COURSE STRUCTURE
AND
DETAILED SYLLABUS
for

M. Tech CAD/CAM (CBCS SCHEME)

Academic Year 2015-2016

DEAPRTMENT OF MECHANICAL ENGINEERING

SNIST
Sreenidhi Institute of Science and Technology
Because, Life is all about taking the right decisions
A U T O N O M O U S

SREENIDHI INSTITUTE OF SCIENCE TECHNOLOGY

(An Autonomous Institution approved by UGC and affiliated tJNTUH)
Yamnampet, Ghatkesar Mandal, Hyderabad - 501 301.

SREENIDHI INSTITUTE OF SCIENCE & TECHNOLOGY (AUTONOMOUS)

CBCS
M.Tech. (CAD/CAM)
Course Structure and Syllabus
For the Academic Year: 2015-2016

I Year – I Semester:

Code	Subject	L	T	P	Credits	Internal marks	External Marks
5W101	Advanced CAD & CAM	3	1	--	3	25	75
5W102	Advanced Finite Element Analysis	3	1	--	3	25	75
5W103	Advanced Manufacturing Processes and Simulations	3	1	--	3	25	75
5W104	Advanced Mechanics of Solids	3	1	--	3	25	75
5W105	Research Methodology	2	--	--	2	25	75
	Professional Elective – I	3	1	--	3	25	75
	Professional Elective – II	3	1	--	3	25	75
5W171	Advanced CAD & CAM Lab	--	--	4	2	25	75
5W172	Comprehensive Viva -I	--	---	--	1	100	--
5W173	Literature Review and Seminar 1	-	-	3	1	100	-
	Total Credits	**20**	**6**	**7**	**24**	**400**	**600**

L - Lectures; T = Tutorial; P = Practical; C = Credits

Code	Professional Elective – I	Code	Professional Elective – II
5W106	Mechatronics	**5W108**	Design of Press Tools & Tool Design
5W107	Dynamics and Mechanism Design	**5W109**	Mechanics and Manufacturing Methods of Composites
5P110	Information Retrieval System	**5PC22**	Data Ware housing and Data Mining
5VC19	Nano Science and Nanotechnology	**5VC20**	Production and Characterization of Nano Materials

I Year – II Semester:

Code	Subject	L	T	P	Credits	Internal Marks	External marks
5W210	Automation & Robotics	3	1	--	3	25	75
5W211	Flexible Manufacturing Systems & CAPP	3	1	--	3	25	75
5W212	Optimum Design of Mechanical Elements	3	1	--	3	25	75
5W213	Design for Manufacturing & Assembly	3	1	--	3	25	75
	Professional Elective – III	3	1	--	3	25	75
	Open Elective	3	1	--	3	25	75
5W275	Computer Aided Analysis and Robotics Lab	--	--	4	2	25	75
5W276	Comprehensive Viva -II	--	---	--	1	100	--
5W277	Literature Review & Seminar -2	--	--	3	1	100	--
5W278	Project Seminar-I(Abstract)	--	--	3	2	100	--
	Total Credits	**18**	**6**	**10**	**24**	**475**	**525**

L - Lectures; T = Tutorial; P = Practical; C = Credits

Code	Professional Elective – III	Code	Open Elective
5W214	Rapid Prototyping, Tooling & Manufacture	**5ZC13**	Entrepreneurship and Innovation
5W215	Advanced Mechanical Vibrations & Condition Monitoring	**5ZC03**	Banking operations, Insurance & Risk Management
5RC16	Big Data Analytics	**5H233**	Ethics, Morals, Gender Sensitizations and Yoga
5VC21	Nano Fluids for Energy Systems	**5RC17**	Data Base Management Systems

II Year - I Semester:

Code	Subject	L	T	P	Credits	Marks	
						Int.	**Ext.**
5W379	Project Seminar-II (Design, Construction and Development)	--	--	--	4	100	--
5W381	Project work (Part – I) (Project Status Report)	--	--	--	20	**Grading**	--
Total Credits		--	--	--	**24**	**100**	---

Grading: A: Excellent, **B:** Good, **C:** Satisfactory, **D:** Unsatisfactory

II Year - II Semester:

Code	Subject	L	T	P	Credits	Marks	
						Int.	**Ext.**
5W482	Project Seminar-III (Results Analysis)	--	--	--	2	100	--
5W483	Pre- Submission Project Seminar	---	--	--	2	100	--
5W484	Project work and Dissertation	--	--	---	20	--	**Grading**
Total Credits		--	--	---	**24**	**200**	--

Grading: A: Excellent, **B:** Good, **C:** Satisfactory, **D:** Unsatisfactory

M.Tech. (CAD/CAM) I Year – I Sem.
ADVANCED CAD & CAM

L	T	P	C
3	1	-	3

CODE: 5W101

Unit – I: CAD Tools:

Definition of CAD Tools, Types of system, CAD/CAM system evaluation criteria, brief treatment of input and output devices. Graphics standard, functional areas of CAD, Modeling and viewing, software documentation, efficient use of CAD software.

Geometric modeling: Types of mathematical representation of curves, wire frame models wire frame entities parametric representation of synthetic curves, hermite cubic splines, Bezier curves, B-splines rational curves **Surface Modeling**: Mathematical representation of surfaces, Surface model, Surface entities surface representation, parametric representation of surfaces, plane surface, ruled surface, surface of revolution, Tabulated Cylinder.

UNIT-II : Parametric Representation of Synthetic Surfaces

Hermite Bi cubic surface, **Bezier** surface, **B**- Spline surface, COONs surface, Blending surface Sculptured surface, Surface manipulation Displaying, Segmentation, Trimming, Intersection, Transformations (both 2D and 3D).**Geometric modelling-3D:**Solid modeling, Solid Representation, Boundary Representation (l3-rep), Constructive Solid Geometry (CSG). CAD/CAM Exchange: Evaluation of data-exchange format, IGES data representations and structure, STEP Architecture, implementation, ACIS & DXF. Design Applications: Mechanical tolerances, Mass property calculations, Finite Element Modeling and Analysis and Mechanical Assembly.

UNIT-III

Features of NC Machines:

Fundamentals of numerical control, advantages of NC systems, classification of NC systems, point to point, NC and CNC, incremental and absolute, open and closed loop systems; Features of N/C Machine Tools, Design consideration of NC machine tool, Methods of improving machine accuracy, Concept of Machining Centers.

UNIT-IV

NC Part Programming :

Manual programming-basic concepts, tape specifications and tape formats, functions controlled by NC (G&M codes, speed, feed tool change etc.), point to point and contour programming, canned cycles, parametric programming.

Computer-aided programming:

General information, APT programming, examples of APT programming, (2D machining only). NC programming on CAD/CAM systems, the design and implementation of post processors, introduction of STEP NC.

Unit – V : Collaborative Engineering

Collaborative Design Approaches in Design and Development, Collaborative environment, Integrated product development, Collaborative Design, Collaborative Design Principles, Changing design approaches , Collaborative design Tools, Design Systems, A web based virtual reality for collaborative product review and customization.

Unit – VI: Product Life Cycle Management through CAD

Introduction – the path to PLM, PLM life cycle model, the threads of PLM (CAD, EDM, PDM, CIM), weaving threads in to PLM, Characteristics of PLM, PLM elements, developing PLM strategy.

Students will be given Engineering Component and student has to design the components and produce its drawing and present it as assignment.

TEXT BOOK:

1. CAD/CAM Theory and Practice / Ibrahim Zeid / Mc Graw Hill international.
2. Computer aided design and manufacturing –Lalit Narayana/Mallikarjun Rao
3. Yoram Koren, 'Computer control of manufacturing systems' Mcgraw Hill intl, (1983).
4. C.S.P. Rao, 'CAD/CAM, Hi-Tech publishers, Hyd, 2004

REFERENCE BOOKS:

1. Mastering CAD/CAM / Ibrhim Zeid / Mc Graw lull international.
2. CAD/CAM / P.N.Rao / TMH.

3. James .V.Valentino and Joseph Goldenberg, ' Introduction to Computer Numerical control' Prentice Hall, Englewood cliff, New Jersey

M.Tech. (CAD/CAM) I Year – I Sem.

ADVANCED FINITE ELEMENT ANALYSIS

L	T	P	C
3	1	-	**3**

CODE: 5W102

Course Out Comes :

Unit-1: Student able to demonstrate the solution techniques for Finite Element Formulations of Mechanical Engineering Problems

Unit-2: Student able to solve stress analysis of frames ,beams and trusses with FEM Techniques

Unit-3: Student acquires knowledge of stress analysis of plates under bending with FEM formulation

Unit-4: Student gains knowledge and in position to apply FEM to solve Dynamics related problems.

Unit-5:Student will learn the method to convert heat transfer problems in to simple solvable equations through FEM

Unit-6: Student will get various ideas and approaches to handle Fluid Flow problems through FEM that leads to gain skills to develop CFD related applications.

Unit – I: Solutions of Finite Element Equations:

Introduction, Solution of Equilibrium Problems (boundary values problems), Guass elimination and Choleski methods, Solutions of Eigen value problems, Jacobi and power methods, Solution of propagation problems(initial value problems),Runga-Kutta method and finite difference method

Unit – II: **Analysis of Space truss and frame Elements:**

Introduction to truss and beam elements, Element formulation of space truss element and frame element, characteristics of stiffness matrices.

Unit – III : A**nalysis of structural plates:**

Introduction, Triangular membrane element, rectangular plate element, FEA of plates in bending, Analysis of triangular and rectangular plates bending.

Unit – IV : **Analysis of free and forced undamped vibrations:**

FE formulations of equation of motion, Natural frequencies and mode shapes of uniform stepped bars, beams and planer trusses, othogonilisation of modes, Dynamic response (forced vibration analysis) of stepped axial bar and beam.

Unit – V: Analysis of unsteady state Heat Transfer Problems:

Introduction to differential equations to unsteady state heat transfer problems, FE formulation, Time dependant temperature distribution in 1D fins and plane walls. Heat transfer problems with radiation.

Unit – VI: Analysis of Inviscid and incompressible flows:

Introduction to partial differential equations to steady state fluid flow, Potential function formulation, Stream function formulation, Finite element solutions, Numericals on 1D flow.

TEXT BOOKS:

1. "The Finite Element Methods in Engineering", S.S. Rao, Butterworth-Heinemann, 4th Edition-2004.
2. Finite and Boundary Element methods in Engineering:O.P.Gupta,Oxford &IBH Publishing Co.Pvt.Ltd.
3. "Introduction to Finite Elements in Engineering", Tirupathi R.Chandrupatla and Ashok D. Belagundu, Pearson Education (Singapore) Pte Ltd, 2006.

