VII Semester B.E. (Mechanical)

Subject code	Subject	University Exam / College Assesment	Marks				Paper durations-Hrs	Lecture-Hrs	Tutorials-Hrs	Pract/Drg-Hrs
			Theory		Practical					
			Maximum	Passing	Maximum	Passing				
7ME1	PRODUCTION TECHNOLOGY II	Univ	80	40	-	-	3	3	1	-
		College	20		-					
7ME2	ELECTIVE I	Univ	80	40	-	-	3	3	1	-
		College	20		-					
7ME3	ELECTIVE II	Univ	80	40	25	25	3	3	1	2
		College	20		25					
7ME4	ENERGY CONVERSION II	Univ	80	40	25	25	3	3	1	2
		College	20		25					
7ME5	MACHINE DESIGN III	Univ	80	40	25	25	3	3	1	2
		College	20		25					
7ME6	PROJECT SEMINAR	College	-	-	50	25	-	-	-	3
Total			500		200			15	5	9

12/5/18

VIII Semester B.E. (Mechanical)

Subject code	Subject	University Exam / College Assesment	Marks				Paper durations-Hrs	Lecture-Hrs	Tutorials-Hrs	Pract/Drg-Hrs
			Theory		Practical					
			Maximum	Passing	Maximum	Passing				
8ME1	INDUSTRIAL MANAGEMENT	Univ	80	40	-	-	3	3	1	-
		College	20		-					
8ME2	ELECTIVE III	Univ	80	40	-	-	3	3	1	-
		College	20		-					
8ME3	AUTOMATION IN PRODUCTION	Univ	80	40	25	25	3	3	1	2
		College	20		25					
8ME4	ENERGY CONVERSION III	Univ	80	40	25	25	3	3	1	2
		College	20		25					
8ME5	COMPUTER AIDED DESIGN	Univ	80	40	25	25	3	3	1	2
		College	20		25					
8ME6	PROJECT	Univ		-	75	75	-	-	-	6
		College		-	75					
Total			500		300			15	5	12

*Subject pertaining to Applied Science & Humanaties BOS** Subject pertaining to Metallurgy BOS
Subject pertaining to Electronics BOS

(Dr. M. Balaraman)

7ME1 **PRODUCTION TECHNOLOGY- II**

UNIT I

Work Study : Productivity –Concept and objectives of productivity. Types of productivity. factors affecting productivity. Tools and techniques to improve productivity. Measurement of productivity. Work study and methods study : Definitions, objectives, steps in method study, process charts, string diagram. motion study, micro motion study, SIMO Chart

[9 Hrs.]

UNIT II

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.

[9 Hrs.]

UNIT III

Plant layout : Objectives, Principle, Types of plant layout, Material handling. Objectives Principles and selection of material handling equipments, Unit load concept, material flow pattern.

[6 Hrs]

UNIT IV

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

[7 Hrs.]

UNIT V

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

[7 Hrs.]

UNIT VI

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

[7 Hrs.]

RECOMMENDED BOOKS

1. Work study by ILO
2. Motion and Time study by Barnes
3. Ergonomics – Murell
4. PPC - Jain & Agrawal
5. Industrial Engg. and Project management by Mart and Telsang
6. Reliability Engg. By Balguruswami
7. Plant layout and Material Handling by James Apple.

7ME2 ELECTIVE – I INDUSTRIAL ROBOTICS

UNIT I

Automation and Robotics. Robot anatomy. configuration of robots. joint notation schemes. work volume. introduction to manipulator kinematics. position representation. forward and reverse transformations of a 2- DoF arm. a 3-DoF arm in two dimension. a 4-DoF arm in three dimension. homogeneous transformations in robot kinematics. D-H notations. solving kinematics equations . introduction to robot arm dynamics.

[7 Hrs.]

UNIT II

Basic control system models. slew motion. joint-interpolated motion and straight line motion. controllers like on/off. proportional. integral. proportional plus integral. proportional plus derivative. proportional plus integral plus derivative

[7Hrs.]

UNIT III

Robot actuation and feedback components. position and velocity sensors. actuators and power transmission devices. mechanical grippers. vacuum cups. magnetic grippers. adhesive grippers. pneumatic. electric. hydraulic and mechanical methods of power and control signals to end effectors

[8 Hrs.]

UNIT IV

General considerations in robot material handling. material transfer applications. pick and place operations. palletizing and related operations. machine loading and unloading. die casting. plastic molding. forging. machining operations. stamping press operations using robots.

