JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(AUTONOMOUS)

M.Tech. (CAD/CAM)
COURSE STRUCTURE

I Year – I Semester

Category	Course Title	Int. marks	Ext. marks	L	P	C
Core Course I	Advanced CAD	40	60	4	--	4
Core Course II	Computer Aided Manufacturing	40	60	4	--	4
Core Course III	Advanced FEM	40	60	4	--	4
Core Elective I	Mechanical Behavior of Materials Stress Analysis and Vibration Rapid Prototyping Technologies	40	60	4	--	4
Core Elective II	Automation in Manufacturing Computer Aided Process Planning Manufacturing systems- simulation modeling and analysis	40	60	4	--	4
Open Elective I	Numerical Methods for Engineering Applications, Production and Operations Management	40	60	4	--	4
Laboratory I	Computer Aided Design Lab	40	60	--	4	2
Seminar I	Seminar	50	--	--	4	2
Total Credits				**24**	**8**	**28**

I Year – II Semester

Category	Course Title	Int. marks	Ext. marks	L	P	C
Core Course IV	Design for Manufacturing And Assembly	40	60	4	--	4
Core Course V	Flexible Manufacturing Systems	40	60	4	--	4
Core Course VI	Industrial Robotics	40	60	4	--	4
Core Elective III	Intelligent Manufacturing Systems Advanced Material Processing Optimization Techniques and Applications	40	60	4	--	4
Core Elective IV	Advanced Mechatronics Design and Manufacturing of MEMS and Micro Systems Fuzzy Logic and Neural Networks	40	60	4	--	4
Open Elective II	Engineering Research and Methodology Quality Engineering in Manufacturing	40	60	4	--	4
Laboratory II	Computer Aided Machining Lab	40	60	--	4	2
Seminar II	Seminar	50	--	--	4	2
Total Credits				**24**	**8**	**28**

II Year - I Semester

Course Title	Int. marks	Ext. marks	L	P	C
Comprehensive Viva-Voce	--	100	--	--	4
Project work Review I	50	--	--	24	12
Total Credits			--	24	**16**

II Year - II Semester

Course Title	Int. marks	Ext. marks	L	P	C
Project work Review II	50	--	--	8	4
Project Evaluation (Viva-Voce)	--	150	--	16	12
Total Credits			--	**24**	**16**

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES (AUTONOMOUS)

M.Tech – I year I Sem. (CAD/CAM)

ADVANCED CAD

(Core Course I)

UNIT- I

CAD Tools: Definition of CAD Tools, Graphics standards, Graphics software: requirements of graphics software, Functional areas of CAD, Efficient use of CAD software.

Basics of Geometric Modeling: Requirement of geometric modeling, Geometric models, Geometric construction methods, modeling facilities desired.

UNIT- II

Geometric modeling: Classification of wireframe entities, Curve representation methods, And Parametric representation of analytic curves: line, circle, arc, conics, and Parametric representation of synthetic curves: Hermite cubic curve, Bezier curve, B-Spleen curve wire, NURBS, Curve manipulations.

UNIT- III

Surface Modeling : Classification of surface entities, Surface representation methods, Parametric representation of analytic surfaces: plane surface, ruled surface, surface of revolution, tabulated cylinder, Parametric representation of synthetic curves: Hermite cubic surface, Bezier surface, B-Spleen surface , Blending surface, Surface manipulations.

UNIT- IV:

Solid Modeling: Geometry and topology, Boundary representation, The Euler-Poincare formula, Euler operators, Constructive solid geometry: CSG primitives, Boolean operators, CSG expressions, Interior, Exterior, closure, Sweeping: linear and non-linear, Solid manipulations.

UNIT- V

Transformations: 1-D and 3-D transformations: translation, scaling, rotation, reflection, concatenation, homogeneous coordinates, Perspective projection, orthotropic projection, isometric projection, Hidden surface removal, shading, rendering.

Evaluation Criteria: Evaluation criteria of CAD software, Data exchange formats: GKS, IGES, PHIGS, CGM, and STEP

Dimensioning and tolerances: Linear, angular, angular dimensions, maximum material condition (MMC), least material condition (LMC), Regardless of feature size (RFS).

TEXT BOOKS

1. CAD/CAM Concepts and Applications/ Alavala/ PHI.
2. CAD/CAM Principles and Applications/ P.N.Rao/TMH/3rd Edition

REFERENCES:

1. CAD/CAM /Groover M.P./ Pearson education
2. CAD / CAM / CIM, Radhakrishnan and Subramanian/ New Age
3. Principles of Computer Aided Design and Manufacturing/ Farid Amirouche/ Pearson

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES (AUTONOMOUS)

M.Tech – I year I Sem. (CAD/CAM)

COMPUTER AIDED MANUFACTURING

(Core Course II)

UNIT - I

Computer-Aided Programming: General information, APT programming, Examples Apt programming problems (2D machining only). NC programming on CAD/CAM systems, the design and implementation of post processors .Introduction to CAD/CAM software, Automatic Tool Path generation.

UNIT - II

Tooling for CNC Machines: Interchangeable tooling system, preset and qualified tools, coolant fed tooling system, modular fixturing, quick change tooling system, automatic head changers. DNC Systems and Adaptive Control: Introduction, type of DNC systems, advantages arid disadvantages of DNC, adaptive control with optimization, Adaptive control with constrains, Adaptive control of machining processes like turning, grinding.

UNIT - III

Post Processors for CNC:

Introduction to Post Processors: The necessity of a Post Processor, the general structure of a Post Processor, the functions of a Post Processor, DAPP — based- Post Processor: Communication channels and major variables in the DAPP — based Post Processor, the creation of a DAPP — Based Post Processor.

UNIT - IV

Micro Controllers: Introduction, Hardware components, I/O pins, ports, external memory:, counters, timers and serial data I/O interrupts. Selection of Micro Controllers Embedded Controllers, Applications and Programming of Micro Controllers. Programming Logic Controllers (PLC' s): Introduction, Hardware components of PLC, System, basic structure, principle of operations, Programming mnemonics timers, Internal relays and counters, Applications of PLC's in CNC Machines.

UNIT - V

Computer Aided Process Planning: Hybrid CAAP System, Computer Aided Inspection and quality control, Coordinate Measuring Machine, Limitations of CMM, Computer Aided Testing, Optical Inspection Methods, Artificial Intelligence and expert system: Artificial Neural Networks, Artificial Intelligence in CAD, Experts systems and its structures.

