Nirma University
Institute of Technology
School of Engineering

Mechanical Engineering Department

M.Tech Design Engineering

3ME1109 Computer Aided Design [3 0 2 5]

Course Learning Outcome:

After successful completion of the course, student will be able to:

- select input and output devices for computer systems for mechanical engineering requirements.
- apply knowledge of mathematical concept for geometry manipulation and modeling of curves, surface and solids.
- operate CAD packages to prepare solid model of components, assemble them to represent complex mechanical systems.
- develop computer algorithm for design and analysis of mechanical systems.

Syllabus:

Introduction

Application of computers to design, benefits of CAD, conventional design vs CAD.

Software configuration of a Graphic system, Functions of a Graphics package, Constructing the Geometry, Transformations, Data Base Structure and Content,

CAD hardware and software

Types of systems, systems, systems evaluation criteria, input devices, output devices, display devices, technical specification of CAD workstation, computer software-operating system, files creation, data file processing, application software in CAD.

Computer graphics

Scan conversions, DDA and Bresenhan's algorithm for generation of various figure, 2D and 3D transformations, mathematical representation of plane curves, space curves such as cubic splines, Bezier curves, Bspline and NURBS, Surface Generation and description, analytic surfaces, parametric surfaces, Bezier and B – spline surfaces, mathematical representation of solids- B-rep, CSG etc., analytical solid modeling, solid manipulation, visual realism.

Standards in CAD, graphics and computing standards, data exchange standards, design database, interfacing design and drafting, mechanical assembly.

Computer aided design of mechanical elements with animation.

Capabilities of various commercially available software in the area of CAD such as Pro E, I-DEAS, CATIA etc.

Mechanical Assembly: Introduction, Assembly Modeling – Parts, Modeling & Representation, Hierarchical Relationships, Mating Conditions. Inference of position from mating conditions.

Representation schemes - Graph structure, Location graph, Virtual Link.

Generation of Assembling Sequences-Precedence Diagram, Liaison-Sequence analysis, Precedence Graph. Assembly Analysis.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:

Laboratory Work will be based on topics covered under the above syllabus.

References:

1. Hearn & Baker, Computer Graphics, PHI Publisher.
2. David F. Rogers & J. Alan Adams, Mathematical Elements for Computer Graphics, McGraw Hill.
3. Ibrahim Zeid, CAD / CAM Theory and Practice, McGraw Hill.
4. Chris McMohan & Jimmie Brown Addison, CAD / CAM, Wesley Publication

3ME3103 Stress Analysis [3 0 0 3]

Course Learning Outcome:
After successful completion of the course, student will be able to
- understand stress, strain and their relations.
- analyze stresses in mechanical structural components.
- explore the scope experimental stress analysis.

Syllabus:
Components of stress and strain; their principal values and invariants. Generalised Hooke s law. General 3-D problems and classical theorems. Plane stress and plane strain. Airy s stress function. 2-D problems in rectangular and polar coordinates. Complex variable approach. Complex representation of stresses, displacements and applied boundary loads. Different methods of solution of 2-d problems for finite and infinite plates with simply and multiply connected regions. Experimental methods of stress analysis. Strain gages. Photoelasticity. Biorefringent coatings. Brittle coatings. Moire frings. X-ray techniques and holography.

Self Study:
The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

References:

1. Budyans, Advanced Strength and Applied Stress Analysis, McGraw Hill.
2. S.P. Timoshenko and J.N. Goodier, Theory of Elasticity, McGraw Hill.
3. J.W. Dally and W.F. Riely , Experimental Stress Analysis, McGraw Hill.
4. Mushelishvili, Some basic problems of the mathematical theory of elasticity, Noordhoof, Netherlands.

3ME3105 Mechanical Design - I [3 1 0 4]

Course Learning Outcome:

After successful completion of the course, student will be able to

- select the appropriate design philosophy for design of a component. .
- design various mechanical systems incorporating the effect of fatigue, creep and fracture mechanics.
- incorporate friction, wear and lubrication consideration in the design.
- design rotating disc, rotating cylinders and corrected gears.

