and a report thereof should be submitted.

1. Stress distribution computation for a cylindrical rod.
2. Stress distribution in a flat plate.
3. Deflection in a cantilever / simply supported beam.
4. Temperature distribution in extended surfaces / fins.
5. Velocity distribution in a flow channel.
6. Pressure distribution in ducts.

ME 806 ELECTIVE - III

D) ENTREPRENEURSHIP DEVELOPMENT AND PROJECT MANAGEMENT LAB

Teaching Scheme : 02 P	Total = 02	Credit : 01
Evaluation Scheme : 25 Internal + 25 External		Total Marks : 50

THE Practical shall consist of minimum 2 case studies on:

1. Project report preparation of a tiny manufacturing industry.
2. Project report preparation of a small scale manufacturing industry.
3. Project report preparation of a medium scale manufacturing industry.
4. Project report preparation of a service industry.
5. Project report preparation of a large manufacturing industry.

ME 807 PROJECT

Teaching Scheme: 06 P	Total = 06	Credit: 08
Evaluation Scheme: 100 Internal + 100 External		Total Marks: 200

1. In continuous with the work completed in VIIth semester, student shall complete the implementation of ideas given in synopsis, so that working model of project shall be completed before the end of semester.
2. Students shall submit final project report in proper format which shall include the work completed in VII semester also.
3. Evaluation of progress by evaluation committee, appointed by HOD, twice in the VIII semester.
4. Final examination of project shall include demonstration of working model, presentation by student and oral examination based on total project work. Project work shall be accessed by guide and one external examiner.