TEXT BOOKS:

1. CAD/CAM Concepts and Applications/ Alavala/ PHI.
2. CAD/CAM Principles and Applications, P.N.Rao, TMH

REFERENCES:

1. Computer Control of Manufacturing Systems / Yoram Koren / Mc Graw Hill. 1983.
2. Computer Aided Design Manufacturing – K. Lalit Narayan, K. Mallikarjuna Rao and M.M.M. Sarcar, PHI, 2008.
3. CAD / CAM / CIM, Radha krishnan and Subramanian, New Age Publications

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES (AUTONOMOUS)

M.Tech – I year I Sem. (CAD/CAM)

ADVANCED FINITE ELEMENT METHODS

(Core Course III)

UNIT-I

Introduction to FEM, basic concepts, historical back ground, applications of FEM, general description, comparison of FEM with other methods, variational approach, Glerkin's Methods. Co-ordinates, basic element shapes, interpolation function, Virtual energy principle, Rayleigh – Ritz method, properties of stiffness matrix, treatment of boundary conditions, solution of system of equations, shape functions and characteristics, Basic equations of elasticity, strain- displacement relations.

UNIT-II

1-D Structural Problems: Axial bar element – stiffness matrix, load vector, temperature effects, Quadratic shape functions and problems.
Analysis of Trusses: Plane Trusses and Space Truss elements and problems
Analysis of BEAMS: Hermite shape functions – stiffness matrix – Load vector – Problems.

UNIT-III

2-D problems: CST, LST, force terms, Stiffness matrix and load vectors, boundary conditions, Isoperimetric elements – quadrilateral element, shape functions – Numerical Integration. Finite element modeling of Axi-symmetric solids subjected to Axi-symmetric loading with triangular elements.
3-D Problems: Tetrahedron element – Jacobian matrix – Stiffness matrix.

UNIT-VI

Scalar Field Problems: 1-D Heat conduction-Slabs – fins - 2-D heat conduction problems – Introduction to Torsional problems.

UNIT-V

Dynamic considerations, Dynamic equations – consistent mass matrix – Eigen Values, Eigen vector, natural frequencies – mode shapes – modal analysis.

TEXT BOOKS:

1. Finite Element Methods: Basic Concepts and applications, Alavala, PHI.
2. Introduction to Finite Elements in Engineering, Chandrupatla, Ashok and Belegundu, Prentice – Mc Graw Hill Hall

REFERENCES:

1. The Finite Element Methods in Engineering / SS Rao / Pergamon.
2. Introduction to Fininte element analysis- S.Md.Jalaludeen,Anuradha Publications, print 2012
3. Finite Element Analysis – Bathe / PHI

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES (AUTONOMOUS)

M.Tech – I year I Sem. (CAD/CAM)

MECHANICAL BEHAVIOUR OF MATERIALS

(Core Elective – I)

UNIT-I:

Introduction to Deformation Behavior: Concept of stresses and strains, engineering stresses and strains, Different types of loading and temperature encountered in applications, Tensile Test - stress-strain response for metal, ceramic and polymer, elastic region, yield point, plastic deformation, necking and fracture, Bonding and Material Behavior, theoretical estimates of yield strength in metals and ceramics.

UNIT-II:

Elasticity Theory: The State of Stress and strain, stress and strain tensor, tensor transformation, principal stress and strain, elastic stress-strain relation, anisotropy, elastic behavior of metals, ceramics and polymers.

Yielding and Plastic Deformation: Hydrostatic and Deviatoric stress, Octahedral stress, yield criteria and yield surface, texture and distortion of yield surface, Limitation of engineering strain at large deformation, true stress and true strain, effective stress, effective strain, flow rules, strain hardening, Romberg's good equation, stress -strain relation in plasticity, plastic deformation of metals and polymers

UNIT-III:

Microscopic view of plastic deformation: crystals and defects, classification of defects, thermodynamics of defects, geometry of dislocations, slip and glide, dislocation generation - Frank Read and grain boundary sources, stress and strain field around dislocations, force on dislocation - self-stress, dislocation interactions, partial dislocations, twinning, dislocation movement and strain rate, deformation behavior of single crystal, critical resolved shear stress (CRSS), deformation of poly-crystals - Hall-Petch and other hardening mechanisms, grain size effect - source limited plasticity, Hall-Petch breakdown, dislocations in ceramics and glasses.

UNIT-IV:

Fracture: fracture in ceramics, polymers and metals, different types of fractures in metals, fracture mechanics - Linear fracture mechanics -KIC, elasto-plastic fracture mechanics - JIC, Measurement and ASTM standards, Design based on fracture mechanics, effect of environment, effect of microstructure on KIC and JIC, application of fracture mechanics in the design of metals, ceramics and polymers

UNIT-V:

Deformation under cyclic load - Fatigue: S-N curves, Low and high cycle fatigue, Life cycle prediction, Fatigue in metals, ceramics and polymers

Deformation at High temperature: Time dependent deformation - creep, different stages of creep, creep and stress rupture, creep mechanisms and creep mechanism maps, creep under multi-axial loading, microstructural aspects of creep and design of creep resistant alloys, high temperature deformation of ceramics and polymers.

TEXT BOOK:

1. G.E. Dieter,"Mechanical Metallurgy", McGraw-Hill, 1986.

REFERENCE:

1. R.W. Hertzberg,"Deformation and Fracture Mechanics of Engineering Materials", John Wiley and Sons, 1976.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES (AUTONOMOUS)

M.Tech – I year I Sem. (CAD/CAM)

STRESS ANALYSIS AND VIBRATION

(Core Elective – I)

UNIT-I

Two dimensional elasticity theory in Cartesian coordinates, plane stress problem in polar coordinates Thick cylinders, Rotating discs - stress concentration.

UNIT- II

Torsion of non circular prismatic sections, rectangular and axisymmetric, Circular plates, introduction to shell theory — contact stresses.

UNIT- III

Single degree freedom, two degree freedom system without and with damping - Free and forced vibrations. Transient vibrations.

UNIT- IV

Transient vibrations of single and two degree freedom systems, multi-degree of freedom systems - applications of matrix methods, continuous systems.

UNIT –V

Free and forced vibrations of strings bars and be CAD/CAM. Principle of orthogonality - classical and energy methods.