Syllabus:

General Design Procedure: Design Philosophies, Design for X, Reliability, Concurrent Engineering, Aesthetics and Ergonomics,

Advanced Materials, Material selection.

Strain Based Approach to Fatigue. Fatigue under variable loading conditions.

Creep:-True stress and true strain, creep phenomenon, creep parameters, stress relaxation. Designing components subjected to creep.

Fracture Mechanics: Griffith theory, Concept of SIF and K_{IC} Crack Tip Plasticity. Determination of plastic zone, size and shape. Fatigue crack propagation and life estimation.

Tribology: Wear and its types. Hydrodynamic, hydrostatic and elsatohydrodynamic lubrication. Porous bearings, stresses in bearing. Determination of static and dynamics load capacity of bearings. Arrangement of bearings for different load conditions.

Gear Materials, corrected gear tooth design, power rating of gears as per BIS.

Rotating Discs and Rotating Cylinder Discs with uniform thickness. Discs with uniform strength. Stresses in rotating cylinder with and without internal pressures.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Tutorial Work:

Tutorial work will be based on above syllabus with minimum 10 tutorials to be incorporated.

References:

1. Ali Fatemi & Ralph Stephens, Metal Fatigue in Engineering, Wiley.
2. Ashok Saxena, The Science and Design of Engg. Materials, McGraw Hill.
3. N. E. Downling, Mechanical Behavior of Materials, Prentice Hall.
4. G. M. Maitra, Hand book of Gear Design, McGraw Hill.
5. P. Rudenko, Material Handling Equipment, Mir Publisher.
6. Burr & Cheathaam, Mechanical Analysis & Design, Prentice Hall.

3ME3106 Applied Dynamics & Vibrations [3 0 2 5]

Course Learning Outcome:

After successful completion of the course, student will be able to

- Apply principle of dynamics to spatial mechanisms.
- Formulate mathematical models of real life engineering systems for vibration studies.
- Evaluate vibratory response of multi degree freedom systems and continuous systems
- Illustrate the vibration characteristics through experiments.

Syllabus:

Dynamics of rigid bodies in three dimensions, Gyro dynamics, Euler's equations, Lagrange's equation, Hamilton's principles, Vibrations of multiple degrees of freedom systems, Vibration of continuous system, Longitudinal vibrations of bars, lateral vibration of straight and curved beans, Rayleigh-Ritz and Galerkin's methods, Introduction to non-linear and random vibrations.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:

Laboratory Work will be based on topics covered under the above syllabus.

References:

1. Shigley J.E and Uicker J J, Theory of machines and Mechanism, McGraw Hill.
2. Amitabh ghosh and Asok kumar malik, Theory of Mechanisms and Machines, East West Publisher.
3. Rao & dukkipati, Advance Mechanical Vibration, Narosa.
4. S S Rao, Mechanical Vibration, Pearson.
5. Greenwood, Principle of Dynamics, Prentice Hall.

3ME3104 Applied Computational Methods [3 0 0 3]

Course Learning Outcome

After successful completion of the course, student will be able to

- formulate mathematical models pertaining to various engineering problems.
- solve linear and non linear system of equations.
- analyze experimental data using curve fitting and interpolating techniques.
- compute integrals and differential of functions and equations using numerical methods.

Syllabus:

Mathematical Modeling and Engineering Problem Solving

Introduction, Simple mathematical model, approximation and rounding off errors, truncation errors and Taylor's series

Roots of Equations

Bracketing methods, open methods, roots of polynomials

Linear Algebraic Equations

Gauss elimination, Gauss Jordan Method, Matrix inversion, Special matrices and Gauss –Siedel method

Curve Fitting

Least squares regression, interpolation, Fourier approximation.

Numerical Differentiation and Integration

Newton-Cotes integration formulas, Newton-cotes algorithm for equations, Romberg integration, Gauss quadrature, high accuracy differentiation formulas, Richardson extrapolation, derivatives of unequally spaced data

Ordinary Differential Equations

Runge Kutta Methods, stiffness and multi step methods, Boundary value and Eigen value problems

Partial Differential Equations

Finite difference, elliptic and parabolic equations

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

References:

1. Chapra S.C. & Canale R P, Numerical Methods for Engineers, McGraw Hill.

2. R. Schilling and S. L. Harris, Applied numerical methods for engineers, Pacific Groove.
3. Gupta S. K., Numerical Methods for Engineers, New Academic Science.
4. Lapidus, L. and Seinfeld, J. H., Numerical Solutions of ODEs.