REFERENCE BOOKS:

1. "Concepts and Applications of Finite Element Analysis", Robert Cook, Wiley India, Pvt., Ltd., 4th Edition-2007
2. "An Introduction to Finite Element Methods", J.N. Reddy, Tata Mc Graw Hill, 2008.
3. "First Course in the Finite Element Method", Platteville Daryl Logan &Daryl Logan, Nelson Engineering, 2007.
4. "Finite Element Procedures", K.J. Bathe, PHI Learning, 2009.

M.Tech. (CAD/CAM) I Year – I Sem.

ADVANCED MANUFACTURING PROCESSES & SIMULATIONS

L	T	P	C
3	1	-	**3**

CODE: 5W103

UNIT-I

ADVANCED FOUNDRY PROCESSES:

Metal mould, Continuous, squeeze, vacuum mould, evaporative pattern, ceramic shell casting, Casting Simulation softwares, Introduction to AutoCAST.

UNIT-II

ADVANCED METAL FORMING PROCESSES:

Details of High Energy Rate Forming (HERF) Processes, Electro-magnetic Forming, Electro-hydraulic forming, Stretch forming, Contour roll forming, Introduction to DEFORM 2D/3D.

UNIT-III

ADVANCED WELDING PROCESSES:

Details of Electron Beam Welding (EBM), Laser Beam Welding (LBM), Ultrasonic Welding (USW)-Merits, Demerits and Applications, Introduction to welding software and its architecture

UNIT-IV

MICROFABRICATION TECHNOLOGY:

Wafer preparation – monolithic processing – moulding – PCB board hybrid & mcm technology – programmable devices & ASIC – electronic material and processing. steriolithography, SAW devices, Surface Mount Technology.

UNIT-V

SIMULATION SYSTEM:

Components of a system, Continuous and discrete systems, Models of a system, Modeling. Random Number Generation: Methods and Tests for random number generation, Random Variable Generation, Simulation of Systems: Simulation of continuous system, Simulation of discrete system, Simulation of event occurrences using random numbers. Simulation of component failures using Exponential and weibull models. Input modeling and output analysis

UNIT-VI

SIMULATION APPLICATIONS:

Single server queue problems and multi-server queue problems, Inventory system, Network problem, Shop Floor problems in a manufacturing environment.

TEXT BOOKS

1. Serope kelpekijian & stevan r. schmid- Manufacturing process engg material – 2003
2. Materials and Processes in Manufacturing" (8th Edi t i on), E. P. DeGarmo, J. T Black, R. A. Kohser , Prentice Hal l of Indi a, New Delhi (I SBN 0- 02- 978760)
3. More Madon, Fundamentals of Microfabrication, CRC Press, 1997.
4. Pandey P.C. & Shan HS Modern Machining Processes, Standard Publishing Co., 1980
5. Jaeger R.C., Introduction to microelectronic fabrication Addison Wesley, 1988

6.Banks J., Carson. J.S., and Nelson B.L., Discrete Event System Simulation, Prentice Hall of India, New Delhi, 1996.

7.Gottfried B.S., Elements of Stochastic Process Simulation, Prentice Hall, London, 1984.

8.Geoffrey Gordon., System Simulation, Prentice Hall of India, 1984.

9.Narsingh Deo., System simulation with Digital Computer, Prentice Hall of India, 1979

M.Tech. (CAD/CAM) I Year – I Sem.
ADVANCED MECHANICS OF SOLIDS

L	T	P	C
3	1	**-**	**3**

COE: 5W104

Course Out Comes :

After completing the course, the students will learn:
Unit I: Basics of Energy Methods and applications in structural mechanics
Unit II: Concept of shear centre, symmetric and un-symmetric bending
Unit III:CO3: Bending of curved beams
Unit IV: Torsion of circular and non-circular cross section beams, membrane analogy, torsion of thin-walled and multiply connected cross-section members
Unit V: Elastic stability of columns, buckling study using eigenvalue and energy methods
Unit VI: Introduction to fracture mechanics

Unit – I: **Energy Methods**:
Hooke's law and the Principle of Superposition, Work done by forces and the elastic strain energy stored, Reciprocal relation, generalized forces and displacements, Castigliano's first theorem, fictitious load method, Theorem of Virtual work, Castigliano's second theorem. Case studies of statically determinate and indeterminate structures, closed ring subjected to concentrated and uniform loads, stresses in chain links.

Unit – II: **Shear Centre**:
Bending axis and shear center; shear center for axi-symmetric and unsymmetrical sections. Unsymmetrical bending: Bending stresses in beams subjected to unsymmetrical bending; deflection of straight beams due to unsymmetrical bending.

Unit – III: **Curved bean theory & Contact Stresses**
Beams: Circumferential stress in curved beams, limitations, correction factors; Winkler Bach formula, - Radial stresses in curved beams, Winkler Bach correction factors.
Contact stresses: Geometry of the Contact Surface, Method of Computing Contact Stresses, Stress for Two Bodies in Line Contact: Loads Normal to Contact Area

Unit – IV: **Torsion**:
Torsion of a cylindrical bar of circular cross Section; Saint-Venant's semi-inverse method; Linear elastic solution; Prandtl elastic membrane (soap film) analogy; torsion of narrow rectangular cross sections; hollow thin wall torsion members, multiply connected cross sections.

Unit – V: **Elastic Stability of Columns**:
Concept of buckling, columns under one or more axial, concentrated load(s) and with / without eccentricity: Euler's buckling load, Secant and Johnson's formulae; treatment of column buckling stability problem as an Eigen-value problem, related case studies. Energy methods for buckling problems: theorem of stationary potential energy, energy and stability considerations, application to buckling problems, The Rayleigh-Ritz method

Unit – VI: **Introduction to Fracture Mechanics**:
Why structures fail, the fracture mechanics approach to design, effect of material properties on fracture, Linear Elastic Fracture Mechanics (LEFM): stress concentration effect of flaws, the Griffith energy balance, the energy release rate, stress analysis of cracks, plane stress versus plane strain, fracture modes. Elastic—Plastic Fracture Mechanics (EPFM): crack tip opening displacement, Green's theorem, the J-contour integral. Design considerations: K as a failure criterion, J-integral as a fracture criterion

TEXT BOOK:

1. "Advanced Mechanics of Solids", Third Edition, L.S.Srinath, TATA McGraw-Hill
2. "Advanced Mechanics of Materials", Sixth Edition, Arthur P. Boresi, Richard J. Schmidt., Wiley International

REFERENCE BOOKS:

1. "Strength of Materials", Sadhu Singh"Fracture Mechanics: Fundamentals and Applications", Second Edition, T.L.Anderson, CRC Press

M.Tech. (CAD/CAM) I Year – I Sem.
RESEARCH METHODOLOGY

L	T	P	C
2	-	-	2

CODE: 5W105

UNIT-I:Introduction:
Defining Research, Scientific Enquiry, Hypothesis, Scientific Method, Types of Research, Research Process and steps in it. Research Proposals – Types, contents, sponsor agent's requirements, Ethical, Training, Cooperation and Legal aspects.

UNIT-II:Research Design:
Meaning, Need, Concepts related to it, categories; Literature Survey and Review, Dimensions and issues of Research Design, Research Design Process – Selection of type of research,
Measurement and measurement techniques ,Selection of Sample, Selection of Data Collection Procedures, Selection of Methods of Analysis, Errors in Research.
Research Problem Solving – Types, Process and Approaches – Logical, Soft System and Creative; Creative problem solving process, Development of Creativity, Group Problem Solving
Techniques for Idea Generation – Brain storming and Delphi Method.

UNIT-III:Research Modeling:
(a) Mathematical – Classification of Models, Development of Models, Stages in Model building,Principles of Modelling, Use of Analogy, Models as Approximations, Data consideration and Testing of Models(b) Heuristics and Simulation – Definition, Applications and reasons for using Heuristics, Heuristic Methods and approaches, Meta-Heuristics; Simulation – Meaning, Applications and Classification of Simulation Models, Process of Simulation, Steps and Features of Simulation Experiments and their Validation.

UNIT-IV: Experimentation:
Objective, Strategies, Factorial Experimental Design, Applications of Experimental Design, Basic Principles – Replication, Randomization and Blocking, Guidelines for designing experiments; Laboratory Experiments, Methods of manipulating Variables, Errors in Experiments, Steps in Design of Experiments.

UNIT-V: Process Optimization
Factorial Design principles, Two factor Factorial Design, General Factorial Design, Fitting response Curves and Surfaces, Blocking, Taguchi Approach to Parameter Design, Robust Design.

UNIT-VI : Analysis:
Analysis of Variance and Co-variance, Hypothesis Testing – Parametric. Report Writing: Pre-writing Considerations, Principles of Thesis Writing, Format of Report Writing, Format of
Publication in Research Journals, Oral Presentations (Briefing)

Reference Books:
1. Krishnaswamy, K.N., Sivakumar, Appa Iyer & Mathirajan M., (2006) -Management ResearchMethodology: Integration of Principles, Methods & Techniques (New Delhi, Pearson Education)
2. Montgomery, Douglas C. (2004) – Design & Analysis of Experiments, 5/e. (New York, JohnWiley & Sons)
3. Kothari, C.K. (2004) – Research Methodology, Methods & Techniques, 2/e. (New Delhi, New Age International Ltd. Publishers)
4. Ross, Phillip J. (1996) – Taguchi Techniques for Quality Engineering, 2/e. (New York, McGraw Hill)
5. Rao S. S. (2004) – Engineering Optimization The ory & Practices, 3/e (New Delhi, New Age International Ltd., Publishers)
6. Handbook of Industrial Automation – Richard L. Shell & Ernest L. Hall (Marcel Decker Inc.)
7. Trochim, William M.K. (2003), - Research Methods 2/e, (New Delhi, Biztantra, Dreamtech)

M.Tech. (CAD/CAM) I Year – I Sem.
MECHATRONICS

L	T	P	C
3	1	-	3

CODE: 5W106

Course Out Comes :

After completing the course the students will learn:

Unit1 : Mechatronics measurement systems, control systems, case studies, actuation systems.

Unit2 :Modeling dynamic systems- first order and second order systems. Transfer functions

Unit3 : Frequency response, performance specifications and stability. Closed loop controllers- P, PI, PID adaptive control.

Unit4 CO4: Introduction of microprocessor, and PLC and identification system

Unit5 Sensors in speed, position, stress, strain, acceleration and temperature measurement sensor. Machine vision

Unit6 : Data base management system, CAD/CAM data bases, graphic database, Oops concepts.

Unit-I:

Introduction: Definition of Mechatronics Measurement systems, Control systems, Microprocessor – based controller, Response of systems, the mechatronics approach, traditional and mechatronics designs, possible mechatronics design solutions, case studies of Mechatronic systems .

Actuators and Motion Control: Pneumatic, Hydraulic, Mechanical and Electrical actuation systems and their limitations, Motor/Load inertia matching. Design with linear slides.

Unit-II:

Dynamic responses of systems: Modeling dynamic systems, first- order systems, second – order systems Performance measures for second – order systems, system identification.