TEXT BOOKS:

1. Advanced strength of materials / Den Hortog J.P./Torrent
2. Theory of Vibrations with Applications/ Thomson W.T./ CBS Publishing

REFERENCES:

1. Theory of Elasticity/Timoshenko S.P. and Goodier J.N./Koakusha Publishers
2. Mechanical Vibrations/ Rao S.S./ Addison Wesley Longman
3. Mechanical Vibrations/ Den Ilartog J.P./ Dover Publications

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES (AUTONOMOUS)

M.Tech – I year I Sem. (CAD/CAM)

RAPID PROTOTYPING TECHNOLGIES

(Core Elective – I)

Unit – I

Introduction: Prototyping fundamentals, Historical development, Fundamentals of Rapid Prototyping, Advantages and Limitations of Rapid Prototyping, Commonly used Terms, Classification of RP process, Rapid Prototyping Process Chain: Fundamental Automated Processes, Process Chain.

Unit – II

Liquid-based Rapid Prototyping Systems: Stereo lithography Apparatus (SLA): Models and specifications, Process, working principle, photo polymers, photo polymerization, Layering technology, laser and laser scanning, Applications, Advantages and Disadvantages, Case studies. Solid ground curing (SGC): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies

Solid-based Rapid Prototyping Systems: Laminated Object Manufacturing (LOM): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies. Fused Deposition Modeling (FDM): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies.

Unit-III

Powder Based Rapid Prototyping Systems: Selective laser sintering (SLS): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies. Three dimensional Printing (3DP): Models and specifications, Process, working principle, Applications, Advantages and Disadvantages, Case studies.

Rapid Tooling: Introduction to Rapid Tooling (RT), Conventional Tooling Vs. RT, Need for RT. Rapid Tooling Classification: Indirect Rapid Tooling Methods: Spray Metal Deposition, RTV Epoxy Tools, Ceramic tools, Investment Casting, Spin Casting, Die casting, Sand Casting, 3D Keltool process. Direct Rapid Tooling: Direct AIM, LOM Tools, DTM Rapid Tool Process, EOS Direct Tool Process and Direct Metal Tooling using 3DP.

Unit – IV

Rapid Prototyping Data Formats: STL Format, STL File Problems, Consequence of Building Valid and Invalid Tessellated Models, STL file Repairs: Generic Solution, Other Translators, Newly Proposed Formats. Rapid Prototyping Software's: Features of various RP software's like Magic's, Mimics, Solid View, View Expert, 3 D View, Velocity 2 , Rhino, STL View 3 Data Expert and 3 D doctor.

Unit –V

RP Applications: Application – Material Relationship, Application in Design , Application in Engineering, Analysis and Planning, Aerospace Industry, Automotive Industry, Jewelry Industry, Coin Industry, GIS application, Arts and Architecture. RP Medical and Bioengineering Applications: Planning and simulation of complex surgery, Customized Implants & Prosthesis, Design and Production of Medical Devices, Forensic Science and Anthropology, Visualization of Biomolecules.

TEXT BOOKS:

1. Rapid prototyping: Principles and Applications - Chua C.K., Leong K.F. and LIM C.S, World Scientific publications , Third Edition, 2010.

REFERANCE BOOKS:

1. Rapid Manufacturing – D.T. Pham and S.S. Dimov, Springer , 2001
2. Whalers Report 2000 – Terry Wohlers, Wohlers Associates, 2000 Rapid Prototyping & Manufacturing – Paul F.Jacobs, ASME Press, 1996.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES (AUTONOMOUS)

M.Tech – I year I Sem. (CAD/CAM)

AUTOMATION IN MANUFACTURING

(Core Elective – II)

UNIT – I

Over View of Manufacturing and Automation: Production systems, Automation in production systems, Automation principles and strategies, Manufacturing operations, production facilities. Basic elements of an automated system, levels of automation; Hardware components for automation and process control, programmable logic controllers and personal computers.

UNIT – II

Material Handling and Identification Technologies: Material handling, equipment, Analysis. Storage systems, performance and location strategies, automated storage systems, AS/RS, types. Automatic identification methods, Barcode technology, RFID.

UNIT – III

Manufacturing Systems and Automated Production Lines: Manufacturing systems: components of a manufacturing system, Single station manufacturing cells; Manual Assembly lines, line balancing Algorithms, Mixed model Assembly lines, Alternative Assembly systems. Automated production lines, Applications, Analysis of transfer lines.

UNIT – IV

Automated Assembly Systems: Fundamentals, Analysis of Assembly systems. Cellular manufacturing, part families, cooling, production flow analysis. Group Technology and flexible Manufacturing systems, Quantitative Analysis.

UNIT – V

Quality Control and Support Systems: Quality in Design and manufacturing, inspection principles and strategies, Automated inspection, contact Vs non contact, CMM. Manufacturing support systems. Quality function deployment, computer aided process planning, concurrent engineering, shop floor control, just in time and lean production.

TEXT BOOK:

1. Automation, production systems and computer integrated manufacturing/ Mikell.P Groover/PHI/3rd edition/2012.

REFERENCES:

1. Automation, Production Systems and CIM/ Mike J P. Grower/PHI
2. System Approach to Computer Integrated Design and Manufacturing/ Singh/John Wiley /96.
3. CAD/CAM/CIM/ P. **R**adha Krishnan **& S**. Subrahamanyarn and Raju/New Age International Publishers/2003.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES (AUTONOMOUS)

M.Tech – I year I Sem. (CAD/CAM)

COMPUTER AIDED PROCESS PLANNING

(Core Elective – II)

UNIT-I

Introduction: The Place of Process Planning in the Manufacturing cycle-Process planning and production Planning-Process planning and Concurrent Engineering, CAPP, Group Technology.

UNIT-II

Part Design Representation: Design Drafting-Dimensioning-Conventional Tolerance- Geometric Tolerance-CAD-input/output devices-Topology - Geometric transformation-Perspective transformation-Data Structure-Geometric modeling for process planning--GT Coding-The OPITZ system-The MICLASS System.

UNIT-III

Process Engineering and Process Planning: Experience based planning-Decision table and Decision trees-Process capability analysis-Process planning-Variant process planning-Generative approach-Forward and backward planning, Input format, AI.

UNIT-IV

Computer Aided Process Planning Systems: Logical Design of process planning- Implementation considerations-Manufacturing system components, Production Volume, No. of production families - CAM-I, CAPP, MIPLAN, APPAS, AUTOPLAN and PRO, CPPP.

