

Course Name: HUMANITIES III (BUSINESS ENVIRONMENT & INDUSTRIAL LEGISLATION)

Course Code: HU 402

Credits: 4

L T P : 4-0-0

Pre Req:

Lecture Wise Breakup

No. of Lectures

- 1. INTRODUCTION (07)**
Scope of business, Characteristics of business and its forms.
- 2. BUSINESS ENVIRONMENT (07)**
Economic, Political and Technological.
- 3. SOCIAL RESPONSIBILITY OF BUSINESS (05)**
Ecological and Global Environment and their relevance in present scenario.
- 3. SOCIAL RESPONSIBILITY OF BUSINESS (05)**
Concept, Social Responsibility toward different interest groups and Business Ethics.
- 4. GLOBALIZATION (07)**
Meaning, Rationale for globalization, features of current globalization, Pros and Cons of globalization.
- 5. WTO (07)**
Functions of WTO. WTO structure, and Implications for India.
- 6. CORPORATE GOVERNANCE (05)**
Concept, Essentials of good Corporate Governance, One case study.
- 7. CONTRACT ACT (05)**
Concept of Contract, types and its essentials.
- 8. SALE OF GOOD ACT (05)**
Essential of sale of goods Act.

BOOKS:

- 1 Francis Cherunilam, Business Environment, Himalaya Publications.
- 2 K.C.Garg, V.K.Sareen, Mukesh Sharma and R.C.Chawla, Commercial & Labour Laws, Kalyani Publishers.

REFERENCES:

1. K Aswathappa, Essential of Business Environment, Himalaya Publication.
2. S.S.Gulshan, Mercantile Law, Excel Books.
3. S.S. Gulshan & G.K. Kapoor, Business Law, New Age International (p) Ltd., Publisher.
4. S Singh, Corporate Governance – Global Concepts & Practices, Excel Books.
5. Roger Benett, International Business, Addison Wesley Longhran, Delhi.
6. Y K Bhushan, Business Organization & Management, Sultan Chand & Sons.

HU402H (Humanities III) -In addition to the contents of HU402, additional topics:

Cluster Growth Model Vs SEZ

Innovative Dynamics of the Company

Foreign Market Entry Strategies

Competition Policy and Law

Corporate Social Responsibility-Two Case Studies

Course Name: HUMANITIES III (CORPORATE FINANCE)

Course Code : HU 404

Credits-4 : L T P: 4-0-0

Pre Req:

Lecture wise breakup

No. of Lectures

- 1. INTRODUCTION (07)**
Finance, Financial Decisions, Objectives of Corporate Financial Decisions and factors influencing financial decisions.
- 2. INDIAN FINANCIAL SYSTEM (07)**
Nature and role of financial system in Indian Economy.
- 3. FINANCIAL MARKETS (08)**
Concepts, Type of markets and their relevance in present scenario.
- 4. FINANCIAL INSTRUMENTS AND FINANCIAL SERVICES (08)**
Capital and Money Market Instruments, Services.
- 5. WORKING CAPITAL (05)**
Types and factors affecting the requirements of working capital.
- 6. SOURCES OF FINANCE (05)**
Short term and long term.
- 7. TIME VALUE OF MONEY AND CAPITAL BUDGETING (05)**
Concept of Compounding and Discounting, Nature of Investment Decisions, Investment, Evaluation Criteria: Pay Back Period Method, Accounting Rate of Return Method, Internal Rate of Return Method and Net Present Value Method.
- 8. FINANCIAL LEVERAGE (03)**
Meaning (trading on equity) and measures.
- 9. DIVIDEND POLICY (05)**

Objectives of Dividend Policy, factors influencing firm's dividend policy.
- 10. CAPITAL STRUCTURE (03)**

Essentials of Capital Structure, Approaches to establish target capital structure.