System transfer functions: The transfer function, first – order systems, second – order systems, Systems in series, systems with feedback loops, Effect of pole location on transient response.

Unit-III:

Frequency response: Sinusoidal input, phasors, frequency response, bode plots, performance specifications, and stability**.**

Closed Loop Controllers: Continuous and discrete processes, control modes, two-step mode, proportional mode, derivative control, integral control, PID controller, digital controllers, control system performance, controller tuning, velocity control, adaptive control.

Unit-IV:

Architecture of intelligent Machines: Introduction to Microprocessor and programmable logic controllers and identification of system, System design Classification. Motion control aspects in Design.

UNIT-V:

Sensors: Introduction, position and speed measurement, stress and strain measurement, temperature measurement vibration and acceleration measurement, pressure and flow measurement, semiconductor sensors and Microelectromechanical devices.

Machine Vision: Feature and Pattern Recognition methods, concepts of perception and cognition in decision making.

UNIT VI:

Manufacturing Data Bases: Data Base management system, CAD/CAM Data bases, Graphic Data Base, Introduction to object oriented concepts, objects oriented model language interface, procedures and methods in creation, edition and manipulation of Data.

TEXT BOOK:

1. W. Bolton, "Mechatronics – Electronics Control Systems in Mechanical and Electrical Engineering", Pearson Education 3rd Edition.

REFERENCE BOOK:

2. Michel B. Histand and David G. A1ciatore, "Introduction to Mechatronics and Measurement systems", "Tata MC Graw".

M.Tech. (CAD/CAM) I Year – I Sem.
DYNAMICS AND MECHANISM DESIGN

L	T	P	C
3	1	**-**	**3**

CODE: 5W107

Course Outcome:
The knowledge of dynamics considerations in mechanism design is essential to use commercial multi body dynamics software in mechanical engineering design

UNIT-I
Geometry of Motion: Introduction, analysis and synthesis, Mechanism terminology, planar, Spherical and spatial mechanisms, mobility,Grashoffs law, Equivalent mechanisms, Unique mechanisms, Kinematic analysis of plane mechanisms: Auxil iary point method using rotated velocity vector, Hall - Ault auxiliary point method, Goodman's indirect method.

UNIT-II.
Generalized Principles of Dynamics: Fundamental law s of motion, Generalized coordinates, Configuration space, Constraints, Virtual work, principle of virtual work, Energy and momentum, Work and kinetic energy, Equilibrium and stability, Kinetic energy of a system,Angular momentum, Generalized momentum. Lagrange'sEquation: Lagrange's equation from D'Alembert's principles, Examples, Hamiltons equations, Hamiltons principle, Lagrange's, equation from Hamiltons principle, Derivation of Hamiltons equations, Examples.

UNIT-III
System Dynamics: Gyroscopic action in machines, Euler's equation of motion, Phase Plane representation , Phase plane Analysis, Response of Linear Systems to transient disturbances. Synthesis of Linkages: Type, number, and dimensional synthesis, Function generation, Path generation and Body guidance, Precision positions, Structural error, Chebychev spacing, Two position synthesis of slider crank mechanisms, Crank-rocker mechanisms with optimum transmission angle Motion Generation: Poles and relative poles, Location of poles and relative poles, polode, Curvature, Inflection circle.

UNIT-IV
Graphical Methods of Dimensional Synthesis: Two position synthesis of crank and rocker mechanisms, Three position synthesis, Four position synthesis (point precision reduction) Over lay method, Coupler curve synthesis, Cognate linkages.

UNIT-V: Ana1ytical Methods of Dimensional Synthesis: Freudenstein's equation for four bar mechanism and slider crank mechanism, Examples, Bloch's method of synthesis, Analytical synthesis using complex algebra.

UNIT-VI **Spatial Mechanisms:** Introduction, Position analysis problem, Velocity and acceleration analysis, Eulerian angles.

Text Books:
1.K.J.Waldron&G.L.Kinzel , “Kinematics, Dynamics and Design of Machinery”, Wiley India, 2007.
2.Greenwood , “Classical Dynamics”, Prentice Hall of India, 1988.
References Books:
1.J E Shigley, “Theory of Machines and Mechanism” -McGraw-Hill, 1995
2.A.G.Ambekar , “Mechanism and Machine Theory”, PHI, 2007.
3.Ghosh and Mallick , “Theory of Mechanism and Mechanism”, East West press 2007.
4.David H. Myszka , “Machines and Mechanisms”, Pearson Education, 2005.

M.Tech. (CAD/CAM) I Year – I Sem.

INFORMATION RETRIEVAL

L	T	P	C
3	1	**-**	**3**

CODE: 5P110

Course Objectives:

On completion of this course you should have gained a good understanding of the foundation concepts of information retrieval techniques and be able to apply these concepts into practice. Specifically, the student should be able to:

- To use different information retrieval techniques in various application areas
- To apply IR principles to locate relevant information large collections of data
- To analyze performance of retrieval systems when dealing with unmanaged data sources
- To implement retrieval systems for web search tasks.

UNIT I

Boolean retrieval. The term vocabulary and postings lists. Dictionaries and tolerant retrieval. Index construction. Index compression.

UNIT II

Scoring, term weighting and the vector space model. Computing scores in a complete search system. Evaluation in information retrieval. Relevance feedback and query expansion.

UNIT III

XML retrieval. Probabilistic information retrieval. Language models for information retrieval. Text classification.

UNIT IV

Vector space classification. Support vector machines and machine learning on documents

UNIT V

Flat clustering, Hierarchical clustering, Matrix decompositions and latent semantic indexing.

UNIT VI

Web search basics, Web crawling and indexes, Link analysis.

TEXT BOOKS:

1. Introduction to Information Retrieval , Christopher D. Manning and Prabhakar
2. Raghavan and Hinrich Schütze, Cambridge University Press, 2008.

M.Tech-CAD-CAM (ME)- I Year – I Sem.
NANO SCIENCE AND NANOTECHNOLOGY

L	T	P/D	C
3	1	0	3

CODE: 5VC19

PURPOSE
The course aims at providing an overview of basic physics of solids and advanced topics in solid state materials of technological value, a working knowledge of the foundations, techniques, and key results of quantum mechanics and the basic principles of thermodynamics and to lay emphasis on the fundamentals

OBJECTIVES	
1.	To show how diverse properties (electronic, thermal, optical) of solid materials can be related to interactions at the atomistic level.
2.	To deduce and verify macroscopic properties of solids using standard theoretical models and understand their significance in wider context of solid materials
3.	To show how solid state physics forms vital part of developing materials of technological value
4.	To achieve an understanding of the theory of quantum mechanics, and an ability to apply the quantum theory to important physical systems
5.	The objective of this course is to make the students acquire depth of knowledge in the concepts of statistical mechanics and thermodynamics.

Unit-I: Introduction to Nanotechnology**,** Crystal Structure: Introduction, arrangement of atoms, two dimensional crystal structures

Unit-II: Three dimensional crystal structures, some examples of three dimensional crystals, planes in crystals and crystallographic directions,

Unit-III: Reciprocal lattice Bragg's law, reciprocal lattice vectors, diffraction conditions, Laue and Powder methods; Quasicrystals, Type of bonds – ionic, covalent and metallic bonds

Unit-IV: Why quantum mechanics? Matter waves, Length scales, De-Broglie hypothesis,Wave particle duality, Heisenberg's uncertainty principle, Schrodinger wave equation, Particle in one dimensional box

Unit-V: Finite Potential Wells and barriers: Periodic lattice, Energy gaps, Qualitative Description of the theory of conduction in Solids, Particle in 2-D box, Quantum Fluctuation and Discrete Quantum states, Concepts of Quantum Confinement

Unit-VI: Thermodynamics, phase diagrams and phase transformations

Textbooks:

1. Introduction to Nanotechnology by Charles P.Poole Jr & Frank J. Owens, Wiley India Pvt. Ltd.
2. Nano pahysics and nanotechnology by E.L.Wolf willely VCH

3. A Textbook of Quantum Mechanics by P.M. Mathews and K. Venkatesan, Tata McGraw Hill Publishing Company Ltd.
4. Modern Quantum Mechanics by J.J. Sakurari, Addison Wesley Longman Inc.
5. Solid state Physics by Kittel
6. Nanotechnology:Principles and Practices by S.K. Kulkarni, Capital Publishing Company
7. Quantum mechanics by Pawling and Wilson
8. The Feynman lectures on Physics; Vol I to III
9. "Nanoscience and Nanotechnology: Fundamentals to Frontiers" by M.S. Ramachandra Rao and Shubra Singh, Wiley Publishers, 2013.

Reference Books:

1. Nanotechnology and Nano Electronics – Materials, devices and measurement techniques by WR Fahrner, Springer
2. Nanotechnology – science, innovation and opportunity by Lynn E Foster, Prentice Hall - Pearson education.
3. Encyclopedia of Nanotechnology by H.S. Nalwa

M.Tech. (CAD/CAM) I Year – I Sem.

DESIGN OF PRESS TOOLS & TOOL DESIGN

L	T	P	C
3	1	-	**3**

CODE:5W108

Course Out Comes :

Unit-1:Student will learn Design principles of various presses
Unit-2:Student will design and evaluate shearing dies
Unit-3:Student get ability to analyze and evaluate bending dies ,progressive dies etc
Unit-4: Student will demonstrate the rules of development split dies and various types of press tool components
Unit-5:Student able to design dies for various drawing operations after under standing related theories
Unit-6:Student understand the role of CAD/CAM in design of press tools

Unit-I: Presses & Press Working:

Classification of Mechanical, Hydraulic, and pneumatic presses Press Characteristics, safety devices in presses. Principles of stretch forming machines, principles of feeding and unloading equipment. Design principles of presses.

Unit-II : Design of Dies:

Introduction, terminology, shearing dies- types of dies - analysis process shearing clearance - size and tolerances of die opening and punch - force, power, energy in shearing -loading center, shearing with inclined edges - strip layouts, economical stock - Utilization.

Unit-III : Theory of Shearing & Various Types of dies:

Theory of shearing ,Dies &Punches Compound dies, progressive dies, stock feeding devices - earn actuated die, horn dies (type, sub-press dies)- precision shearing dies, shaving dies, lamination dies- Bending dies, theory of bending development of blank, spring back, curling, flanging and press brake dies, bending on press brake.

Unit-IV : Split dies and various types of press tool components

Split dies, rules of development for split dies, inserts, types of punches, punch holders, punches - strippers - calculation of springs and rubber ejector, shedders, stops - pilots - stock guides - alignment system design for press tools.