UNIT-V

An Integrated Process Planning Systems: Totally integrated process planning systems-An Overview-Modulus structure-Data Structure-Operation-Report Generation, Expert process planning

TEXT BOOKS:

1. Gideon Halevi and Roland D. Weill, "Principle of process planning- A Logical Approach", Chapman & Hall, 1995
2. Chang T. C. & Richard A.Wysk, "An Introduction to automated process planning systems", PrenticeHall1985

REFERENCE BOOKS:

1. Chang,T.C., "An Expert Process Planning System", Prentice Hall,1985
2. Nanua Singh, "Systems Approach to Computer Integrated Design and Manufacturing", John Wiley &Sons,1996
3. Rao P.N., "Computer Aided Manufacturing", Tata McGraw Hill Publishing Co., 2000.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES (AUTONOMOUS)

M.Tech – I year I Sem. (CAD/CAM)

MANUFACTURING SYSTEMS- SIMULATION MODELLING AND ANALYSIS

(Core Elective – II)

UNIT - I:

System – ways to analyze the system – Model - types of models – Simulation – Definition – Types of simulation models – steps involved in simulation – Advantages & Disadvantages. Parameter estimation – estimator – properties – estimate – point estimate – confidence interval estimates – independent – dependent – hypothesis – types of hypothesis- steps – types 1& 2 errors – Framing – strang law of large numbers.

UNIT - II:

Building of Simulation model – validation – verification – credibility – their timing – principles of valid simulation Modeling – Techniques for verification – statistical procedures for developing credible model. Modeling of stochastic input elements – importance – various procedures – theoretical distribution – continuous – discrete – their suitability in modeling.

UNIT - III:

Generation of random variates – factors for selection – methods – inverse transform – composition – convolution – acceptance – rejection – generation of random variables – exponential – uniform – weibull – normal Bernoullie – Binomial – uniform – poisson. Simulation languages – comparison of simulation languages with general purpose languages – Simulation languages vs Simulators – software features – statistical capabilities – G P S S – SIMAN- SIMSCRIPT –Simulation of M/M/1 queue – comparison of simulation languages.

UNIT - IV:

Output data analysis – Types of Simulation w.r.t output data analysis – warmup period- Welch algorithm – Approaches for Steady – State Analysis – replication – Batch means methods – comparisons

UNIT – V:

Applications of Simulation – flow shop system – job shop system – M/M/1 queues with infinite and finite capacities – Simple fixed period inventory system – Newboy paper problem.

TEXT BOOKS:

1. Simulation Modeling and Analysis / Law, A.M.& Kelton / McGraw Hill, 2nd Edition, New York, 1991.
2. Discrete Event System Simulation / Banks J. & Carson J.S., PH / Englewood Cliffs, NJ, 1984.

REFERENCE BOOKS:

1. Simulation of Manufacturing Systems / Carrie A. / Wiley, NY, 1990.
2. A Course in Simulation / Ross, S.M., McMillan, NY, 1990.
3. Simulation Modelling and SIMNET / Taha H.A. / PH, Englewood Cliffs.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES (AUTONOMOUS)

M.Tech – I year I Sem. (CAD/CAM)

NUMERICAL METHODS FOR ENGINEERING APPLICATIONS

(Open Elective – I)

UNIT-I

Introduction to finite difference formula- Parabolic Equation: Introduction – Explicit finite difference approximation to one dimensional equation Crank – Nicholson implicit method – derivation boundary conditions.

UNIT-I

Alternate direction implicit (ADI) method finite difference in cylindrical and spherical polar co-ordinates. **Convergence stability and consistency:** Definitions of local truncation error and consistency convergence analysis – stability analysis by matrix method Eigen value von Newman stability methods, global rounding error-local truncation error-lax's equation theorem.

UNIT-III

Hyperbolic Equations: Analytical solution of 1^{st} order quasi linear equation – numerical integration along a characteristic lax wenderoff explicit method.

CFI condition wenderoff implicit approximation – propagation of discontinues – Numerical solution by the method of characteristics.

UNIT-IV

Elliptic Equations: Introduction – Finite differences in polar co-ordinates – formulas for derivative near a curved boundary analysis of the discretization error of the five point approximation to polman's equation over a rectangle.

UNIT-V

Systematic iterative methods for large linear systems – necessary and sufficient condition for convergence of iterative methods – stones implicit methods.

Finite Element Method: weighted residual method – variations methods – division of the region into elements linear element – Galerkin formulation.

TEXT BOOKS:

1. Numerical Solution of partial differential equations, Finite Differences methods/ G.D. Smith/ Brunel University, Clarandon Press Oxford.
2. The Finite Differences Methods in Partial Differential equation/ A.R. Mitchel and D.F. Grnra/ John Wiley.

REFERENCES:

1. Numerical Methods for Engineers and scientists/Joe D. Hoffman/ Mc Graw Hill
2. Applied Finite Element Analysis/ Larry J. Segerlind/ John Wiley.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES (AUTONOMOUS)

M.Tech – I year I Sem. (CAD/CAM)

PRODUCTION AND OPERATIONS MANAGEMENT

(Open Elective –I)

UNIT -I

Operation Management: Definition – Objectives – Types of production systems – historical development of operations management – Current issues in operation management. Product design – Requirements of good product design – product development – approaches – concepts in product development – standardization – simplification – Speed to market – Introduction to concurrent engineering.

UNIT – II

Value Engineering: objective – types of values – function & cost – product life cycle- steps in value engineering – methodology in value engineers – FAST Diagram – Matrix Method. Location – Facility location and layout – Factors considerations in Plant location- Comparative Study of rural and urban sites – Methods of selection plant layout – objective of good layout – Principles – Types of layout – line balancing.

UNIT - III

Aggregate Planning: definition – Different Strategies – Various models of Aggregate Planning – Transportation and graphical models. Advance inventory control systems push systems – Material Requirement – Terminology – types of demands – inputs to MRP- techniques of MRP – Lot sizing methods – benefits and drawbacks of MRP –Manufacturing Resources Planning (MRP –II), Pull systems – Vs Push system – Just in time (JIT) philosophy Kanban System – Calculation of number of Kanbans Requirements for implementation JIT – JIT Production process – benefits of JIT.

UNIT - IV

Scheduling: Policies – Types of scheduling – Forward and Backward Scheduling – Gantt Charts – Flow shop Scheduling – n jobs and 2 machines, n jobs and 3 machines – job shop Scheduling – 2 jobs and n machines – Line of Balance.

UNIT – V

Project Management: Programming Evaluation Review Techniques (PERT) – three times estimation – Critical path – probability of completion of project – critical path method – crashing of simple nature.