BOOKS:

1. Pandey I.M., Financial Management, Vikas Publishing House Pvt.Ltd.
2. Khan M Y, Indian Financial System, Tata McGraw Hill.
3. Bhole LM and Mahakud Jitendra, Financial Institutions and Markets,

- 5. COMPUTER IMPLEMENTATION (04)**
Computer implementation of FEM, pre and post processing of FEM
- 6. TWO DIMENSIONAL PROBLEMS: (08)**
FEM modeling of 2-D problems by potential-energy and Galerkin approach, constant strain triangle (CST) and its shape functions, derivation of various matrices for CST element, temperature effects, problem modeling and boundary conditions
- 7. 2-D ISO-PARAMETRIC ELEMENTS AND NUMERICAL INTEGRATION (08)**
Four noded quadrilateral elements and its related matrices, numerical integration for one, two and three dimensional integrals, higher order elements, serendipity element, six noded triangle element, concept of Pascal triangle, concept of convergence and its criterion, concept of isotropy.
- 8. BEAMS (05)**
FE formulation consisting of beam elements, Hermitian shape function and its related matrices, application of boundary conditions, shear force and bending moment
- 9. DYNAMIC FEM FORMULATION (05)**
Hamilton's principle, concept of lumped and distributed mass system, its different matrices for various elements, evaluation of eigenvalues and eigenvectors.

BOOKS:

Introduction to Finite Elements in Engineering: Chandrupatla & Belegundu, PHI, 3rd Ed

REFERENCES:

1. Finite Element Method: J N Reddy, Mc Graw Hill, 2nd Ed
2. Concept & Application of Finite Element Analysis: Cook et al, John Wiley, 4th Ed
3. The Finite Element Method for Engineers: Huebner et al, John Wiley, 3rd Ed
4. Finite Element Analysis (Theory & programming): C S Krishnamoorthy, TMH, 2nd Ed
5. Text Book of Finite Element Analysis: P Seshu, PHI,

Course Name :EXPERIMENTAL STRESS ANALYSIS

Course Code :ME 479 Credit : 4 L T P : 4 0 0

Pre req. : -----

Lecture wise breakup No. of Lectures

- 1. BASIC ELASTICITY (07)**
Laws of stress transformation, principal stresses and principal planes, Cauchy's stress quadric. Strain analysis, strain equations of transformation, Principal strain, Cauchy's strain quadric, stress-strain relationship.
- 2. TWO DIMENSIONAL PHOTO ELASTICITY: (07)**
Stress optic law, optics of polariscope, plane and circular polariscope, dark and light field arrangements, fringe multiplication, fringe sharp ending, compensation techniques, commonly photo-elastic materials.
- 3. THREE DIMENSIONAL PHOTO ELASTICITY: (06)**
Neuman's stain optic relationship, stress freezing in models, materials for three-dimensional photo-elasticity, shear-difference method of stress separation.

4. BI-REFRINGENT COATINGS: (02)

Sensitivity reinforcing effects and thickness of bi-refringent coatings.

5. ELECTRIC RESISTANCE STRAIN GAUGES: (08)

Gauge construction and installation, temperature compensation, gauge sensitivity, gauge factor, corrections for transverse strain effects. Factors affecting gauge relation. Rosettes, Rosettes analysis, potentiometer and wheatstone bridge circuits for strain measurements.

6. BRITTLE COATINGS: (07)

Introduction, coatings, stresses and failure theories, different types of crack patterns, crack detection. Composition of brittle coatings, coating cure, influence of atmospheric conditions, effect of biaxial stress field.

BOOKS:

1. Experimental Stress Analysis: James W. Dally, William F. Riley
2. Theory of Elasticity: Timoshenko & Goodier

REFERENCE BOOKS:

1. Experimental Stress Analysis Dally & Riby McGraw Hill, N.Yord, 1987
2. Theory of Elasticity & Plasticity Khanna Publishers, N.Delhi, 1979
3. Theory of Plasticity J.Chakrabarty, McGraw Hill, International Editions,

Course Name : RENEWABLE ENERGY

Course Code : ME 480 L T P : 4 0 0

Pre req. : -----

Lecture wise breakup

No. of Lectures

1. INTRODUCTION TO RENEWABLE ENERGY SOURCES: (03)

Introduction to Non-conventional/Renewable Energy Sources & Technologies. Their Importance for Sustainable Development and Environmental Protection.

2. SOLAR RADIATIONS: (04)

Measurement and Prediction of Solar Radiations; Instruments for Solar Radiation; Characteristics of Solar Spectra including Wavelength Distribution; Radiation Properties and Spectral Characteristics of Materials; Selective Surfaces & Basics of Solar Collectors.

3. SOLAR THERMAL SYSTEM: (05)

Solar Collection Devices; their analysis; Solar Collector Characteristics; Solar Pond; application of solar energy to space heating etc.