Unit-V :

Theory of drawing, Draw Dies, Various types of draw-dies. Deep drawing dies &shallow drawing dies. Rectangular draw dies. Trimming dies. Defects in deep drawing blank development, strain factor, calculation of force, Ironing (application of rubber and hydraulic system) -

Unit-VI :

Application of CAD/CAM soft-ware in designing of die-casting dies. Plastic moulds and press tools

TEXT BOOKS:

1. *Fundamentals of tool Design*- ASTME, Prentice Hall, New Delhi, 1987
2. Heinrich Makelt, *Mechanical Presses,* Edward Arnold, London, 1968

REFERENCE BOOKS:

1. Geoffrey Rowe W., An *Introduction to the Principles of Metal Working*, Edward Arnold, 1977.
2. Sheet metal working Read & Eary, *Mechanical Processing in Materials*, 1967.
3. *Die design Hand book* - Wilson, Mc Graw Hills, New York, 1965.
4. Eary and Redds, *Shear Working of Metals*, Prentice Hall, New Delhi, 1969.

M.Tech. (CAD/CAM) I Year – I Sem.
MECHANICS AND MANUFACTURING METHODS OF COMPOSITES

L	T	P	C
3	1	-	**3**

CODE: 5W109

UNIT – I

Basic concepts and characteristics: Geometric and Physical definitions, natural and man-made composites, Aerospace and structural applications, types and classification of composites, Fibres- Glass, Silica, Kevlar, carbon, boron, silicon carbide, and born carbide fibres.Particulate composites, Polymer composites, Thermoplastics, Thermosets, Metal matrix and ceramic composites.

UNIT – II

Micromechanics: Unidirectional composites, constituent materials and properties, elastic properties of a lamina, properties of typical composite materials, laminate characteristics and configurations. Characterization of composite properties.

Coordinate transformations: Hooke's law for different types of materials, Hooke's law for two dimensional unidirectional lamina, Transformation of stress and strain, Numerical examples of stress strain transformation, Graphic interpretation of stress – strain relations. Off -axis, stiffness modulus, off - axis compliance.

UNIT – III

Elastic behaviour of unidirectional composites: Elastic constants of lamina, relation ship between engineering constants and reduced stiffness and compliances, analysis of laminated composites, constitutive relations.

UNIT-IV Strength of unidirectional lamina: Micro mechanics of failure, Failure mechanisms, Strength of an orthotropic lamina, Strength of a lamina under tension and shear maximum stress and strain criteria, application to design. The failure envelope, first ply failure, free-edge effects. Micromechanical predictions of elastic constants.

UNIT – V

Analysis of laminated composite plates : Introduction, thin plate theory,specially orthotropic plate, cross and angle ply laminated plates, problems using thin plate theory. Analysis of composite beams

UNIT – VI

Manufacturing methods: Autoclave, tape production, moulding methods, filament winding, man layup, pultrusion, RTM.

TEXT BOOKS:

1. R. M. Jones, Mechanics of Composite Materials, Mc Graw Hill Company, New York, 1975.
2. Engineering Mechanics of Composite Materials by Isaac and M.Daniel,Oxford University Press, 1994.

REFERENCES:

1. B. D. Agarwal and L. J. Broutman, Analysis and performance of fibre Composites, Wiley-Interscience, New York, 1980.
2. L. R. Calcote, Analysis of Laminated Composite Structures, VanNostrand Rainfold, New York, 1969

M.Tech. (CAD/CAM) I Year – I Sem.

DATA MINING AND DATA WAREHOUSING

(Professional Elective-II)

L	T	P	C
3	1	-	**3**

CODE: 5PC22

UNIT I

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Issues in Data Mining.

Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT II

Data Warehouse and OLAP Technology for Data Mining: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Usage of Data Warehousing Online Analytical Processing and Mining

UNIT III

Data Cube Computation: Efficient Methods for simple Data Cube Computation (Full Cube, Iceberg Cube, Closed Cube and Shell Cube), Discovery Driven exploration of data cubes, Attribute-Oriented Induction for data characterization and its implementation

UNIT IV

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, The Apriori algorithm for finding frequent itemsets using candidate generation, Generating association rules from frequent itemsets, Mining frequent itemsets without candidate generation, Mining various kinds of Association Rules, Correlation Analysis

UNIT V

Classification and Prediction: Description and comparison of classification and prediction, preparing data for Classification and Prediction

Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Backpropagation

Prediction, linear and non-linear regression, evaluating accuracy of a Classifier or a Predictor

UNIT VI

Cluster Analysis: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, k-means and k-mediods methods, CLARANS, Agglomerative and divisive hierarchical clustering, chameleon dynamic modeling, clustering based on density distribution function, wavelet transformation based clustering, conceptual Clustering, Constraint-Based Cluster Analysis, Outlier Analysis.

TEXT BOOKS:

1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber, Morgan Kaufmann Publishers, 2nd Edition, 2006.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education.

M.Tech-CAD-CAM (ME)- I Year – I Sem.
PRODUCTION AND CHARACTERIZATION OF NANOMATERIALS

L	T	P/D	C
3	1	0	3

CODE: 5VC20

PURPOSE
To get variety of advanced applications, synthesis part place important role.Therfore it is very important to students know about the various synthesis techniques of nanomaterials.

OBJECTIVES
In this Subject students will learn about different physical methods, chemical methods, thermolysis rule and biological methods. For the synthesis of nanomaterials, students gain in depth of knowledge which will be helpful to them in the career to go forward successfully in the field of nanoscience and nanotechnology.

Unit-I: Introduction to synthesis of nanostructure materials, Bottom-up approach and Top-down approach with examples. Physical methods**:** Inert gas condensation, Arc discharge, RF-plasma, plasma arc technique, electric explosion of wires, laser ablation, laser pyrolysis,

Unit-II: Ball milling, molecular beam epitaxy, electrodeposition, rapid solidification (RSP), consolidation, Chemical methods**:** Nanocrystals by chemical reduction, photochemical synthesis, electrochemical synthesis, nanocrystals of semiconductors and other materials by arrested precipitation, emulsion synthesis, sonochemical routes

Unit-III: Thermolysis route - spray pyrolysis and solvated metal atom dispersion, sol-gel method, solvothermal and hydrothermal routes, solution combustion synthesis, CVD method and other variants, Biological methods – use of bacteria, fungi**,** actinomycetes for nano-particle sythesis-magnetotatic bacteria for natural synthesis of magnetic nano-particles, role of plants in nano particle synthesis.

Unit-IV: Compositional and structural Characterization techniques**:** X-ray Photoelectron Spectroscopy (XPS), X-Ray topography, Energy Dispersive X-ray analysis (EDAX), Principles and applications of X-ray diffraction, Small angle X-ray diffraction and Wide angle X-Ray diffraction; electron diffraction, Electron probe microanalysis (EPMA), Ion beam techniques: SIMS & RBS, 3-D atom probe

Unit-V: Surface characterization Techniques: Scanning electron microscopy (SEM), Transmission electron microscopy, Basic principles and the applications of scanning probe techniques (SPM), Atomic force microscopy, scanning tunneling microscopy, Spectroscopic techniques: UV-Visible spectroscopy, Infrared (IR) & Fourier Transform infrared (FTIR) spectroscopy, Raman spectroscopy techniques: micro Raman and laser Raman; Photo luminescence spectroscopy

Unit-VI: Electrical characterization techniques: Hall measurement, Dynamic and static Current voltage (I-V) characteristics, capacitance, voltage measurements, I-V analysis by AFM and STM (STS), electron beam induced current measurement (EBIC), Magnetic & dielectric characterization: SQUID, VSM, MFM, Neutron diffraction, Dielectric measurements, impedance and ferroelectric measurements

Textbooks:

1. Inorganic Materials Synthesis and Fabrication by J.N. Lalena, D.A. Cleary, E.E. Carpenter, N.F. Dean, John Wiley & Sons Inc.
2. Introduction to Nano Technology by Charles P. Poole Jr and Frank J. Owens. Wiley India Pvt Ltd.
3. The Chemistry of nanomaterials: Synthesis, Properties and Applications, Vol-I by C.N.R. Rao, A. Muller and A.K. Cheetham
4. "Nanoscience and Nanotechnology: Fundamentals to Frontiers" by M.S. Ramachandra Rao and Shubra Singh, Wiley Publishers, 2013.

Reference books:

1. Encyclopedia of Nanotechnology by M.Balakrishna Rao and K.Krishna Reddy, Vol I to X, Campus books.
2. Encyclopedia of Nanotechnology by H.S. Nalwa
3. Nano: The Essentials – Understanding Nano Scinece and Nanotechnology – by T.Pradeep; Tata Mc.Graw Hill

M.Tech.(CAD/CAM) I Year – I Sem.

ADVANCED CAD AND CAM LAB

L	T	P	C
-	-	4	2

CODE: 5W171

CAD Lab:

Softwares: Pro-E and Catia

I. Preliminary Practice on :

Creation of working drawing, creating geometry, constraining the sketch, 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, assembling existing component creating bill of materials, Import and export of drawing from other software.

II EXPERIMENTS ON CAD

1. Solid modeling features in modeling , extrusion, blend revolve, sweep rib, tweak Blend cut etc.
2. 3D-Modeling of truss bearing bracket and converting in to Production drawing
3. 3D Modeling & assembly of Oldham coupling
4. 3D Modeling various parts of knuckle joint & assembly of Knuckle joint
5. 3D Modeling of plumber bearing

CAM Lab:

III EXPERIMENTS ON CAM

Programs on CNC Lathe:

6. Part programme Simulation on lathe operations using XL Turn
7. Part programme Simulation on mill and drill operations using XL Mill
8. Exercise on Facing, Turning, Step Turning and Taper turning CNC Lathe
9. Exercise on Pattern repetition through sub program on CNC Lathe
10. Exercise on Thread cutting on CNC Lathe

Programs on CNC Mill:

11. Exercise on Profile cutting and pocket cutting on CNC Mill
12. Exercise on Mirroring on CNC Mill
13. Demo of Part loading on CNC Machines with XL Articulated Robot

M.Tech. (CAD/CAM) I Year – I Sem.

COMPREHENSIVE VIVA-I

L	T	P	C
-	-	-	1

CODE: 5W172

Max. Marks: 100

There shall be a Comprehensive Viva-Voce in II year I Semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of Head of the Department and two Senior Faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the students' understanding in various subjects he/she studied during the M.Tech course of study. The Comprehensive Viva-Voce is valued for 50 marks by the Committee. There are no internal marks for the Comprehensive Viva-Voce. A candidate has to secure a minimum of 50% to be declared successful.

M.Tech. (CAD/CAM) I Year – I Sem.

LITERATURE REVIEW & SEMINAR-I

L	T	P	C
-	-	3	1

CODE: 5W173

Max. Marks: 100

After studying this course, the students will be able to

1. Identify a research topic
2. Collect literature
3. Present seminar
4. Discuss the queries

There shall be three seminar presentations during I year I semester and I year II Semester. For seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the Department in a report form and shall make an oral presentation before the Departmental Committee, which shall consist of the Head of the Department, a senior Faculty Member and the Supervisor and will jointly evaluate the report and presentation. For each Seminar there will be only internal evaluation of 25 marks. A candidate has to secure a minimum of 50% to be declared successful.