TEXT BOOKS:

1. Operations Management/ E.S. Buffs/ John Wiley & Sons / 2007
2. Operations Management Theory and Problems/ Joseph G. Monks / Macmillan / McGraw Hill / 3rd Edition.

REFERENCES:

1. Production Systems Management/ James I. Riggs / John Wiley & Sons.
2. Production and Operations Management/ Chary/ Mc Graw Hill/2004
3. Operations Management/ Richard Chase/ Mc Graw Hill/2006

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(AUTONOMOUS)

M.Tech – I year I Sem. (CAD/CAM)

COMPUTER AIDED DESIGN LAB

Creation of working drawing, creating geometry, constraining the profile, extracting a part using tools, creating pattern of holes, translating rotating, mirroring, managing the specification tree. Creating sheets and views, creating text and dimensions, creating an assembly, moving components, assembling existing components, creating bill of materials, creating wire frame and surface geometry using generative shape design and sweep tools. Generation of Ferguson's cubic surface patches, Bezier surface patches. Coons patch. Import and export of drawing from other software.

Linear static analysis, Automatic calculation of rigid body modes, uses specified Eigen value shift, lumped and consistent mass matrices. Buckling analysis, Jacobi inverse iteration techniques. Steady state harmonic response, mode superposition method, overall structural and damping, linear dynamic analysis, non linear static analysis, non- linear dynamic analysis. Steady state heat transfer analysis problems. Transient heat transfer analysis. Familiarity with element library. Defining Boundary conditions, multipoint constraint familiarity with different types of loads. Solution techniques, direct and iterative solver. Results and analysis. Design optimization.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES (AUTONOMOUS)

M.Tech – I year II Sem. (CAD/CAM)

DESIGN FOR MANUFACTURING AND ASSEMBLY

(Core Course IV)

UNIT I

INTRODUCTION: Design philosophy steps in Design process - General Design rules for manufacturability - basic principles of design Ling for economical production - creativity in design. Materials: Selection of Materials for design Developments in Material technology - criteria for material selection - Material selection interrelationship with process selection process selection charts.

UNIT II

MACHINING PROCESS: Overview of various machining processes - general design rules for machining - Dimensional tolerance and surface roughness - Design for machining - Ease - Redesigning of components for machining ease with suitable examples. General design recommendations for machined parts.

METAL CASTING: Appraisal of various casting processes, selection of casting process, - general design considerations for casting - casting tolerances - use of solidification simulation in casting design - product design rules for sand casting.

UNIT III

METAL JOINING: Appraisal of various welding processes, Factors in design of weldments - general design guidelines - pre and post treatment of welds - effects of thermal stresses in weld joints - design of brazed joints. Forging - Design factors for forging - Closed dies forging design - parting lines of die5 drop forging die design - general design recommendations. Extrusion & Sheet Metal Work: Design guidelines for extruded sections - design principles for Punching, Blanking, Bending, and Deep Drawing - Keeler Goodman Forming Line Diagram - Component Design for Blanking.

UNIT-IV

ASSEMBLE ADVANTAGES: Development of the assemble process, choice of assemble method assemble advantages social effects of automation.

AUTOMATIC ASSEMBLY TRANSFER SYSTEMS: Continuous transfer, intermittent transfer, indexing mechanisms, and operator - paced free – transfer machine.

UNIT-V

DESIGN OF MANUAL ASSEMBLY: Design for assembly fits in the design process, general design guidelines for manual assembly, development of the systematic DFA methodology, assembly efficiency, classification system for manual handling, classification system for manual insertion and fastening, effect of part symmetry on handling time, effect of part thickness and size on handling time, effect of weight on handling time, parts requiring two hands for manipulation, effects of combinations of factors, effect of symmetry effect of chamfer design on insertion operations, estimation of insertion time.

TEXT BOOKS:

1. Product Design for Manufacturing and Assembly/ Geoffrey Boothroyd, Peter Dewhurst & Winston Ansthony Knight/CRC Press/2010
2. Assembly Automation and Product Design/ Geoffrey Boothroyd/ Marcel Dekker Inc., NY, 1992.

REFERENCES:

1. Hand Book of Product Design/ Geoffrey Boothroyd/ Marcel and Dekken, N.Y. 1990.
2. Computer Aided Assembly London/ A Delbainbre/.
3. Engineering Design - Material & Processing Approach/ George E. Deiter/McGraw Hill Intl. 2nd Ed. 2000.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES (AUTONOMOUS)

M.Tech – I year II Sem. (CAD/CAM)

FLEXIBLE MANUFACTURING SYSTEMS

(Core Course V)

UNIT- I

Introduction to flexible manufacturing systems. Planning and scheduling and control o FMS. Knowledge based scheduling.

UNIT – II

Hierarchy of computer control. Supervisory computer.

UNIT - III

Software for simulation and database of FMS. Specification and selection, trends, application of simulation software.

UNIT - IV

Manufacturing data systems data flow, CAD/CAM considerations. Planning FMS database, just in time characteristics, Pull method, quality small lot sizes, work station loads, close supplier ties, flexible workforce — line flow strategy.

UNIT - V

Preventive maintenance. Karban system, implementation issues.

TEXT BOOKS:

1. Hand Book of Flexible Manufacturing Systems/ Jha N K/ Academic Press.
2. Production System l3eyond Large Scale Production/ Talichi Ohno/ Toyota Productivity Press India Pvt. Lid.

REFERENCE:

1. Flexible Manufacturing Systems/ H K Shivanand/New Age International/2006

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(AUTONOMOUS)

M.Tech – I year II Sem. (CAD/CAM)

INDUSTRIAL ROBOTICS

(Core Course VI)

UNIT - I

INTRODUCTION: Automation and Robotics, Robot anatomy, robot configuration, motions joint notation work volume, robot drive system, control system and dynamic performance, precision of movement.

CONTROL SYSTEM AND COMPONENTS: basic concept and modals controllers control system analysis, robot activation and feedback components. Positions sensors, velocity sensors, actuators sensors, power transmission system.

UNIT - II

MOTION ANALYSIS AND CONTROL: Manipulator kinematics, position representation forward transformation, homogeneous transformation, manipulator path control, robot dynamics, configuration of robot controller.

UNIT - III

END EFFECTORS: Grippers-types, operation, mechanism, force analysis, tools as end effectors consideration in gripper selection and design. SENSORS: Desirable features, tactile, proximity and range sensors, uses sensors in robotics.

MACHINE VISION: Functions, Sensing and Digitizing-imaging, Devices, Lighting techniques, Analog to digital single conversion, image storage, Image processing and Analysis-image data reduction, Segmentation feature extraction. Object recognition, training the vision system, Robotics application.