4. BIOMASS: (02)

Biomass as an Energy Source; Energy Plantations; Conversion Technologies – Thermal, Chemical and Biological; Photosynthesis, Biogas generation, Classification of Biogas plants.

5. BIOGAS: (04)

Principles of Bioconversion: Types of Bioreactors – Batch, Continuous, Plug-flow, Stirred Tank & Film, Reaction Kinetics, Reactor Design and Analysis, materials-

Municipal Refuse, Sewerage, Industrial Wastes, Agricultural Wastes, Animal and Human Wastes; Landfill systems; Properties and Uses of Biogas.

6. BIOFUELS: (04)

Bioconversion Techniques – Direct Combustion, Pyrolysis, Flash Pyrolysis Fermentation and Gasification; Utilization of Industrial Wastes such as Bagasse; Household and Community Combustion Systems – Improved Cook-stoves; Industrial Biomass Combustion Systems; Gasification; Sizing; Beneficiation of Fuels. Thermodynamics & Kinetics of Gasification; Types of Gasifiers–Downdraft, Updraft, Cross flow, Fluidized. Combustion Characteristics of Biofuels; Utilization in Conventional Engines and or Power Generation including Cogeneration.

7. OTHER RENEWABLE SOURCES OF ENERGY: (02)

Waves: Nature and availability of Energy from waves Onshore & Off-shores: Principles of Wave Converters – Raft, Duck, Oscillating Water Columns, Tapered Channels & Buoys; Energy Conversion & Transmission; Secondary Applications of Waves such as Harbour Wall, Seawater Pumping.

8. WIND ENERGY: (07)

Basic Principle; Basic components of a WECS, Classification of W.E.C., Their types, Applications of Wind Energy, Environmental aspects, Wind Energy Developments in India.

Tides: Origin & nature of Tides, Tidal Heads & Duration; Principles of Tidal Energy Conversion, Site Selection – Single and Multiple Bay System; Cycles & Load Factors; Regulation and Control of Tidal Power Generato (**Ocean Thermal Energy Conversion**): Temperate & Tropical Oceans; Principles of OTEC Systems; Site Selection; Power Cycles; Selection of Working Fluids; Pumps & Turbines; Heat Exchanger Criteria; Bio-fueling; Secondary Applications such as Fresh Water Production, Maniculture, etc., Power Transmission & System Efficiency.

9. THERMAL ENERGY: (05)

Geothermal Resources, Location and Potential Assessment, Classification & Characteristics of Geothermal Resources – Hot Rock, Hot Water & Steam, Chemical & Physical Properties of Geothermal Brines: Control of Scale Deposition, Drilling, Logging & Cementing Operations for Geothermal Wells; Principles of Power Production System & Cycles: Refrigeration, Two-Phase Flow Turbines; Thermal Phase Flow Turbines; Thermal Utilization & Mineral Recovery; Ecological and Safety Considerations.

BOOKS:

1. S.P. Sukhatme - Solar Energy: Principles of thermal Collection and Storage, Tata Graw Hill, New Delhi
2. H.P. Garg and Jai Prakash - Solar Energy: Fundamentals and Applications, Tata McGraw Hill
3. Chang - Energy Conversion, Prentice Hall

REFERENCES:

1. Soo- Direct Energy Conversion, Prentice Hall
2. Bockris and Srinivasan - Fuel Cells, McGraw Hill
3. Duffic and Beckman - Solar Engineering of Thermal Processes, John wiley

Course Name : POWER PLANT ENGINEERING

Course Code : ME 481 Credit : 4 L T P : 4 0 0

Pre req. : -----

Lecture wise breakup

No. of Lectures

1. STEAM POWER PLANT: (16)

Introductory: Generation of electricity and sources of energy, thermodynamic cycles, selection of power plants on thermodynamic economical and operating considerations, Future trends in power industry, power source of the future.

Steam Generators: Principle construction and operation of high pressure boilers, Design trends in water tube boilers, Supercritical pressure systems, Steam generators for special applications, Generator selection, maintenance and operation. Boiler furnaces.

Feed Water Heating and Steam Turbines: Cycle with finite number of heaters, analysis of optimum rise in ideal cycle efficiency. Type of heater arrangements, equations for single heater arrangement and series of heaters. Losses in various types of heater arrangements.