In the First semester the report must be in the form of the review paper with a format used by IEEE / ASME etc. In the Second semester Technical Seminar in the form of Independent Review Paper must be of high quality fit for publication in a reputed conference / journal.

The evaluation format for seminar is as follows:

- Day to day evaluation by the Supervisor : 20 marks
- Final Report : 20 marks
- Presentation : 60 marks (20 Abstract seminar +40 Final Presentation)

The presentation includes content (5) + Participation (5) + Presentation (10) for a total of 20 marks and double for 40 marks for final presentation.

A Student has to concentrate on the following sections while writing technical paper or presenting seminar.

Contents:

- Identification of specific topic
- Analysis
- Organization of modules
- Naming Conventions
- Writing style
- Figures
- Feedback
- Miscellaneous

REFERENCES:

Teach Technical Writing in Two Hours per Week by Norman Ramsey

For Technical Seminar the student must learn few tips from sample seminars and correcting himself, which is continues learning process

REFERENCE LINKS:

I. http://www.cs.dartmouth.edu/~scot/givingTalks/sld001.htm
II. http://www.cse.psu.edu/~yuanxie/advice.htm
III. http://www.eng.unt.edu/ian/guides/postscript/speaker.pdf

NOTE: A student can use any references for this process, but must be shared in classroom.

M.Tech. (CAD/CAM) I Year – II Sem.
AUTOMATION & ROBOTICS

L	T	P	C
3	1	-	3

CODE: 5W210

Unit – I:

Introduction: Basic principles of automation. Types of automated systems - degree of Mechanization, Index for degree of Mechanization for various automated operations. Automatic loading and feeding of work pieces and Types. Basic Elements of Automated systems. Functions of advanced Automation.

Unit – II:

Fluid power controls in Automation: Relative advantages of various controls - Hydraulic, pneumatic and Electrical controls for automatic location, loading and clamping – Automatic control devices. Servo controls, Mechanical servo and Electro hydraulic servo systems. Sensors, Actuators.
Design of hydraulic circuits, Design of pneumatic circuits, Maintenance and trouble shooting of hydraulic and pneumatic circuits

Unit – III:

Material handling and Identification Technologies: Automated material handling - Types of equipment and functions, analysis and design of material handling systems. Material Transport systems, Automated guided vehicle systems. Automated storage systems: Automated storage and retrieval systems. Analysis of storage systems. Automatic Data Capture, Bar code technology, other ADC technologies. Shop floor Data Collection systems.

Unit –IV :

Manufacturing Systems: Introduction, Manufacturing Cells, Cellular Manufacturing, FMS, Manual Assembly lines. Line Balancing; Transfer lines and analysis of transfer lines without and with buffer storage. Automated Assembly systems. Design for Automated Assembly.
Quality Control Systems: Introduction, Statistical Process Control Inspection Principles and Practices, Automated inspection and automated inspection technologies-contact and non contact methods Coordinate measuring machine-machine vision-other optical inspection methods. Non-contact non-optical inspection technologies. Lean Production and Agile Manufacturing.

Unit – V: **Robotics**:

Classification and structure of Robotic systems, structure of continuous path robot systems, drives and control systems, control approaches for robots. Applications of Robotics

Unit – VI:

Robot arm kinematics, the direct kinematics problem and inverse kinematic solutions, planning of manipulator trajectories, robot sensors, range sensors, proximity sensors, touch sensors, force and torque sensors, programming, manual teaching, lead through teaching, programming languages, storing and operating task programmes, robot selection and application.

TEXT BOOKS:

1. Mikell P. Grover, Automation, Production Systems and Computer Integrated Manufacturing, Second Edition, Pearson Education Asia, First Indian Reprint 2001.
2. Antony Espossito, "Fluid power with Applications", Prentice Hall
3. Mittal and Nagrath, 'Robotics and Control', Tata Mc Graw Hill.

REFERENCE BOOKS:

1. C. Ray Asfahl, Robots and Manufacturing automation, John Wiley and Sons New York-1992.
2. Earnest C. Fitch, Fluid power and control systems Mc Graw Hill Book Company, 1966.
3. R.D.Klafter, T.A., Chnielewski and Michael Negin, 'Robotic Engineering – An integrated approach – Prentice Hall, New Delhi, 1994

M.Tech. (CAD/CAM) I Year – II Sem.
FLEXIBLE MANUFACTURING SYSTEMS & CAPP

L	T	P	C
3	1	-	**3**

CODE: 5W211

Course Out Comes :

Unit-I: Ability to understand the components of FMS, FMS Application, hierarchy of computer control in Flexible Manufacturing System

Unit-II: Ability to understand software for simulation, application of simulation software, and database of FMS

Unit-III: Ability to understand the structure of computer aided process planning, and implement CAPP in manufacturing

Unit-IV: Ability to understand the group technology concepts, applications and implementation in different types of CAPP.

Unit-V: Ability to understand the group technology concepts, applications and implementation in different types of CAPP. (PO No: e, a)

Unit-VI: Ability to understand the Computer programming languages in CAPP, Computer integrated planning systems, and implementation of CAPP

Unit – I

Introduction to Flexible Manufacturing Systems (FMS):

Types of FMS, FMS Components, FMS Planning & Implementation issues, Design issues, FMS Application & Benefits. FMS Computer Control system, Hierarchy of computer control and Supervisory control. Knowledge Based Scheduling,

Unit – II

CAD/CAM Considerations for FMS:

FMS Planning, Software for simulation and database of FMS. Specification and selection, trends, application of simulation software, Planning FMS database. Just –In –Time Manufacturing System, Kanbann system and Preventive maintenance.

Unit – III : Introduction to Computer Aide Process Planning(CAPP):

Information requirement for process planning system, Role of process planning, advantages of conventional process planning over CAPP, Structure of Automated process planning system, feature recognition, methods.

Generative CAPP system: Importance. Principle of Generative CAPP system, automation of logical decisions

Unit – IV : Retrieval CAPP system:

Significance, group technology, structure, relative advantages, implementation, and applications. .

Selection of manufacturing sequence: Significance, alternative-manufacturing processes, reduction of total set-up cost for a particular sequence.

Unit – V :Implementation techniques for CAPP:

MIPLAN system, Computer programming languages in CAPP, criteria for selecting a CAPP system and benefits of CAPP. Computer integrated planning systems, and Capacity planning system.

Unit – VI :

Computer Aided Inspection and quality control:

Coordinate Measuring Machine, Limitations of CMM, Computer Aided Testing, Optical Inspection Methods. Artificial Intelligence and expert system in Product manufacturing: Artificial Neural Networks, Artificial Intelligence in CAD, Experts systems and its structures.

TEXT BOOKS:

1. Jha N.K." Hand Book of Flexible Manufacturing Systems" Academic Press.
2. Automation, Production systems and Computer Integrated Manufacturing System - Mikell P Groover

REFERENCE BOOKS:

1. Computer Design and Manufacturing - Dr. Sadhu Singh.
2. Computer Engineering - David Bedworth
3. Talichi Ohno, Toyota" Production System l3eyond Large Scale Production", Productivity Press India Pvt. Ltd.

M.Tech. (CAD/CAM) I Year – II Sem.

OPTIMUM DESIGN OF MECHANICAL ELEMENTS

L	T	P	C
3	1	-	3

CODE:5W212

Course Out Comes :

After completing the course, the students will learn:

Unit I: Basics of optimization, considerations relevant to mechanical / structural systems

Unit II: Concepts and methods for single-variable unconstrained and constrained optimisation

Unit III: Concepts and methods for multi-variable unconstrained and constrained optimization

Unit IV: Techniques for nonlinear optimization

Unit V:Advanced optimization techniques

Unit VI: Optimisation of complex mechanical elements

Unit – I: Introduction

General characteristics of mechanical systems; adequate and optimum design; principles of optimization; formulation of objective function; design constraints; classification of optimisation problems; considerations in optimization: economic (cost minimisation), geometric (shape example: minimization of surface area for a given volume), material (volume minimisation, mass, weight), strength (stresses; maximization of load carrying capacity), maximization of rigidity (minimization of deflections)

Unit – II: Single Variable Optimisation

Unconstrained optimisation; classification of optimal points; optimality conditions; Direct methods: Bracketing a three-point pattern, Fibonacci's method, Golden section method, Powell's method; Derivative-based methods: Newton's method, Bisection method

Constrained optimization: formulation, optimality conditions, necessary and sufficient conditions; design of tensile bar for maximum energy absorption capability per cycle of repeated / variable loading with space and material constraints

Unit – III: Multi-Variable Optimisation

Unconstrained optimisation; problem formulation; optimality conditions; Gradient-based methods: Steepest descent method, Conjugate gradient method, Newton's method, Davidon-Fletcher-Powell (DFP) method, Broyden-Fletcher-Goldfarb-Shanno (BFGS) method; **Constrained optimization**: Problem formulation, Necessary conditions for optimality (equality, inequality and mix of both types of constraints), Sufficient conditions; Design of a 2-bar truss structure of different cross-sections for minimum mass; Minimum weight tubular column design to support a given load without overstressing and buckling

Unit – IV: Nonlinear Programming

Zoutendijk's method of feasible directions; Interior and exterior penalty function methods; optimal design of a practical torsion bar for minimum weight; design of torsion shaft for minimum cost and minimum dynamic torque;

Unit – V: Advanced Optimisation Topics

Geometric Programming technique; dynamic vibration absorbers

Unit–VI: APPLICATIONS OF OPTIMIZATION IN DESIGN ANDMANUFACTURING SYSTEMS: Some typical applications like optimization of path synthesis of a four-bar mechanism, minimization of weight of a cantilever beam, optimization of springs and gears, general optimization model of a machining process, optimization of arc welding parameters, and general procedure in optimizing machining operations sequence.

TEXTBOOK:

1. S.S.Rao, "Engineering Optimisation: Theory and Practice", Wiley Eastern Edition
2. Kalyanamoy Deb, "Optimisation for Engineering Design Algorithms and Examples", Prentice Hall of India
3. Optimal design – Jasbir Arora, Mc Graw Hill (International) Publishers

REFERENCE BOOKS:

1. Jasbir S. Arora, "Introduction to Optimum Design", McGraw Hill International Edition
2. Ray C. Johnson, "Optimum Design of Mechanical Elements", John Wiley & Sons

M.Tech. (CAD/CAM) I Year – II Sem.

DESIGN FOR MANUFACTURING & ASSEMBLY (DFMA)

L	T	P	C
3	1	-	3

CODE: 5W213

Course Out Comes :

After completing the course, the students will learn:

Unit I: Basic principles of designing for economical production material for design development with charts

Unit II:: Overview of various machining process, Redesigning of components for machining with suitable examples and various casting process

Unit III: Design principles for Punching , Blanking ,Bending , Deep drawing etc. Design factors for forging

Unit IV: Development of the assemblies process, automatic assembly transfer system ,assembly advantages

Unit V: Development of the systematic DFA methodology, assembly, efficiency, classification system for material handling

Unit VI:Effect of part symmetry handling time

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 (or 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 die forging design - parting lines of die5 drop forging die design - general design recommendations.