[8 Hrs.]

UNIT V

Use of robot in spot welding. continuous arc welding. spray coatings. Robots in Assembly Operations

[7 Hrs.]

UNIT VI

Robot cell layouts. multiple robots and machine interface. other considerations in work cell design. work cell control. interlocks. error detection and recovery. workcell controller. robot cycle time analysis.

[8Hrs.]

TEXT BOOKS

1. M.P. Groover, M. Weiss, R.N. Nagel, N. G. Odrey " INDUSTRIAL ROBOTICS", McGRA -HILL INTERNATIONAL.
2. Koren " Robotjcs"

7ME2 **ELECTIVE – I TOOL DESIGN**

UNIT I

Theory of metal Cutting

Introduction. Mechanics of chip formation . Cutting tool materials. Single point cutting tool. Designation of cutting tools. ASA system. Importance of Tool angles. Orthogonal rake system. Classification of cutting tools. Types of chips. determination of shear angle. velocity relationship . force relations. Merchant's Theory. Cutting power. Energy consideration in metal cutting. Tool wear. Tool life. Tool life criteria. variable affecting tool life. Machineability

[8 Hours]

UNIT II

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 [7 Hours]

UNIT III

PRESS TOOL DESIGN

Introduction. Press operations - Blanking. piercing . Notching . Perforating . Trimming . Shaving . Slitting . Lancing. Nibbling . Bending. Drawing

Press working equipment - Classification. Rating of a press. 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. angular clearance. 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 outs. Pilots. Blanking & Piercing die design - Single & progressive dies

[9 Hours]

UNIT IV

Bending Forming & Drawing dies

Bending methods - Bending Terminology, V- Bending, 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, Differance 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.

[6 Hours]

UNIT V

Forging Die Design & mould Design

Forging Die Design : Introduction, Classification of forging dies, Single impression dies, Multiple Impression dies. Forging disign factors - Draft, fillet & corner radias, 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

[8 Hours]

UNIT VI

Design of jigs & fixture :- Introduction, locating & clamping - principle of location, principle of pin location, locating devices, radial or angular location, V - location, bush location, design principle for location purpose, principle for clamping purposes, clamping devices, 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 principles for milling fixtures, Indexing jig & fixtures, Automatic clamping devices.

[7 Hours]

TEXT BOOKS

1. Fundamentals of Tool Design :ASTME
2. Tool Design :Donaldson
3. Tool Design :Pollock
4. Jigs & Fixtures Design and construction : Pollock
5. Jigs & Fixtures Design Manual : Hernrickson
6. Jigs & Fixtures : H. B. Goroshkin
7. Production Engineering : P. C Sharma
8. Production Technology : R. K. Jain
9. Fundamentals of Tool Engineering : Basu, Mukharjee & Mishra

7ME2 ELECTIVE – I SYNTHESIS OF MECHANISMS

UNIT I

Introduction to kinematics, types of mechanism, kinematics synthesis, science of relative motion, tasks of kinematic synthesis with practical applications, Degree of freedom, class-I, class-II chain, Harding's notation, Grashof criterion, Grubler's criterion

[7 Hrs]

UNIT-II

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.

[8 Hrs.]

UNIT-III

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

[7 Hrs]

UNIT-IV

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

[8 Hrs]

UNIT-V

Synthesis for infinitesimally separated position, concept of polode and centrod, Euler's savery equation, inflection circle, Bobbilier and Hartman's construction.

[7 Hrs]

UNIT-VI

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.

[8 Hrs]

Text Books:

1) Applied linkage synthesis – TaO D C.
2) Advanced mechanism design – G.N. Sandor. A.G. Erdman
3) Kinematics and mechanisms design – C H. Suh C.W. Radchiffe

7ME2 **ELECTIVE – I RENEWABLE ENERGY SYSTEMS**

UNIT I

Solar Energy: Introduction, solar constant, spectral distribution of solar radiation, direct & diffuse radiation, measurement of solar radiation and measuring instruments. Solar radiation geometry, solar angles, estimation of average solar radiation, radiation on tilted surface, tilt factors

[8 Hrs]

UNIT II

Solar flat plate collectors: Types of collectors, liquid flat plate collectors, solar air heaters, transmissivity of glass cove(system, collector efficiency, analysis of flat plate collector, fin efficiency, collector efficiency factor and heat removal factor, selective surfaces, evacuated collectors, novel designs of collector

[7 Hrs]

UNIT III

Concentrating collectors: line focusing, point focusing and non focusing type, central receiver concept of power generations compound parabolic collector, comparison of flat & concentrating collectors.