Fuels and Firing: How fuel burns? Type of fuels and their characteristics. Coal handling and coal storage, methods of coal firing, stocker fired and pulverized fuel feeding systems, pulverized and different types of stockers. Ash handling and ash disposal. Burning and feeding of oil and gas. Selecting fuel for new plants. Combustion control.

Water Treatment: Quality of water needed by the plant. Types of impurities, PH value, Clarification of water and filter designs. Water treatment. Deaerators and aerators. Handling and feeding chemicals. Feed water regulation. Condenser cooling water systems.

Miscellaneous: Construction and operation of economizers, air pre-heaters, steam separators. Schematic layout of a modern coal fed steam power station. Heat balance of steam power station. Steam Station costs. Load curves. Site selection.

2. DIESEL POWER PLANTS: (04)

Diesel plant elements, arrangements of diesel plant, diesel engine fuel injection system, air intake system, engine lubrication and engine cooling systems, supercharging and superchargers. Methods of starting and stopping the engines.

Advantages and disadvantages of using diesel power plant, Economics of diesel plant over steam and hydro-electric plant.

3. GAS TURBINE POWER PLANTS: (04)

Elements of gas turbine plants, principle and performance of simple gas turbine plant, thermal refinement of gas turbine cycle. Combination gas turbine cycles. Gas turbine cycle calculations. Economics of gas turbine plant compared with steam power plant.

4. NUCLEAR POWER PLANT: (05)

Atomic structure, energy levels, binding energy. Radio-activity, decay laws, half lives, nuclear reaction. The fission chain reaction (Controlled and uncontrolled). Maintenance of chain reaction, heat removal, reactor fuels and materials. Some common types of power reactors. Pressurized water reactor, boiling water reactor and gas cooled reactor. Reactor system safety provisions. Fusion reaction, site selection. Economics of nuclear

Beam welding, their process detail, various variable and their effect on the weld properties, Application of the processes, Advantages & Disadvantages.

6. WELDING OF LIGHT METAL & ALLOYS (05)

Welding of aluminum and its alloys, welding of magnesium and its alloys, weldability of Al& Mg and this alloys. Various are welding process and solid states process used for welding of welding of Aluminium. Physics of welding of Aluminium.

7. WELDING SYMBOLS, WELDING DESIGN & WELDING DEFECTS(05)

Representing the weld, Basic welds symbols, Dimensions of welds, Welding Joint design, Welding positions. Welding Allowable Strength of welds, Under different type loading (Tensile shear Fatigue, combined), Defects and their causes and Remedies.

8. INSPECTION & TESTING OF WELDS (06)

Destructive Testing & its Design for specimen (Tensile test, Fatigue test), visual inspection, Non destructive testing, x-ray radiography, Magnetic particle inspection dye penitent test, ultrasonics inspection and Eddy current testing, Hardness Testing Micro hardness testing.

BOOKS:

1. Welding Process & Technology by Dr. R.S. Parmar.
2. Welding Engineering & Technology, Dr. R.S. Parmar, Khanna Publication.

REFERENCES:

1. Welding by AC Davies, Cambridge University.
2. Welding Technology for Engineers by Haldev Raj, V. Shankar, A.K. Bhaduri, Narosa, Publication House.
3. Welding & Welding Technology by Richard L. Little Tata Mc - .Graw Hill edition.

Course Name : METAL FORMING

Course Code : ME 483 Credit : 4 L T P : 4 0 0

Pre req. : -----

Lecture wise breakup No. of Lectures

1. INTRODUCTION (05)

Plastic deformation and related properties, Basic structure of metals and Alloys, Forming Properties of metals and alloys, Testing (yield strength and flow stress), factor affect the yield strength, Ductility and formability, Theory of fracture, super plasticity, Anisotropy in sheet metals.

2. METAL FORMING PROCESSES (06)

Introduction, classification of forming processes, Compressive forming processes, combined tensile and compressive forming, tensile forming process, forming by bending, forming by shearing, high energy rate forming process, Newer and Advanced forming process, Advantages of forming processes.

1. THEORY OF SLIP LINES, UPPER AND LOWER BOUND THEOREMS (06)

Theory of slip lines, basic equation and method of solutions, Geiringer Velocity relations, Geometrical Properties of slip lines, construction of slip lines, upper bound theorem, lower bound theorem, problems.