Unit – IV: Extrusion & Sheet Metal Work: Design guidelines for extruded sections - design principles for Punching, Blanking, Bending, Deep Drawing - Keeler Goodman Forming Line Diagram - Component Design for Blanking. .

Unit – V: Assembly 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 – VI: 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 pal1 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. Geoffrey Boothroyd, ."Assembly Automation and Product Design", Marcel Dekker Inc., NY, 1992.
2. Engineering Design - Material & Processing Approach - George E. Deiter, McGraw Hill IntI. 2nd Ed. 2000.

REFERENCE BOOKS:

1. Geoffrey Boothroyd, "Hand Book of Product Design" Marcel and Dekken, N.Y. 1990.
2. A Delbainbre "Computer Aided Assembly London, 1992.

M.Tech. (CAD/CAM) I Year – II Sem.

RAPID PROTOTYPING, TOOLING & MANUFACTURE

L	T	P	C
3	1	-	**3**

CODE: 5W214

Course Out Comes :

1.Student understands the importance, applications and classifications of RPT
2.student able to demonstrate various RPT processes
3.student gain skills related to RPT modeling
4.student acquires state of art knowledge related to rapid tooling in RPT
5.student exposes the RPT manufacturing methods like SLS processes
6.student gets ability to relate CAD/CAM to RPT

Unit-I Introduction to Rapid Prototyping:

Need for Time Compression in Product Development, History of RP systems, Growth of RP industry, Data formats, RP information workflow, Classification of RP systems, Applications of Advantages & Limitations of RP.

Unit-II Rapid Prototyping Processes:

Stereo lithography (SL), Selective Laser Sintering (SLS), Fused Deposition Modelling (FDM), Solid Ground Curing (SGC), Laminated Object Manufacturing (LOM); Principle, Process details, Machine details, Advantages, Dis-advantages, Applications.

Unit-III Concept Modelers:

Introduction to concept modeler, Principle and applications of: Thermo Jet Printer, Sander's model market, 3-D printer, Genisys Xs printer, JP System 5, Object Quadra Systems. Softwares for Rapid Prototyping: Overview of Solid view, Magics, Mimics and Magics Communicator, View Expert and 3 Data Expert, 3D view, Velocity2, Rhino, Stl View, Internet based software, Collaboration tools.

Unit-IV Introduction to Rapid Tooling:

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

Unit-V Rapid Manufacturing:

Introduction to RM, Factors influencing Accuracy, data Preparation: Errors due to tessellation, Errors due to Slicing, Part Building: Errors in the SL Process, SLS Process, Part Building Orientation: Orientation Constraints of the SL Process and SLS Process.

Unit-VI CAD/CAM/CNC in relation to Rapid Prototyping:

Reverse Engineering Machines and softwares, advantages and applications.

TEXT BOOKS:

1. Rapid Manufacturing - by D.T. Pham and S.S. Dimov, Springer, 2001
2. "Rapid Prototyping- Principles and Applications", C. K. Chua, K. S. Leong & C. S. Lim, World Scientific Publication.

REFERENCE BOOKS:

1. Wohlers Report 2000- by Teny Wohlers, Wohlers Associates, 2000.
2. Rapid prototyping - by Amithaba Ghose, Eastern Law house, 1997.
3. Stereolithography and other RP&M Technologies-by Paul F. Jacobs, ASME Press, 1996.
4. Rapid Prototyping & Manufacturing - by Paul F. Jacobs, ASME Press, 1996.

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M.Tech. (CAD/CAM) I Year – II Sem.

ADVANCED MECHANICAL VIBRATIONS & CONDITION MONITORING

L	T	P	C
3	1	-	3

CODE: 5W215

Course Out Comes :

student should be able

to develop ability to analyze mechanical vibrations and select elements for various vibration applications - with attention to amplitude and frequencies.

to analyze resonance conditions and Safety factors for machine members of multi degree freedom under steady state and periodic fatigue loads .

to derive vibration equations for continuous systems

to acquire procedure to analyze and design of vibration measurement devices.

to learn technique to evaluate random and non linear vibrations

to understand various types of monitoring techniques and their applications.

Unit I: Vibrations of Single Degree of Freedom Systems:

Simple harmonic motion, Free and forced vibrations of damped and undamped systems; Simple harmonic excitation; steady state response forced vibrations; free transverse and torsion vibrations;

Unit II: Vibration of Systems with Two Degrees of Freedom:

Free vibration of spring coupled systems, Two degree freedom of mass coupled system, bending vibrations of two degree of freedom system, Forced vibrations of un damped two degree of freedom system, Forced damped vibrations, Vibration isolation, Close coupled system, Far coupled system, mode shapes and modal analysis

Unit III: Vibration of Systems with Multi-degree of Freedom:

Continuous Systems: Vibrating string, longitudinal vibration of rods, Torsional vibration of rods, Euler equation for beams.

Approximate methods: Dunkerley lower bound method, Rayieigh's upper bound method, Holzer method,Stodola's methods

Unit IV: Experimental methods in vibration analysis:

Vibration instruments: exciters, transducers, analysers, measurement devices: vibrometers, velocity meters and accelerometers; Signal analysis techniques: time domain analysis, frequency domain analysis, amplitude and power spectra, coherence, auto and cross correlations, amplitude and frequency modulations; Tests for free and forced vibrations

Unit V: Condition Monitoring of Systems:

Introduction to Vibration and Condition Monitoring; Failure types, investigation and occurrences; Machinery Signatures and analysis; Wear and lubricant / contaminant monitoring and analysis; Introduction to Active Control of Structures

Unit VI:

Random Vibrations : Random phenomena, Time averaging and expected value, Frequency response function, Probability distribution, Correlation, Power spectrum and power spectral density, Fourier transforms, FTs and response.

Introduction to Vehicle dynamics: vehicle subjected to random vibrations (for example an uneven road), Introduction to nonlinear and random vibrations, Vibrations in turbines.

TEXTBOOK:

1. "Introductory Course on Theory and Practice of Mechanical Vibrations", J.S.Rao, K.Gupta, Revised second edition, New Age International Publishers
2. "Theory of Vibration with Applications", William T. Thomson, Marie Dillon Dahleh, Pearson Low Price Edition
3. "Condition Monitoring and Condition Based Maintenance", Dr. Prabhu, Teacher Training Institute, Bhopal

REFERENCE BOOKS:

1. "Mechanical Vibration and Shock Measurements", J.T.Broch, Bruel and Kjae Publication
2. "Mechanical Fault Diagnosis and Condition Monitoring", R.A.Collacott, Chapman and Hall Publishers
3. "Applications of Random Vibrations", N. C. Nigam, S. Narayanan, Narosa Publishers

M.Tech. (CAD/CAM) I Year – II Sem.

BIG DATA ANALYTICS

L	T	P	C
3	1	-	**3**

CODE: 5RC16

Course Outcomes:

The students must able to understand

1) The big Data platform, Challenges of Conventional Systems, Predictive Analytics, Data Mining, and Real Time Analysis by providing an advanced, practical background that allows the students to lead and participate in Big Data and Data Analytics projects.

2): Regression Modeling - Multivariate Analysis - Bayesian Modeling and Time series analysis.

3) The course incorporates a deep-dive into Big Data, the Data Analytics lifecycle, Machine Learning (ML), Hadoop (MapReduce, HDFS) and Tez, as well as the Apache projects Zookeeper, Storm, Kafka, Cassandra, HBase, and Mahout. Various Machine Learning algorithms are scrutinized and actual cases studies are conducted to solve comprehensive Big Data problems.

UNIT I

INTRODUCTION TO BIG DATA: Introduction to BigData Platform – Traits of Big data -Challenges of Conventional Systems - Web Data – Evolution Of Analytic Scalability - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - ReSampling - Statistical Inference - Prediction Error.

UNIT II

DATA ANALYSIS : Regression Modeling - Multivariate Analysis - Bayesian Modeling - Inference and Bayesian Networks - Support Vector and Kernel Methods - Analysis of Time Series: Linear Systems Analysis - Nonlinear Dynamics - Rule Induction - Neural Networks: Learning And Generalization - Competitive Learning - Principal Component Analysis and Neural Networks - Fuzzy Logic: Extracting Fuzzy Models from Data - Fuzzy Decision Trees - Stochastic Search Methods.

UNIT III

MINING DATA STREAMS : Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

UNIT IV

FREQUENT ITEMSETS AND CLUSTERING : Mining Frequent Itemsets - Market Based Model – Apriori Algorithm – Handling Large Data Sets in Main Memory – Limited Pass Algorithm – Counting Frequent Itemsets in a Stream – Clustering Techniques – Hierarchical – K-Means – Clustering High

Dimensional Data – CLIQUE And PROCLUS – Frequent Pattern based Clustering Methods – Clustering in NonEuclidean Space – Clustering for Streams and Parallelism.

UNIT V

FRAMEWORKS AND VISUALIZATION : MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed File Systems – Visualizations - Visual Data Analysis Techniques - Interaction Techniques;

UNIT VI:

Systems and Analytics Applications - Analytics using Statistical packages-Approaches to modeling in Analytics – correlation, regression, decision trees, classification, associationIntelligence from unstructured information-Text analytics-Understanding of emerging trends and technologies-Industry challenges and application of Analytics

TEXT BOOKS:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.

2. AnandRajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.

3. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.

4. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007

5. Pete Warden, "Big Data Glossary", O'Reilly, 2011.

6. Jiawei Han, MichelineKamber "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008.

M.Tech-CAD-CAM (ME)- I Year – I Sem.

NANOFLUIDS FOR ENERGY SYSTEMS

L	T	P/D	C
3	1	0	3

CODE: 5VC21

PURPOSE
The course aims at providing importance of Biological molecules and their importance in life. This also includes the applications of Biomolecules at nano level.

INSTRUCTIONAL OBJECTIVES	
1.	To study the importance biomolecules and their properties in life.
2.	To study the central dogma of molecular biology leading to protein synthesis.
3.	To correlate biological structures with other physical components and theie analysis
4.	To apply bionanostructures in the treatment of diseases.
5.	To compare the functioning of brain with a computer.

Unit-I: Introduction: Fundamentals of Cooling, Fundamentals of Nanofluids, Making Nanofluids, Experimental Discoveries, Mechanisms and Models for Enhanced Thermal Transport,Future Research

Unit–II : Synthesis of Nanofluids: General Issues of Concern,Synthetic Methods, Nanomaterials,Microemulsion-Based Methods for Nanofluids, Solvothermal Synthesis,Synthesis using Supports, Using Biology, Magnetic Nanofluids, Inert Gas Condensation,Anisotropic Nanoparticles,Other Nanofluids.