3ME3205 Optimization Methods in Engineering Design [3 0 0 3]

Course Learning Outcome:
After successful completion of the course, student will be able to
- understand the basic concepts of optimization
- Apply the various methods of optimization based on linear programming, non linear programming and stochastic programming for decision making.
- solve hard engineering problems which are interdisciplinary in nature using unconventional optimization techniques like genetic algorithm, simulated annealing, neural network based optimization techniques
- acquaint with capabilities of software tools used in the optimization process.

Syllabus:
Introduction: Introduction, Historical development, Engineering Application, Optimization Techniques, Classification
Classical Optimization Techniques: Basic Concepts of Optimization-Convex and Concave Functions, Necessary and sufficient conditions for Stationary Points; Optimization of one-dimensional Functions; Unconstrained Multivariable Optimization, Multivariable optimization with equality and inequality constraint.
Linear Programming – Introduction, Linear Programming and its Applications; Simplex method Duality in linear programming, Decomposition Principle, Quadratic Programming
Nonlinear Programming - Introduction, Elimination methods — Unrestricted Search, Exhaustive Search, Dichotomous search, Fibonacci method, Golden Section Method, Interpolation methods, Direct and Indirect Search Methods
Stochastic Programming - Introduction, Concept of Probability theory, Stochastic linear, nonlinear, geometric and dynamic programming.
Unconventional Optimization: Genetic Algorithms, Simulated Annealing, Neural Network- Based Optimization, Fuzzy systems
Software related to optimization.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

References:

1. Singiresu S. Rao, Engineering Optimization, New Age.
2. T.F.Edgar and D.M.Himmelblau, Optimization of Chemical Processes.
3. G.S.Beveridge and R.S.Schechter, Optimization Theory and Practice.
4. G.V.Rekllaitis, A.Ravindran, and K.M.Ragsdell, Engineering Optimization-Methods and Applications, Wiley.
5. Deb Kalyanmoy, Optimization for Engineering Design: Algorithms and Examples, PHI.

3ME3206 Finite Element and Boundary Element Methods [3 0 2 5]

Course Learning Outcome:

After successful completion of the course, student will be able to

- formulate the structural engineering, heat transfer problem into finite element and boundary element model
- derive and solve the stiffness matrix, displacement matrix and load vectors for one/two dimension structural and heat transfer problem
- apply the capabilities of finite element software to solve the structural engineering, heat transfer problem
- interpretate and evaluate the quality of results obtained using FE software
- appreciate the application and limitation of FEA and Boundary Element Method

Syllabus:

Finite Element Formulation: Introduction, Weighted Residual Method, weak form of WR statement, Principle of stationary total potential (PSTP), Rayleigh – Ritz Method.
One Dimensional Finite Element Analysis: General form of total potential for 1-D and finite element equations. Linear bar element, Quadratic bar element, Beam Element, Frame elements
Two Dimensional Finite Element Analysis: Introduction, Simple three nodded triangular element, four noded rectangular element, six noded triangular element, Natural co-ordinates and Co-ordinate transformation. Isoparametric representation, Numerical Integration,
Dynamic Analysis: Introduction, Equations of motion based on weak form and using Lagrange approach, Consistent and lumped mass matrix, Solution of Eigen value problems, transient vibration analysis.
Fluid Flow and Heat Transfer Problems: Derivation of basic differential equations 1-D and 2- D finite element formulation, Examples on fluid flow and heat transfer problems.
Boundary Element Methods: Boundary element formulation for heat conduction and 2D stress analysis. Case studies.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:

Laboratory Work will be based on topics covered under the above syllabus.