Applications of solar energy to water heating, space heating, space cooling, drying, refrigeration, distillation, pumping. Solar furnaces, solar cookers, solar thermal electric conversion, solar photo- voltaics

Solar energy storage, sensible, latent and thermochemical storage, solar pond

[8 Hrs]

UNIT IV

Biogas :- Introduction, bio gas generation, fixed dome & floating drum biogas plants, their constructional details, raw material for biogas production, factors affecting generation of biogas and methods of maintaining biogas, production, digester design considerations, fuel properties of biogas and utilisation of biogas. Bio Mass :- Introduction, methods of obtaining energy from biomass, Incineration, pyrolysis, gasification, classification of gasifiers & constructional details, chemistry of gasification, fuel properties, applications of gasifiers.

[7 Hrs]

UNIT V

Wind and Ocean energy :-

Power in wind, forces on blades, wind energy. Basic principle of wind energy conversion, site selection consideration, wind data and energy estimation, basic components of WECS, Classification of WEC systems, savonius and darrieus rotars, applications of wind energy.

Ocean energy: Introduction :- ocean thermal electric conversion, open and closed cycle of OTEC, hybrid cycle, energy from tides, basic principles of tidal power & components of tidal power plants, single & double basin arrangement, estimation of tidal power and energy. Energy from ocean waves -energy availability, wave energy conversion devices

[8 Hrs]

UNIT VI

Geothermal and MHD power generation :

Geothermal energy: Introduction, classification of geothermal systems vapour dominated, liquid dominated system, total flow concept, petrothermal systems, magma resources, applications of geothermal operational & environmental problems.

Magneto Hydro Dynamic power generation: Introduction principles of MHD power generation, MHD open and closed systems, power output from MHD generators, design problems of MHD generation, gas conductivity, seeding

[7 Hrs.]

TEXT BOOKS

Energy Technology -Parulekar & Rao
Non Conventional Energy Sources -G D Rai

REFERENCE BOOK

(1) Solar Energy -S.P. Sukhatme
(2) Solar Energy -Duffie & Beckman
(3) Solar energy engg.- Jui sheng Hsieh

7ME2 ELECTIVE – I PROJETCT EVALUATION & MANAGEMENT

UNIT I

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

[7 Hrs.]

UNIT II

Technical feasibility : Process selection, Level of automation, plant capacity, acquiring technology, Appropriate technology, plant location, Equipment selection & procurement, Govt. policies.

[7 Hrs.]

UNIT III

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

[9 Hrs.]

UNIT IV

Project Planning & Control : CPM, PERT, Optimum project duration, resource allocation, updating.

[7 Hrs.]

UNIT V

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

[7 Hrs.]

UNIT VI

Project review :
Initial review, performance analysis , ratio analysis, sickness, project revival, environ- mental & social aspects.

[8 Hrs.]

RECOMMENDED BOOKS

1. Projects, Prasanna chandra, Tata mc graw Hill publishing company Ltd
2. CPM & PERT, Shrinath, East West publisher
3. Projects, P.K. Joy, Macmillon
4. Engineering Economy H. G Thuesen, W J Fabricky, G.J Thuesen Printce Hall of India Pvt. Ltd.

7ME2 ELECTIVE – I : MATERIAL HANDELING SYSTEM

UNIT I

Types of intraplant transporting facility, principal groups of material handling equipments, choice of material handling equipment, hoisting equipment, screw type, hydraulic and pneumatic conveyors, general characteristics of hoisting machines surface and overhead equipments, general characteristics of surface and overhead equipments and their applications. Introduction to control of hoisting equipments

[8 Hrs.]

UNIT II

Flexible hoisting appliances like ropes and chains, welded load chains, roller chains selection of chains, hemp rope and steel wire rope, selection of ropes, fastening of chains and ropes, different types of load suspension appliances, fixed and movable pulleys, different types of pulley systems, multiple pulley systems, Chain and rope sheaves and sprockets.

[10 Hrs.]

UNIT III

Load handling attachments, standard forged hook, hook weights, hook bearings, cross piece and casing of hook, crane grab for unit and piece loads, carrier beams and slings, load platforms and side dump buckets, electric lifting magnets, grabbing attachments for loose materials, crane attachments for handling liquid materials.