UNIT - IV

ROBOT PROGRAMMING: Lead through programming, Robot programming as a path in space, Motion interpolation, WAIT, SINONAL AND DELAY commands, Branching capabilities and Limitations.

ROBOT LANGUAGES: Textual robot Languages, Generation, Robot language structures, Elements in function.

UNIT - V

ROBOT CELL DESGIN AND CONTROL: Robot cell layouts-Robot centered cell, In-line robot cell, Considerations in work design, Work and control, Inter locks, Error detect ion, Work wheel controller.

ROBOT APPLICATION: Material transfer, Machine loading/unloading. Processing operation, Assembly and Inspection, Feature Application.

TEXT BOOKS:

1. Industrial Robotics / Groover M P /Pearson Edu.
2. Introduction to Robotic Mechanics and Control by JJ Craig, Pearson, 3rd edition.

REFERENCES:

1. Robotics / Fu K S/ McGraw Hill.
2. Robotic Engineering / Richard D. Klafter, Prentice Hall

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES (AUTONOMOUS)

M.Tech I year II Sem. (CAD/CAM)

INTELLIGENT MANUFACTURING SYSTEMS

(Core Elective III)

UNIT I

Computer Integrated Manufacturing Systems Structure and functional areas of CIM system, - CAD, CAPP, CAM**,** CAQC, ASRS. Advantages of CIM. Manufacturing Communication Systems - MAP/TOP, OSI Model, Data Redundancy, Top- down and Bottom-up Approach, Volume of Information. Intelligent Manufacturing System Components, System Architecture and Data Flow, System Operation.

UNIT II

Components of Knowledge Based Systems - Basic Components of Knowledge Based Systems, Knowledge Representation, Comparison of Knowledge Representation Schemes, Interference Engine, Knowledge Acquisition.

UNIT III

Machine Learning - Concept of Artificial Intelligence, Conceptual Learning, Artificial Neural Networks - Biological Neuron, Artificial Neuron, Types of Neural Networks, Applications in Manufacturing.

UNIT IV

Automated Process Planning - Variant Approach, Generative Approach, Expert Systems for Process Planning, Feature Recognition, Phases of Process planning. Knowledge Based System for Equipment Selection (KBSES) - Manufacturing system design. Equipment Selection Problem, Modeling the Manufacturing Equipment Selection Problem, Problem Solving approach in KBSES, Structure of the KRSES.

UNIT V

Group Technology: Models and Algorithms Visual Method, Coding Method, Cluster Analysis Method, Matrix Formation - Similarity Coefficient Method, Sorting-based Algorithms, Bond Energy Algorithm, Cost Based method, Cluster Identification Method, Extended CI Method. Knowledge Based Group Technology - Group Technology in Automated Manufacturing System. Structure of Knowledge based system for group technology (KBSCIT) — Data Base, Knowledge Base, Clustering Algorithm.

TEXT BOOKS:

1. Intelligent Manufacturing Systems/ Andrew Kusiak/Prentice Hall.
2. Artificial Neural Networks/ Yagna Narayana/PHI/2006

REFERENCES:

1. Automation, Production Systems and CIM / Groover M.P./PHI/2007
2. Artificial neural networks/ B.Vegnanarayana/PHI
3. Introduction to Artificial Neural Systems/Jacek M. Zurada/JAICO Publishing House Ed. 2006.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES (AUTONOMOUS)

M.Tech I year II Sem. (CAD/CAM)

ADVANCED MATERIALS PROCESSING

(Core Elective III)

UNIT I

Introduction to Advanced Materials Processing, Need and development of processes, Applications.

Advanced casting I: Introduction, Principle of Stir casting, steps in stir casting process, Factors affecting in stir casting process: stirring speed stirring time and temperature, preheat temperature of the mold, particle distribution, wettability between reinforcement and liquid metal and porosity Advantages and application, composite preparation, analysis of composite

UNIT II

Advanced casting II: Squeeze casting process, advantages Slip casting: principle, applications, advantages and limitations. Gel casting: principle, applications, advantages and limitations

UNIT III

Advanced Joining Processes I: Brief introduction to TIG, MIG, plasma welding processes, applications and advantages Friction welding , process variables and applications and advantages Friction stir processing, process variables and applications and advantages.

UNIT IV

Advanced Joining Processes II: Electron beam welding , process variables and applications and advantages Hybrid welding processes, TIG and Plasma arc welding process Laser beam welding , process variables and applications and advantages

UNIT V

Advanced Metal forming: Hot and cold deformation processes, high energy rate forming, Explosive forming, hydraulic forming etc.

Surface Coating: Coating Materials, Coating on different materials, Coating methods and its applications, Limitations.

TEXT BOOKS:

1. Richard W Heine, Principles of Metal Casting, Tata Mcgraw Hill Education Private Limited, 2003.
2. R.S.Mishra, Friction stir welding and processing, ASM International, 2007.
3. Nadkarni S.V. Modern Arc Welding Technology, Oxford IBH Publishers, 1996.

REFERENCES:

1. Surender Kumar, Technology of Metal Forming Processes, Prentice-Hall, Inc., 2008
2. M.C. Shaw, Metal Cutting Principles, Oxford University Press, 2nd Edition, 2004.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(AUTONOMOUS)

M.Tech I year II Sem. (CAD/CAM)

OPTIMIZATION TECHNIQUES AND APPLICATIONS

(Core Elective III)

UNIT- I

Single Variable Non-Linear Unconstrained Optimization: Elimination Methods: Uni-Model function-its importance, Fibonacci method, & Golden section method. Interpolation methods: Quadratic & Cubic interpolation methods.

UNIT- II

Multi variable non-linear unconstrained optimization: Direct search methods – Uni variant method, Pattern search methods – Powell's, Hook - Jeeves, Rosen rock search methods. Gradient methods: Gradient of function& its importance, Steepest descent method, Conjugate direction methods: Fletcher-Reeves method,& variable metric method.

UNIT- III

Linear Programming – Formulation, Simplex Method & Artificial Variable Optimization Techniques: Big M & Two Phase Methods. Sensitivity Analysis: Changes In The Objective Coefficients, Constants& Coefficients Of The Constraints. Addition And Deletion Of Variables, Constraints.