Unit –III : Conduction Heat Transfer in Nanofluids: Conduction Heat Transfer,Measurement of Thermal Conductivity of Liquids, Thermal Conductivity of Oxide Nanofluids, Temperature Dependence of Thermal Conductivity Enhancement, Metallic Nanofluids, Nanofluids with Carbon Nanotubes,

Unit – IV: Theoretical Modeling of Thermal Conductivity in Nanofluids: Simple Mixture Rules, Maxwell's Approach, Particle Distributions, Particle Geometries, Symmetrical Equivalent Medium Theory, Matrix-Particle Interfacial Effects, Interfacial Thermal Resistance, Dynamic Models of Thermal Conductivity in Nanofluids, Near-Field Radiation Model.

Unit – V : Convection in Nanofluid: Fundamentals of Convective Heat Transfer, Convection in Suspensions and Slurries, Convection in Nanofluids, Analysis of Convection in Nanofluids, Numerical Studies of Convection in Nanofluids, Convective Simulation for Chip Cooling Application.

Unit – VI : Boiling of Nanofluids**:** Fundamentals of Boiling, Pool Boiling of Nanofluids, Critical Heat Flux in Pool Boiling of Nanofluids, Other Investigations Related to Boiling of Nanofluids. Applications and Future Direction: Liquid Cooling, Applied Research in Nanofluids.

Text books:

1. Bio Nano Technology by Good Sell, Wiley Liss
2. Introduction to Nanotechnology by Charles. P.Poole Jr and Frank J. Owens, Wiley India Pvt Ltd.
3. Nano Technology, A gentle introduction to the next big idea by Mark Ranter and Daniel Ranter, Pearson education
4. Nanotechnology – science, innovation and opportunity by Lynn E Foster, Prentice Hall - Pearson education

5. “Soft Nanoparticles for Biomedical Applications” Royal Society of Chemistry, 2014 edited by Joan Estelrich etc.,

Reference books:

1. Encyclopedia of Nanotechnology by H.S.Nalwa
2. Encyclopaedia of Nanotechnology by M.Balakrishna Rao and K.Krishna Reddy (Vol I to X), Campus books.

M.Tech. (CAD/CAM) I Year – II Sem.

ENTREPRENEURSHIP AND INNOVATION

(Open Elective)

L	T	P	C
3	1	-	**3**

CODE: 5ZC13

Course Out Comes :

After studying this course, the students will be able to

Unit1 Acquire qualities of an Entrepreneur

Unit2 Understand how to set up an organization

Unit3 Carry out SWOT analysis for setting up small business unit

Unit4 Acquire decision making managerial behavior

Unit5 Develop knowledge on getting financial support from various funding agencies

Unit6 Buildup strategies for a successful business

Unit – I:

Nature of Entrepreneurship; Characteristics, Qualities and skills of an Entrepreneur, functions of entrepreneur, Entrepreneur scenario in India and Abroad. Forms of Entrepreneurship: Small Business, Importance in Indian Economy, Types of ownership, sole trading, partnership, Joint Stock Company and other forms. First-Mover disadvantages, Risk Reduction strategies, Market scope strategy, Imitation strategies, and Managing Newness.

Unit – II:

Aspects of Promotion: Generation of new entry opportunity, SWOT Analysis, Technological Competitiveness, legal regulatory systems, patents and trademarks, Intellectual Property Rights- Project Planning and Feasibility Studies- Major steps in product development.

Unit – III: Management Of Small Business:

Pre feasibility study - Ownership - budgeting - project profile preparation - Feasibility Report preparation - Evaluation Criteria- Market and channel selection- Product launching - Monitoring and Evaluation of Business- Effective Management of Small business.

Unit – IV: Support Systems For Entrepreneurs:

Institutional Support, Training institution, Financial Institutions and Aspects: Sources of raising Capital, Debt-Equity, Financing by Commercial Banks, Government Grants and Subsidies, Entrepreneurship Promotion Schemes of Department of Industries (DIC), KVIC, SIDBI, NABARD, NSIC, APSFC, IFCI and IDBI. New Financial Instruments. Research and Development – Marketing and legal aspects, Taxation benefits, Global aspects of Entrepreneurship.

Unit – V: Introduction To Innovation:

Meaning of innovation, sources of innovative opportunity, 7 sources of innovative opportunity, Principles of innovation, the enablers of innovation, business insights, insights for innovation, technical architecture for innovation, focus on the essence of innovation.

Unit – VI: Process And Strategies For Innovation:

Process of innovation, the need for a conceptual approach, Factors contributing to successful technological innovation, Strategies that aim at innovation, impediments to value creation and innovation.

TEXT BOOKS:

1. Robert D Hisrich, Michael P Peters, Dean A Shepherd: Entrepreneurship, TMH, 2009
2. Bholanath Dutta: Entrepreneurship – Text and cases, Excel, 2009.

REFERENCE BOOKS:

1. Vasanth Desai: Entrepreneurship, HPH, 2009
2. H. Nandan: Fundamentals of Entrepreneurship, PHI, 2009.
3. Barringer: Entrepreneurship, Pearson,2009.
4. Peter Drucker (1993), "Innovation and Entrepreneurship", Hyper Business Book.
5. C.K. Prahalad, M.S. Krishnan, The new age of Innovation – TATA McGRAW-HILL Edition 2008.

M.Tech. (CAD/CAM) I Year – II Sem.

BANKING OPERATIONS, INSURANCE AND RISK MANAGEMENT

(Open Elective)

L	T	P	C
3	1	**-**	**3**

CODE: 5ZC03

Course Out Comes :

After going through course, the student will be able to

1.know the introduction to Banking Business

2. know the Banking Reforms and Regulation

3. know about Insurance

4. know Insurance Business Environment

5.know the Risk and it's Analysis

6. know the Risk Return criteria

Unit – I: Introduction To Banking Business:

Banking Sectors- Retail, Corporate, Rural, and International; Non-banking financial intermediaries; Types of advances and deposits in a bank, New Dimensions and Products. - Credit, Debit and Smart Cards, and e-Banking Structure of the Indian Banking System's. Commercial Banks – Public and Private Sector and Foreign Banks. Cooperative Banks.

Unit – II: Banking Reforms and Regulation:

Banking Regulation Act, 1949, Reserve Bank of India Act 1934, and Reserve Bank's Instruments of Credit Control. Deficiencies in Indian Banking including Problems Accounts and Non-Performing Assets, Banking Sector Reforms.

Unit – III: Insurance:

Need for and importance of insurance, branches of insurance (life and general insurance) policy and procedure.

Unit – IV: Insurance Business Environment:

Mathematical basis of life insurance, reinsurance coverage, regulatory and legal frame work governing the insurance, business and economics of insurance, need for changing mindset; Latest trends.

Unit – V: Risk Analysis:

Firm risk and Market risk: Portfolio related Risk measure, Mean variance and portfolio construction. Port folio theory and capital Budgeting CAPM.Risk Management: Option valuation; Derivatives: managing financial Risk Options and option contracts; credit risk management; introduction, risks and credit risk management.

Unit – VI: Risk And Return:

Return and Risk, measuring internal risk, measuring Historical return and measuring historical risk measuring expected return and risk .Derivatives and Risk Management: Risk management Forwards and Futures, options; Interest rates and currency swaps

TEXT BOOKS :

1. Varshney, P.N., Banking Law and Practice, Sultan Chand & Sons, New Delhi.
2. General principles of Insurance - Harding and Evanly
3. Investment Analysis and Port folio Management: Prasanna Chandra 2/e

REFERENCE BOOKS :

1. Read, E. W., Commercial Bank Management, Harper and Row Publishers, New York
2. Lectures on Banking Law - Gilbert J.N.
3. Dr. Shrikrishna Laxman Karve, Principles of Life Insurnace, Himalaya publishing house.
4. P.K. Gupta, Principles and practice of non life insurance, Himalaya publishing house

M.Tech. (CAD/CAM) I Year – II Sem.
ETHICS, MORALS, GENDER SENSITIZATION AND YOGA
Open Elective

L	T	P	C
3	1	-	**3**

CODE: 5H233

COURSE OUTCOMES

Students will be able to

- Discriminate between right and wrong from their own behavior and judge the same in others.
- Understand how moral development involves thoughts, feelings, and behaviors regarding right and wrong and get intrapersonal and interpersonal dimensions.
- Understand Engineer's Responsibility for safety and risk.
- Understand rules and principles set by the society in a customary way.
- Perceive gender literacy and understand the importance of gender perspective and in turn delve into gender issues.
- Understand and appreciate the importance of yoga for an enriched life style.

UNIT I: HUMAN VALUES AND MORALS

Why Value Education, Understanding Social Factors, System, Structure and Source of Generic Values; Morals, Values and Ethics; Integrity; Work Ethics; Service Learning-Civic Virtue-Respect for Others-Living Peacefully-Caring-Sharing; Honesty; Courage; Value Time; Cooperation; Commitment; Empathy; Self Confidence; Spirituality; Character; Loyalty; Confidentiality

UNIT II: ENGINEERING ETHICS AND PERSONALITY DEVELOPMENT

Ethical Principles, Ethical Theories, , Use of Ethical Theories, Types of Inquiry, Engineering and Ethics, Engineering Ethics, Moral Autonomy of Engineers, Professional Ethics, Consensus and Controversy, Ethics in Business, Global business, Understanding Factors of Success, Human Aspirations, Personality and Our Identity, Understanding SELF, Happiness and Self-Interest, Positive Thinking, Custom and Religion, Understanding responsibility toward society, Understanding National and cultural Ethos; Professionalism

UNIT III:ENGINEERING AS SOCIAL EXPERIMENTATION

Comparison with Standard Experiments; Knowledge Gained; Learning from the Past; Engineer as Manager, Consultants and leaders and responsible social Experimenter; Engineers personality Trait, Big Five Personality model, Conscientiousness ,Accountability- Roles of Codes-Codes and Experimental Nature of Engineering; Engineer's Responsibility for safety and Risk, Concept of Safety-Types of Risks

UNIT IV: GLOBAL PERSPECTIVE

Distinguish between Bribes and Gifts; Occupational Crimes; Globalization- Cross-Cultural Issues; Environmental Ethics; Internet and Computer Codes of Ethics

Case Study:

Ethics in Military and Weapons Development-Ethics in Research work

M.Tech. (CAD/CAM) I Year – II Sem.

DATA BASE MANAGEMENT SYSTEMS

(Open Elective)

L	T	P	C
3	1	-	**3**

CODE: 5RC17

UNIT I :

Data base System Applications, data base System VS file System – View of Data – Data Abstraction – Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor, History of Data base Systems. Data base design and ER diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model – Conceptual Design for Large enterprises.

UNIT II :

Introduction to the Relational Model – Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views.

Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

UNIT III:

Form of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases.

UNIT IV :

Schema refinement – Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – FORTH Normal Form.