4. FORGING PROCESSES (05)

Introduction, Forging machines, open die forging, closed die forging, Impression die forging, upsetting & Swaging, Analysis of plane strain compression, Analysis of compression of circular discs, Upper bound solutions in forging, Problems.

5. STRIP ROLLING PROCESS (05)

Introduction, Longitudinal strip / sheet rolling processes, specific roll pressure in hot strip rolling, welding in strip rolling, determination of rolling load, elastic deformation of rolls and strips, cold strip rolling load calculation rolling torque, Problems cold rolling of sheets and strips, hot rolling of sheets and plates, longitudinal rolling mills, sheet camber.

6. WIRE, TUBE AND STRIP DRAWING PROCESSES (05)

Introduction, wire drawing processes, lubrication in wire drawing, wire drawing machinery, Analysis of Drawing Circular wires, Tube drawing processes, Analysis of tube drawing with mandrel, tube sinking, strip drawing, drawing of non-circular wire.

7. EXTRUSION PROCESSES (04)

Introduction, direct Extrusion, indirect extrusion, Impact extrusion, Hydrostatic extrusion, Continuous extrusion, Punch load calculation in direct extrusion, extrusion through curved dies. Control burst and lubrication in extrusion.

8. SHUT METAL FORMING PROCESS (05)

Cutting off, Blanking, Punching, Piercing, bending, deep drawing, redrawing, drawing of tubes from Annular shut discs, Forces in Circular cup drawing, Draw ability of shut metals, Limit diagrams, Deep drawing with tricotrix dies.

9. TRANSVERSE ROLLING PROCESSES (05)

Introduction of different transverse rolling discs, deformation in transverse rolling discs, Calculation of load and torque in rolling with flat rolls, rolling load with Angular rolls, manufacture of seamless tubes and pipes, roll piercing mill, gear rolling, thread rolling, problems.

10. MEASUREMENT OF FRICTION IN METAL FORMING (04)

Introduction, methods of measuring friction in metal forming. Measurement of friction in rolling, forging, various instruments and gauges used for measurement of friction in metal forming.

BOOKS:

1. Mathematical Theory of Plasticity, Hill. R., Oxford University Press, Oxford, 1950.
2. Theory of Perfectly Plastic Solids, Prager. W and Hodge, P.G. Jr., Chapman and Hall, London, 1951.

REFERENCES:

1. A.S.T.M.E., High Velocity forming of metals, Prentice Hall of India Pvt. Ltd., New Delhi.

2. Fundamentals of Metal forming processes, B.L. Juneja, New Age International Publishers, New Delhi , 2007.
3. Hand Book of Metal forming, Kurt Langi, McGraw Hill Book Company, New York, 1985.

Course Name : ENERGY CONVERSION (DC-14)

Course Code : ME 424 / ME 424 H Credits : 4 L T P : 4 0 0

Pre requisite. : -----

Lecture wise breakup

No. of Lectures

1. THERMODYNAMICS OF I.C. ENGINES (10)

Introduction: I.C. Engine classification, Operation of two stroke and four stroke reciprocating I.E. Engines and rotary (Wankel) engine and their comparison.

Comparison of SI and CI engines. Otto Cycle – The Ideal Cycle for SI Engines Diesel Cycle – The Ideal cycle for CI Engines. Deviation of actual cycles from ideal cycles. Pressure – Time diagram for I.C. Engines.

Combustion in SI Engines: Combustion in S.I. Engines, Combustion Phenomenon, Flame speed, ignition delay, effect of engine variables on Delay period, abnormal combustion, Preignition, detonation, effect of various engine parameters on detonation, effect of detonation on engine performance and methods employed to reduce detonation. Combustion chamber design for S.I. Engines.

Combustion in CI Engines: Combustion in C.I. Engines, Combustion phenomenon, Delay period, Diesel Knock, CI Engine Combustion Chambers, High speed cinematography for combustion visualization – a brief note.

Fuels: Rating of SI Engines fuel, Cetane ratings of CI Engine fuels, Octane and Cetane numbers.

Performance of IC Engines: Performance curves of C.I. and S.I. engines. Overall IC Engine performance (engine sizing, mean effective pressure (MEP), power and torque). Effect of compression ratio and of air fuel ratio on power and efficiency of an engine. Variation of engine power with altitude, supercharging, its advantages and its applications, types of superchargers.