[7 Hrs.]

UNIT IV

Arresting gear, ratchet type arresting gear, roller ratchet, shoe brakes and its different types like electromagnetic, double shoe type, thruster operated, controlled brakes, shoe brakes, thermal calculations of shoe brakes and life of linings, safety handles, load operated constant force and variable force brakes, general theory of band brakes, its types and construction.

[10 Hrs.]

UNIT V

Different drives of hoisting gears like individual and common motor drive for several mechanisms, travelling gear, travelling mechanisms for moving trolleys and cranes on runway rails, mechanisms for trackless, rubber-tyred and crawler cranes, motor propelled trolley hoists and trolleys, rails and travelling wheels, slewing jib and luffing gears. Operation of hoisting gear during transient motion, selecting the motor rating and determining braking torque for hoisting mechanisms, drive efficiency calculations, selecting the motor rating and determining braking torque for travelling mechanisms, slewing mechanisms, jib and luffing mechanisms. (Elementary treatment is expected)

[8 Hrs.]

UNIT VI

Cranes with rotary pillar, cranes with a fixed post, jib cranes with trolley, cranes with luffing boom, cantilever cranes, cage elevators, safety devices of elevators, belt and chain conveyors and their power calculations, vibrating and oscillating conveyors, pneumatic and hydraulic conveyors, screw conveyors, hoppers, gates and feeders. Introduction to AGV's as new material handling device, use of robot for material handling.

[7 Hrs.]

Text Book

1. Materials Handling Equipment- N. Rudenko , Envee Publishers, New Dehli
2. Materials Handling Equipment- M.P. Alexandrov, Mir publications, Maskow

7ME2 ELECTIVE – I ADVANCED I. C. ENGINES

UNIT I

Engines types and their operation
Introduction and Historical Perspective

ENGINE CLASSIFICATIONS

Engine operating cycles
Engine components
Engine friction, lubrication and cooling, lubrication systems.
Frictional losses, blow by losses, pumping loss.
Factors affecting mechanical friction

[8 Hrs]

UNIT II

AUTOMOTIVE FUELS

S.I. Engine fuels characteristics
C.I. Engine fuels characteristics
Rating of engine fuels. I.C. engine fuels – petrol, diesel, CNG, LPG, Alcohols, Vegetable oils fuel supply system. S. I. Engine. Carburetors, modern carburetor S.P.F.I. MPFI direct injection.
C.I.Engine: Fuel injection pump, reciprocating rotary, fuel injector, High presser D.I. systems, fuel distribution systems.

[7Hrs.]

UNIT III

S. I. Engine
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, turbocharging supercharging and scavenging in engines.

[7 Hrs.]

UNIT IV

C. I. Engines
Combustion in direct and indirect injection, fuel spray behaviour, combustion in C. I. Engines, ignition delay, auto ignition, Factors affecting delay, Effects of fuel properties Abnormal combustion, supercharging and turbocharging in engines.

[7 Hrs.]

UNIT V

Stratified charge engine, free piston engine, adiabatic engines.
Pollutant formation & Control

Nature and extent of problem, Nitrogen oxides
Kinetics of NO formation, formation of NO_2
NO formation in S. I. Engines
NOx formation in C. I. Engine
Carbon monoxide and unburned hydrocarbon emissions in S.I. and C.I. engines
EGR Particulate emissions, measurement technique.
Catalytic converters, particulate traps. [8 Hrs.]

UNIT VI

Engine Design and Operating Parameters

Important engine characterstics, Geometrical properties of Reciprocating engines, Brake, Torque & Power, Indicated work per cycle. Mechanical efficiency, Road load power, Mean effective pressure. Specific fuel consumption and efficiency, Air/Fuel and Fuel/Air ratios. Volumetric efficiency. Engine specific weight and specific volume. Correction factors for power and efficiency. Specific emission and emission index. Relatiosnip between performance parameters

Measurement and Testing

Measurement of friction power indicated power. Brake power. Fuel consumption. Air consumption, Performance parameters and characteristics: Engine Power. Engine efficiencies. Engine performance characteristics. Variables affecting performance characteristics

TEXT BOOK

Internal Combustion Engine Fundamentals - John B. Heywood
Internal Combustion Engines and Air pollution - Edward F. Obert

REFERENCE BOOKS

Internal Combustion Engines - V. Ganesan
Internal Combustion Engines - V. M. Domkundwar
Internal Combustion Engines - M. C. Mathur. R.D. Sharma

7ME3 ELECTIVE – II : FINITE ELEMENT METHODS

UNIT I

Fundamentals of stress & strain, stress & strain components, stress strain relationship, Elastic constants, plane stress, plane strain., differential equation of equilibrium compatibility equations, boundary conditions, Saint Venant's principle, Airy's stress function.