Simulation – Introduction – Types- steps – applications: inventory & queuing – Advantages and disadvantages

UNIT- IV

Integer Programming- Introduction – formulation – Gomory cutting plane algorithm – Zero or one algorithm, branch and bound method

Stochastic Programming:Basic concepts of probability theory, random variables- distributions-mean, variance, correlation, co variance, joint probability distribution. Stochastic linear programming: Chance constrained algorithm.

UNIT- V

Geometric Programming: Posynomials – Arithmetic - Geometric inequality – unconstrained G.P-constrained G.P(≤ type only)

Non Traditional Optimization Algorithms: Genetics Algorithm-Working Principles, Similarities and Differences between Genetic Algorithm & Traditional Methods. Simulated Annealing- Working Principle-Simple Problems. Introduction to Particle Swarm Optimization(PSO)(very brief)

TEXT BOOKS:

1. Optimization theory & Applications / S.S.Rao / New Age International.
2. Optimization for Engineering Design, Kalyanmoy Deb, PHI

REFERENCE BOOKS:

1. S.D.Sharma / Operations Research
2. Operation Research / H.A.Taha /TMH
3. Optimization in operations research / R.LRardin
4. Optimization Techniques /Benugundu&Chandraputla / Pearson Asia.
5. Optimization Techniques theory and practice / M.C.Joshi, K.M.Moudgalya/ Narosa Publications

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(AUTONOMOUS)

M.Tech I year II Sem. (CAD/CAM)

ADVANCED MECHATRONICS

(Core Elective IV)

UNIT-I

Mechatronics systems, elements, levels of Mechatronics system, Mechatronics design process, system, measurement systems, control systems, microprocessor-based controllers, advantages and disadvantages of Mechatronics systems. Sensors and transducers, types, displacement, position, proximity, velocity, motion , force, acceleration, torque, fluid pressure, liquid flow, liquid level, temperature and light sensors.

UNIT-II

Solid state electronic devices, PN junction diode, BJT, FET, DIA and TRIAC. Analog signal conditioning, amplifiers, filtering. Introduction to MEMS & typical applications.

UNIT-III

Hydraulic and pneumatic actuating systems, Fluid systems, Hydraulic and pneumatic systems, components, control valves, electro-pneumatic, hydro-pneumatic, electro-hydraulic servo systems: Mechanical actuating systems and electrical actuating systems.

UNIT-IV

Digital electronics and systems, digital logic control, micro processors and micro controllers, programming, process controllers, programmable logic controllers, PLCs versus computers, application of PLCs for control.

UNIT-V

System and interfacing and data acquisition, DAQS, SCADA, A to D and D to A conversions; Dynamic models and analogies, System response. Design of Mechatronics systems & future trends.

TEXT BOOKS:

1. MECHATRONICS Integrated Mechanical Electronics Systems/KP Ramachandran & GK Vijaya Raghavan/WILEY India Edition/2008
2. Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering by W Bolton, Pearson Education Press, 3rd edition, 2005.

REFERENCES:

1. Mechatronics Source Book by Newton C Braga, Thomson Publications, Chennai.
2. Mechatronics – N. Shanmugam / Anuradha Agencies Publishers.
3. Mechatronics System Design / Devdas shetty/Richard/Thomson.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES (AUTONOMOUS)

M.Tech I year II Sem. (CAD/CAM)

DESIGN AND MANUFACTURING OF MEMS AND MICRO SYSTEMS

(Core Elective-IV)

UNIT – I

Overview and Working Principles of Mems and Microsystems: MEMS & Microsystems, Evolution of Micro fabrication, Microsystems & Microelectronics, Microsystems & Miniaturization, Applications of MEMS in Industries, Micro sensors, Micro actuation, MEMS with Micro actuators Micro accelerometers, Micro fluidics.

UNIT – II

Engineering Science for Microsystems Design and Fabrication: Atomic structure of Matter, Ions and Ionization, Molecular Theory of Matter and Intermolecular Forces, Doping of Semiconductors, The Diffusion Process, Plasma Physics, Electrochemistry, Quantum Physics

UNIT – III

Engineering Mechanics for Microsystems Design: Static Bending of Thin Plates, Mechanical Vibration, Thermo mechanics Fracture Mechanics, Thin-Film Mechanics, Overview of Finite Element Stress Analysis

UNIT – IV

Thermo Fluid Engineering & Microsystems Design: Overview of Basis of Fluid Mechanics in Macro and Mesoscales, Basic equations in Continuum Fluid Dynamics, Laminar Fluid Flow in Circular Conduits, Computational Fluid Dynamics, Incompressible Fluid Flow in Micro conduits, Fluid Flow in Sub micrometer and Nanoscale, Overview of Heat conduction in Solids, Heat conduction in Multilayered Thin films and in solids in sub micrometer scale, Design Considerations, Process Design Mechanical Design, Mechanical Design using FEM, Design of a Silicon Die for a Micro pressure Sensor

UNIT – V

Materials for Mems & Microsystems and Their Fabrication: Substrates and Wafers, Active substrate materials, Silicon as a substrate material, Silicon Compounds, Silicon Piezo resistors, Gallium Arsenide, Quartz, Piezoelectric Crystals and Polymers, Photolithography, Ion implantation, Diffusion and oxidation, Chemical and physical vapor deposition, Etching, Bulk micro manufacturing, Surface Micromachining, The LIGA Process.

TEXT BOOKS:

1. Tai – Ram Hsu, MEMS & Microsystems: Design & Manufacturing, Tata Mc-Graw Hill,.ed.,2002
2. Maluf, M., “An Introduction to Microelectromechanical Systems Engineering”, Artech House, Boston, 2000

REFERENCES

1. Trimmer, W.S.N., “Micro robots and Micromechanical Systems”, Sensors & Actuators, vol. 19, no.1989.
2. Trim, D.W., “Applied Partial Differential Equations”, PWS-Kent Publishing, Boston, 1990.
3. Madou, M. ”Fundamentals of Microfabrication”, CRC Press, Boca Raton, 1997.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES (AUTONOMOUS)

M.Tech I year II Sem. (CAD/CAM)

FUZZY LOGIC AND NEURAL NETWORKS

(Core Elective-IV)

UNIT-I

Knowledge and Processing – Knowledge and Intelligence- logic frames- production systems. Fundamentals of Fuzzy logic-characteristics of fuzzy logic and systems-Fuzzy sets-Fuzzy number-Equality of fuzzy sets- Empty Fuzzy set –Fuzzy point-universal Fuzzy set. Operations on Fuzzy sets-Intersection-union –complement.