2. GAS TURBINES; (08)

Position of gas turbine in power industry, classification of Gas turbines, on the basis of system of operation and on the basis of combustion (at constant volume or at constant pressure).

Thermodynamics of constant pressure gas turbine cycle, calculation of net output, work ratio and thermal efficiency of ideal and actual cycles, cycle air rate, temperature ratio, effect of change in Sp. Heat and efficiency of ideal and mass of fuel o power and efficiency. Operating variables and their effects on thermal efficiency and work ratio.

Thermal refinements and their effects on gas turbine cycle. i.e. gas turbine cycle with regeneration, inter cooling and reheating, multistage compression and expansion, pressure losses in heat exchangers and combustion chambers.

Comparison of gas turbine with a steam turbine and I.E. engine. Field of application of gas turbines.

3. AIRCRAFT PROPULSION USING GAS TURBINE: (05)

Principle of propulsion thrust work and thrust power, propulsion efficiency, Overall thermal efficiency, specific fuel consumption. Intake and Propelling nozzle efficiencies, classification and comparison of ram jets, turbojets, turbo props, pulse jets and rockets.

Thermodynamics cycle analysis and efficiencies of propulsive devices of turbojet engine. Advantages and disadvantages of jet propulsion over other propulsion systems. Variation of thrust and SFC with flight conditions for a given engine. Fields of application of various propulsion units.

4. IMPULSE STEAM TURBINE (06)

General description, pressure and velocity compounding, Velocity diagram and work done. Effect of blade friction on velocity diagram, Blade efficiency and overall efficiency Reheat factor and condition curve.

5. REACTION STEAM TURBINE: (06)

Degree of reaction, Velocity diagrams, blade efficiency and its derivation. Calculation of blade height etc. Requirement of an ideal working fluid, binary vapour cycles. Methods of attachment of blades to turbine rotor, losses in steam turbines., Labyrinth packing and governing of steam turbine

6. PRINCIPLES OF HYDRAULIC TURBINE (08)

Force of jet on stationery moving flat and curved plates flow over radial vanes, velocity triangles, Determination of power. Different types of runner, Description of Pelton and Turgo Impulse Turbines, Simple design features of Pelton turbines such as number of jets, number of buckets, depth and width of buckets, velocity diagram, jet ratio, power and efficiency.

Description of Francis, Kaplan Turbines and other reaction turbines, velocity diagrams, speed ratios, flow ratio, degree of reaction as applied to Kaplan and Francis Turbines, Cavitations, Various types of draft tubes, Governing of hydraulic turbine and performance of hydraulic turbines.

7. CENTRIFUGAL PUMPS: (05)

Brief description and classification of Centrifugal pumps (Radial flow, Axial flow, mixed flow, Single Stage and Multistage). Priming and priming devices. Velocity triangles, work done, pressure rise, various efficiencies, Minimum starting speed, impeller diameter.

8. RECIPROCATING PUMPS: (04)

Slip and coefficient of discharge, Effect of acceleration on pressure in suction and delivery pipes, Air vessels (work saved by air vessel on suction and delivery pipe). Comparison with centrifugal pumps.

ME 424 ENERGY CONVERSION In addition to the contents of ME 424 the additional topics:

Estimation of slip in centrifugal compressor, three dimensional flow in axial flow compressor, losses in axial flow machines, typical high pressure boilers, governing of compound steam engines, Edward,s air pump in condenser, phenomenon in nozzle operating off the design condition, cycles for modern steam plant.

BOOKS:

1. Thermodynamics and Heat Engines Vol.II by R. Yadav, Dhanpat Rai, & Sons Delhi.
2. Gas Turbine Theory by Cohan H. and Rogers G.F.C. HIH Sarvanamutto, Pearson Education.

REFERENCES:

1. Fundamental of compressible flow with aircraft and rocket propulsion by S.M. Yahya.
2. Principles of Turbo machinery by D. Shepherd, Macmillan Pub. Co.
3. Thermodynamics an Engineering Approach by Yunus A Cengel and Michael A. Boles, McGraw-Hill, Inc.
4. Theory of Hydraulic Machines, V.P. Vasandani, Khanna Publishers, Delhi., 1992.
5. Hydraulic & Fluid Mechanics, J. Lal, Metropolitan Book Co., N. Delhi, 1994.