UNIT V :

Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability- Lock –Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity, Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage-Advance Recovery systems- Remote Backup systems.

UNIT VI :

Data on External Storage – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and Performance Tuning- Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure.

TEXT BOOKS :

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition

2. Data base System Concepts, Silberschatz, Korth, McGraw hill, V edition.

REFERENCES :

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.

2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education

3. Introduction to Database Systems, C.J.Date Pearson Education

M.Tech. (CAD/CAM) I Year – II Sem.

COMPUTER AIDED ANALYSIS AND ROBOTICS LAB

L	T	P	C
-	-	4	2

CODE: 5W275

Computer Aided Analysis:

The following exercises shall be practiced on CAE Software (ANSYS):

1. Static analysis of 2D truss structure
2. Static analysis of 3D trusse structure
3. Static Analysis of Axial compound bar
4. Structural static analysis of beams with distributed load and point loads
5. Structural static analysis of curved beam
6. Structural Analysis of Opened Coiled Spring
7. Structural static Analysis of I.C Engine connecting rod
8. Structural Modal Analysis of cantilever beam
9. Transient Dynamic Analysis of Beam
10. Thermal Analysis of composite slab.
11. Buckling Analysis of a column
12. Static Analysis of pressure vessel
13. Eigen values Analysis of spring-mass systems

Robotics Lab:

14. Study of various components of Articulated Robot (XL ROBOT-MTAB)
15. **Exercise on Pick and Place Tasks on Robot**: Recording Pick and Place positions, Performing Pick and Place Movements, Writing a Pick and Place Program, Running the Program Line by Line and Running the Program continuously

M.Tech. (CAD/CAM) I Year – II Sem.

COMPREHENSIVE VIVA-VOCE -II

L	T	P	C
-	-	-	1

CODE: 5W276

Max. Marks: 100

There shall be a Comprehensive Viva-Voce in II year I Semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of Head of the Department and two Senior Faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the students' understanding in various subjects he/she studied during the M. Tech course of study. The Comprehensive Viva-Voce is valued for 50 marks by the Committee. There are no internal marks for the Comprehensive Viva-Voce. A candidate has to secure a minimum of 50% to be declared successful.

M.Tech. (CAD/CAM) I Year – I Sem.

LITERATURE REVIEW & SEMINAR-2

L	T	P	C
-	-	3	1

CODE: 5W277

Max. Marks: 100

After studying this course, the students will be able to

1. Identify a research topic
2. Collect literature
3. Write technical review paper
4. Present seminar
5. Discuss the queries and Publish research paper

There shall be three seminar presentations during I year I semester and I year II Semester. For seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the Department in a report form and shall make an oral presentation before the Departmental Committee, which shall consist of the Head of the Department, a senior Faculty Member and the Supervisor and will jointly evaluate the report and presentation. For each Seminar there will be only internal evaluation of 25 marks. A candidate has to secure a minimum of 50% to be declared successful.

In the First semester the report must be in the form of the review paper with a format used by IEEE / ASME etc. In the Second semester Technical Seminar in the form of Independent Review Paper must be of high quality fit for publication in a reputed conference / journal.

The evaluation format for seminar is as follows:

- Day to day evaluation by the Supervisor : 20 marks
- Final Report : 20 marks
- Presentation : 60 marks (20 Abstract seminar +40 Final Presentation)

The presentation includes content (5) + Participation (5) + Presentation (10) for a total of 20 marks and double for 40 marks for final presentation.

A Student has to concentrate on the following sections while writing technical paper or presenting seminar.

Contents:

- Identification of specific topic, Analysis
- Organization of modules, Naming Conventions
- Writing style, Figures
- Feedback
- Miscellaneous

REFERENCES:

Teach Technical Writing in Two Hours per Week by Norman Ramsey

For Technical Seminar the student must learn few tips from sample seminars and correcting himself, which is continues learning process

REFERENCE LINKS:

IV. http://www.cs.dartmouth.edu/~scot/givingTalks/sld001.htm
V. http://www.cse.psu.edu/~yuanxie/advice.htm
VI. http://www.eng.unt.edu/ian/guides/postscript/speaker.pdf

NOTE: A student can use any references for this process, but must be shared in classroom.

M.Tech. (CAD/CAM) I Year – II Sem.

PROJECT SEMINAR-I (Abstract)

L	T	P	C
-	-	3	2

CODE: 5W278

Max. Marks: 100

In I year II semester, a project seminar shall be conducted for 100 marks and for 2 credits (there is no external evaluation). The evaluation for the project seminar shall be done in two stages, i.e. in the middle of the semester and at the end of the semester. The mid-semester seminar evaluation shall carry 10 marks and the end semester seminar evaluation shall carry 15 marks. The report for the mid-semester project seminar will carry 5 marks and remaining marks shall be for presentation and discussion. The report for end semester project seminar shall be for 5 marks and the remaining marks shall be for presentation and discussion. A candidate shall secure a minimum of 50% to be declared successful.

M.Tech. (CAD/CAM) II Year – I Sem.

PROJECT SEMINAR-II

(DESIGN, CONSTRUCTION AND DEVELOPMENT)

L	T	P	C
-	-	-	4

CODE: 5W379

Max. Marks: 100

In II year I semester, a project seminar shall be conducted for 100 marks and for 4 credits (there is no external evaluation). The evaluation for the project seminar shall be done in two stages, i.e. in the middle of the semester and at the end of the semester. The mid-semester seminar evaluation shall carry 20 marks and the end semester seminar evaluation shall carry 30 marks. The report for the mid-semester project seminar will carry 5 marks and remaining marks shall be for presentation and discussion. The report for end semester project seminar shall be for 10 marks and the remaining marks shall be for presentation and discussion. A candidate shall secure a minimum of 50% to be declared successful.

M.Tech. (CAD/CAM) II Year – I Sem.

PROJECT WORK (PART-I)

(PROJECT STATUS REPORT)

L	T	P	C
-	-	-	**20**

Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the Project Review Committee.

A Project Review Committee (PRC) shall be constituted comprising of Heads of all the Departments which are offering the M.Tech programs and three other senior faculty members concerned with the M.Tech. programme.

Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the previous semesters and after obtaining the approval of the PRC.

After satisfying 6.2, a candidate has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work to the PRC for its approval. Only after obtaining the approval of PRC the student can initiate the Project work. This process is to be completed within four weeks of commencement of II year I semester.

The student shall submit a project report at the end of II year I semester, and the same shall be evaluated at the end of that semester by the PRC as Excellent/Good/Satisfactory/Unsatisfactory. In the case of Unsatisfactory declaration, the student shall re-submit the Project report after carrying out the necessary modifications / additions in the Project work, within the specified time as suggested by the PRC.

M.Tech. (CAD/CAM) II Year –II Sem.
PROJECT SEMINAR – III
(Result Analysis)

L	T	P	C
-	-	-	2

CODE : 5W482

Max. Marks: 100

A project seminar shall be conducted for 100 marks and for 2 credits (there is no external evaluation). The evaluation for the project seminar shall be done in two stages, i.e. in the middle of the semester and at the end of the semester. The mid-semester seminar evaluation shall carry 20 marks and the end semester seminar evaluation shall carry 30 marks. The report for the mid-semester project seminar will carry 5 marks and remaining marks shall be for presentation and discussion. The report for end semester project seminar shall be for 20 marks and the remaining marks shall be for presentation and discussion. A candidate shall secure a minimum of 50% to be declared successful.

M.Tech. (CAD/CAM) II Year – II Sem.

PRE SUBMISSION PROJECT SEMINAR

L	T	P	C
-	-	-	2

CODE: 5W483

Marks: 100

Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the Project Review Committee.

A Project Review Committee (PRC) shall be constituted comprising of Heads of all the Departments which are offering the M.Tech programs and three other senior faculty members concerned with the M.Tech. programme.

Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the previous semesters and after obtaining the approval of the PRC.

After satisfying 6.2, a candidate has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work to the PRC for its approval. Only after obtaining the approval of PRC the student can initiate the Project work. This process is to be completed within four weeks of commencement of II year I semester.

The student shall submit a project report at the end of II year I semester, and the same shall be evaluated at the end of that semester by the PRC as Excellent/Good/Satisfactory/Unsatisfactory. In the case of Unsatisfactory declaration, the student shall re-submit the Project report after carrying out the necessary modifications / additions in the Project work, within the specified time as suggested by the PRC.

M.Tech. (CAD/CAM) II Year – II Sem.

PROJECT WORK AND DISSERTATION

L	T	P	C
-	-	-	20

CODE: 5W484

By the end of this course, students will be able to

1.Critically and theoretically analyze the systems/products they are going to design or develop.
2.Apply the theoretical knowledge gained to bring out innovative products.
3.Effectively communicate in a variety of forms including written, visual, verbal, online and technical literacy.
4.Work and participate as effective members in a group within a professional environment.
5.Develop an ongoing critical awareness of learning needs in the application of appropriate technologies.
6.Gain as much knowledge and experience in areas of the area of Digital Systems and Computer Electronics

A candidate is permitted to submit Project Dissertation only after successful completion of PG subjects (theory and practical), seminars, Comprehensive viva-voce, PG Project Part–I, and after the approval of PRC, not earlier than 40 weeks from the date of registration of the project work. For the approval of PRC the candidate shall submit the draft copy of thesis to the Head of the Department and shall make an oral presentation before the PRC. Along with the draft thesis the candidate shall submit draft copy of a paper in standard format fit for publication in Journal / Conference, based on the project thesis, to the Head of the Department with due recommendation of the supervisor.

- Four copies of the Project Dissertation certified by the Supervisor and Head of the Department shall be submitted to the College.

- The dissertation shall be adjudicated by one examiner selected by the College. For this, Head of Department shall submit a panel of 3 examiners, who are eminent in that field, with the help of the PRC. The Chief Superintendent of the college in consultation with the college academic committee shall nominate the examiner.

- If the report of the examiner is not favorable, the candidate shall revise and resubmit the Dissertation, in the time frame as prescribed by PRC. If the report of the examiner is unfavorable again, the thesis shall be summarily rejected. The candidate can re-register only once for conduct of project and evaluation of Dissertation, and will go through the entire process as mentioned above. The total duration for the M. Tech program is limited to four years.

If the report of the examiner is favorable, viva-voce examination shall be conducted by a Board consisting of the Head of the Department, Supervisor and the Examiner who adjudicated the Dissertation. The Board shall jointly report the student's performance in the project work as – (a) Excellent, or (b) Good, or (c) Satisfactory, or (d) Unsatisfactory, as the case may be. In case, the student fails in the viva-voce examination, or gets the Unsatisfactory grade, he can re-appear only once for the viva-voce examination, as per the recommendations of the Board. If he fails at the second viva-voce examination, the candidate can re-register only once for conduct of project and evaluation of Dissertation, and will go through the entire process as mentioned above. The total duration for the M. Tech program is limited to four years.