UNIT-II

Fuzzy Relations-classical N-Array Relation-Reflexivity-Anti reflexivity-symmetricity Transitivity-Equivalence-Binary fuzzy relations, operation on Fuzzy relations-Intersection union-projection-Cartesian product.

UNIT-III

Fuzzy Implications, Translation rules, Triangular norms, Triangular conorm, Fuzzy Rule base system, Fuzzy logic controller, Defuzzification Methods, Fuzzy logic applications-prevention of Road accidents-control room temperature-Robot control system-domestic applications Industrial applications.

UNIT-IV

Basic concepts of Neural Network-Processing units-connection between units-output rules- Network topologies-paradigms of learning –perception, Back-propagation, classification Models-Association Models, optimization models.

UNIT-V

Rule Based Neural Networks-Network Training –Application of Neural Network in Mathematical Modeling- Knowledge based approaches-applications in Mechanical Engineering –Fuzzy –Neural, example, Neuro –Fuzzy examples-Intelligence in Automation.

TEXT BOOKS:

1. Fuzzy logic &Neural Networks/ Chennakesava R. Alavala/ New Age International,2008
2. Intelligent Control Fuzzy Logic Applications/ Clarence W.de Silva/ CRS Press,1995.

REFERENCES

1. Fuzzy Logic with engineering Applications/ Timothy J. Ross/ Mc Graw Hill Inc., 1995.
2. Neural Networks in Computer Intelligence/ Limin Fu / Tata McGraw Hill Publishing Company Ltd.,2003
3. Stamations and Understanding Neural Networks and Fuzzy Logic/ V. Karthalopoulos
4. Basic concepts Applications, IEE Neural Networks Council PHI 2001.
5. Neural Networks Algorithms, Applications/ James A. Freeman and David M. Skapura &Programming Techniques/ Pearson Education Asia,2001

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(AUTONOMOUS)

M.Tech I year II Sem. (CAD/CAM)

ENGINEERING RESEARCH AND METHODOLOGY

(OPEN ELECTIVE II)

UNIT-I

Research Methodology: An Introduction: Meaning of Research, Objectives of Research and Motivation in Research. Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method. Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India

Defining the Research Problem: What is a Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration, and Conclusion.

UNIT-II

Research Design: Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Conclusion

Sampling Design: Census and Sample Survey, Implications of a Sample Design, Steps in Sampling Design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs, How to Select a Random Sample? , Random Sample from an Infinite Universe, Complex Random Sampling Designs.

UNIT-III

Measurement and Scaling Techniques: Measurement in Research, Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement, Technique of Developing Measurement Tools, Scaling, Meaning of Scaling, Scale Classification Bases, Important Scaling Techniques, Scale Construction Techniques

Methods of Data Collection: Collection of Primary Data, Observation Method, Interview Method, Collection of Data through Questionnaires, Collection of Data through Schedules, Difference between Questionnaires and Schedules, Some Other Methods of Data Collection, Collection of Secondary Data

UNIT-IV

Processing and Analysis of Data: Processing Operations, Some Problems in Processing, Elements/Types of Analysis, Statistics in Research Measures of Central Tendency, Measures of Dispersion Measures of Asymmetry (Skewness), Measures of Relationship Simple Regression Analysis, Multiple Correlation and Regression, Partial Correlation Association in Case of Attributes, Other Measures

Analysis of Variance and Covariance :Analysis of Variance (ANOVA), What is ANOVA?, The Basic Principle of ANOVA, ANOVA Technique, Setting up Analysis of Variance Table, Short-cut Method for One-way ANOVA, Coding Method, Two-way ANOVA, ANOVA in Latin-Square Design, Analysis of Co-variance (ANOCOVA), ANOCOVA Technique, Assumptions in ANOCOVA- Case studies.

UNIT-V

Interpretation and Report Writing: Meaning of Interpretation, Why Interpretation?, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports.

TEXT BOOKS:

1. Research Methodology: Methods and Trends by Dr. C. R. Kothari
2. Research methodology: an introduction for science & engineering students", by Stuart Melville and Wayne Goddard

REFERENCES

1. Research Methodology: An Introduction" by Wayne Goddard and Stuart Melville

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(AUTONOMOUS)

M.Tech I year II Sem. (CAD/CAM)

QUALITY ENGINEERING IN MANUFACTURING

(Open Elective II)

UNIT I

Quality Value and Engineering: An overall quality system, quality engineering in production design, quality engineering in design of production processes. Loss Function and Quality Level: Derivation and use of quadratile loss function, economic consequences of tightening tolerances as a means to improve quality, evaluations and types tolerances.(N-type, S-type and L-type)

UNIT II

Orthogonal Arrays: Typical test strategies, better test strategies, efficient test strategies, steps in designing, conducting and analyzing an experiment. Interpolation of Experimental Results: Interpretation methods, percent contributor, estimating the mean

UNIT III

Analysis of Variance (ANOVA): NO-way ANOVA, One-way ANOVA, Two-way ANOVA, Critique of F-test, ANOVA for four level factors, multiple level factors.

Regression Analysis: Measures of Relationship Simple Regression Analysis, Multiple Correlation and Regression

UNIT IV

Tolerance Design and Tolerancing: Functional limits, tolerance design for N-type. L-type and S-type characteristics, tolerance allocation fbr multiple components. Parameter and Tolerance Design: Introduction to parameter design, signal to noise ratios, Parameter design strategy, some of the case studies on parameter and tolerance designs.

UNIT V

ISO-9000 Quality System, BPRE, 6.-sigma, Bench marking, Quality circles Brain Storming
— Fishbone diagram — problem analysis.

TEXT BOOKS:

1. Taguchi Techniques for Quality Engineering / Phillip J. Ross / McGraw Hill, Intl. II Edition,1995
2. Quality Engineering in Production systems *I* G. Taguchi, A. Elsayed et al **/** Mc.Graw Hill Intl. Edition, 1989**.**

REFERENCE:

1. Taguchi Methods explained: Practical steps to Robust Design **/** Papan P. Bagchi *I* Prentice Hall md. Pvt. Ltd., New Delhi.

JAYAMUKHI INSTITUTE OF TECHNOLOGICAL SCIENCES
(AUTONOMOUS)

M.Tech I year II Sem. (CAD/CAM)

COMPUTER AIDED MACHINING LAB

Features and selection of CNC turning and milling centers. Practice in part programming and operation of CNC turning machines, subroutine techniques and use of cycles. Practice in part programming and operating a machining center, tool Joining and selection of sequences of operations, tool setting on machine, practice in APT based NC programming.