[7 Hrs]

UNIT II

Fundamental concepts of FEM -' Historical background, Scope of FEM in Engg Applications, Principle 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 Software's.

[7Hrs]

UNIT III

Finite element modeling & analysis using Bar & Beam element -stiffness matrix assembly, boundary conditions, load vector, temperature effects.

Two dimensional plane 'b11ss -Local & Global coordinate system element stiffness matrix, assembly, boundary conditions, load vector force & stress calculations

[8 Hrs]

UNIT IV

Two dimensional problems using CST & LST -formulation of CST & LST elements, elemental stiffness matrix, assembly, boundary conditions, load vector, stress calculation. 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.

[8 Hrs]

UNIT V

Introduction to Isopearametric & 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.

[7Hrs]

UNIT VI

Steady state one dimensional & two dimensional heat conduction problems using I-D and triangular element 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 spiffiness 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 and strains Pre & Post processing in FEA

[8 Hrs]

TEXT BOOKS

1. Introduction to Finite Elements in Engineering -T R. Chandrupatla & AD Belegundu

2. Theory of Elasticity -S.P. Timoshenko
3. Concept and applications of Finite element Analysis -RD Cook
4. The Finite Element Method -A basic introduction for engineers -D. W. Griffitns, D.A Nethercot –
Granada Publishing

LIST OF PRACTICAL

Students should use the commercial software or programmes from the text-books or self developed programs, to verify the results obtained by manual calculations. The input data and output results of the problem solved using the computer programs, should be included in the Journal

1. Any two problem using bar element
2. Any two problems using truss element
3. Any two problems using CST element
4. Any one problem using axisyrmnetric element
5. Any one problem of free vibration analysis using bar element
6. Any one problem of Torsion of Prismatic bars
7. Any one problem on Steady State Heat conduction.

LIST OF TUTORIALS

Two tutorials on each unit .

7ME3 **ELECTIVE-II : COMPUTER INTEGRATED MANUFACTURING SYSTEM**

UNIT I

Introduction: Fixed, Programmable and Flexible Automation. Classification of automated manufacturing systems based on product variety & production volume. Difference between Automation and CIMS.

Evolution of CIM, Segments of CIM - Computer aided Design, Computer Aided Manufacturing, Computer controlled business functions. Overview of CIM softwares.

[5 Hrs.]

UNIT II

CAD : Fundamentals of CAD – Design process, Product design and development through CAD and CAE. Geometric Modelling Techniques – wire frame modelling, surface modelling, solid modelling, graphic standards. Concept of Concurrent Engineering.

Introduction to CAD softwares – Facilities available in CAD software

[6 Hrs.]

UNIT III

Introduction to flexible manufacturing systems. Subsystems of FMS. Types of FMS layouts.

Introduction to NC, CNC, DNC, Adoptive control systems, constructional and operational features, CNC manual part programming.

- Introduction to automated material handling equipments: Conveyors, monorails, carts wire guided, vehicle, AGV
- Introduction to robots & their applications in manufacturing.
- Introduction to Automated inspection devices: Coordinate Measuring Machine (CMM), Inspection probes etc.
- Automated storage & retrieval systems.

[12 Hrs.]

UNIT IV

Manufacturing Planning.

Automated process planning: Process planning, general methodology of group technology, part identification and coding.

- Retrieval & Generative CAPP systems. Introduction to process planning softwares
- Forecasting, Master production schedule, Materials requirement planning, Capacity requirement planning, Production planning

[6 Hrs.]

UNIT V

Manufacturing system control: Computerized statistical process control, Shop floor control, Shop floor data collection techniques, CAQC, Bill of materials.

Business functions: Purchase orders receiving, inventory management Financial control, Job costing, Sales & Marking applications

[8 Hrs]

UNIT VI

Simulation: Need of simulation, Simulation languages & Packages, Simulation methodology. Types of simulation approaches- Even Scheduling Approach (ESA), Activity scanning Approach (ASA), Process Interaction Approach (PIA)

- Interfacing requirements for integrating manufacturing systems. [6 Hrs.]