Course Name : COMPUTER AIDED DESIGN, DRAFTING & MANUFACTURING (DC-15)

Course Code : ME 425 / ME 425 H Credit: 4 Design Point: 2 L T P: 4 0 0

Pre requisite. : ----

Lecture wise breakup No. of Lectures

1. COMPUTER AIDED DESIGN:

Fundamentals of CAD: The Design Process, Applications of computers for design, Benefits of CAD.

CAD/CAM Systems: Systems Configuration & Components Graphics terminal, Input-Output devices, CPU.

Computer Graphics, Geometric Modeling & Transformations: Functions of a graphic package Geometric transformations, Homogeneous transformations, Composition of transformations, Geometric Modeling Approaches – Wire frame vs. Solid Modeling, CAD/CAM data exchange. Computer aided drafting.

2. NUMERICAL CONTROL PRODUCTION SYSTEMS:

Conventional Numerical Control, NC Part Programming, DNC, CNC & Adaptive Control.

3. INDUSTRIAL ROBOTICS:

Robot Anatomy, Robot Specifications, End Effectors, Robotic Sensors, Robot Programming Applications.

4. GROUP TECHNOLOGY L& CELLULAR MANUFACTURING SYSTEMS:

GT implementation, Part family formation, Classification & coding systems, Benefits of GT Cellular Manufacturing.

5. COMPUTER AIDED PROCESS PLANNING:

Process Planning function, Retrieval & Generative process planning systems, Feature Recognition in CAPP, Benefits of CAPP, Machinability Data systems, Computer generated time standards.

6 COMPUTER INTEGRATED PRODUCTION MANAGEMENT SYSTEMS:

Inventory Management and Materials Requirement Planning: Inventory Management, MRP, MRP inputs, outputs and working, Benefits of MRP.

Shop Floor Control & Computer Process Monitoring: Functions of shop floor controls. The shop floor control system, operation scheduling, Factor Data Collection System, Computer Process Monitoring.

7. COMPUTER CONTROL

Control Systems: Linear Feedback Control Systems, Optimal Control, Sequence Control & Programmable Controllers, Computer Process Control.

Computer Aided Quality Control: Terminology in quality control. The computer in QC, Contact inspection methods, Computer aided testing, Integration of CAQC and CAD/CAM.

8 Computer Integrated Manufacturing Systems (CIMS): Types of manufacturing systems, Machine tools and related equipment, Material Handling system, computer control system. Human Labour in the manufacturing system, Benefits of CIMS.

BOOKS:

1. Computer Aided Design & Manufacture Zimmer & Groover

REFERENCES:

1. Automation, Production systems & computer Integrated Manufacturing M.P. Groover

Course Name : DEPARTMENT LAB-VI (MANUFACTURING & CAD LAB)

Course Code : ME 463 Credit: 2 Design Point: 2 L T P : 0 0 3

Pre requisite : -----

MANUFACTURING LAB

1. CNC Milling – 2 Exercises

Generation of tool path, generation of NC code, optimization of tool path (to reduce machining time) using any CAM software.

2. Coordinate Measuring Machine, Case Study, Inspection of a component using different probes (for example: gears, housings, flywheel, walls of machine structure etc.); generation of report and interface

3. R.P. Tooling : Introduction, Simple prototype manufacturing.

4. Assignment on (CAPP,APP, MPS, MRP

5. Introduction to ERP

CAD LAB

1. Study of at least one CAD software in each of the following categories:

(a) High end CAD like U6/NX, CATIA, Pro/E.

(b) Mid range CAD like Solid Edge, AIP.

(c) Low end CAD like Auto CAD, Turbo CAD, Auto CAD LT.

1. Assembly modeling (for any 2 assemblies or sub assemblies)- using top down and bottom up approaches inclusive of sketching, part modeling (using solid and surface modeling / styling tool boxes), drafting (parts and assemblies).

2. CAD File / data exchange amongst the various CAD softwares for CMM, CAE, CNC, CAM.

4. To determine the damping co-efficient of a damper in a free transverse vibrations.
5. To find the damping factor ratio of a damper system by forced vibrations.
6. Investigation of node and antinode position for a cantilever.
7. Investigation of node and antinode position for a beam.
8. To determine experimentally and theoretically the natural frequencies of vibrations of a two rotor system.
9. To determine experimentally the whirling speed of a shaft for a given system.

Course Name : Capstone Project II
Course Code : ME 499