References:

1. O.C Zienkiewicz, The Finite Element Method, McGraw Hill.
2. C.S. Desai and J.F. Abel, Introduction to Finite Element Method, CBS Publisher.
3. R.D. Cook, Concepts and Application of Finite Element Analysis, Wiley.
4. Daryl L. Logan, A First Course in the Finite Element Methods, Cengage Learning.
5. C.A. Brebbia and S. Walker, Boundary Element Techniques in Engineering, Newness Butterworths.
6. P.K. Banerjee and R. Butterfield, Boundary Element Method in Engineering Science, Mc Graw Hill.

3ME3207 Design of Mechanisms & Manipulators [3 0 2 5]

Course Learning Outcome:
After successful completion of the course, student will be able to
- Synthesis the planar mechanisms for required applications
- Analyze the mechanisms statically and dynamically under the action of various loading.
- Carry out the kinematic and dynamic analysis of robotic manipulator.

Syllabus:
Basic Concept: - Mechanisms, Rigid body, Displacement, Kinematic Chain, Kinematic Inversion, Transmission of motion.
Vector method in plane kinematics, Kinematic analysis using complex polar notation and Cartesian vector notation.
Matrix Method in Kinematics: - Introduction, Rigid body rotation matrices, rigid body displacement matrices, screw matrix, Denavit – Hartenberg notation, Differential rotation and displacement matrices.
Kinematic Analysis of Spatial Mechanism: - Relative Spatial motion, Relative displacement, relative velocity, relative acceleration, plane kinematics, analysis using relative joint rotation angle. Kinematic analysis of spatial mechanism in closed form.
Mobility Analysis: - Introduction, Constraint Analysis, Numerical synthesis of plane linkages, range of motion analysis, mobility analysis.
Rigid Body Guidance: - plane rigid body guidance mechanism, three position synthesis, four position synthesis, spherical rigid body guidance.
Function Generation: - Precession points, chebychev spacing, three position function generation, four position spherical four bar function generation.
Path generation: - plane four bar path generation linkage, spherical four bar path generation.
Dynamics of Mechanism: - dynamics of plane four bar linkages, dynamic balancing plane four bar linkages, inverse dynamics of spatial mechanisms, dynamical equation of motion.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:
Laboratory Work will be based on topics covered under the above syllabus.

References:

1. C. H. Suh and C. W. Radcliff, Kinematics and Mechanism Design, Wiley.
2. Ashok kumar Malik, Amitabh Ghosh, Gunther Dittrich, Kinematic Analysis and Synthesis of Mechanisms, Mc Graw Hill.

3ME3208 Mechanical Design – II [3 1 0 4]

Course Learning Outcome:

After successful completion of the course, student will be able to

- design the components of crane structure and machine tool structure.
- apply the concepts of ergonomics and dynamics for the machine tools.
- design the pressure vessels as per various standard criterions.

Syllabus:

Design and analysis of crane structure, Design of main girder of overhead traveling crane, Testing of crane structure as per BIS.

Design of Machine Tool: Analysis of machine tool system from the kinematics, strength and rigidity point of view, design of multi speed gearbox, design of spindle, guideways, ball screw, design of machine tool structure, hydraulic bearing, air and gas bearing.

Design considerations of electrical, mechanical and Hydraulic drives in machine tool, stepped and stepless arrangements and systems.

Design of control mechanisms - selection of standard components - Dynamic measurement of forces and vibrations in machine tools - Stability against chatter - use of vibration dampers.

Pressure Vessel Design

Factors influencing the design of vessels, classification of pressure vessels, material selection, loads & types of failures, various codes used for design of vessels

Stresses in pressure vessels, stresses in circular ring, cylinder & sphere, membrane stresses in vessels under internal pressure, thick cylinders, multilayered cylinders, stress considerations in the selection of flat plat & conical closures, Discontinuity stresses in pressure vessels, Autofrettage of thick cylinders, thermal stresses & their significance.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Tutorial Work:

Tutorial work will be based on above syllabus with minimum 10 tutorials to be incorporated.

References:

1. P. Rudenko, Material Handling Equipment, Mir Publisher.
2. N. K. Mehta, Machine Tool Design, Mc Graw Hill.

3. CMTI Machine Tool Design Handbook.
4. Denis R. Moss, Pressure vessel design manual, Butterworth-Heinemann.
5. ASME code section 8, div. 1, div. 2, and section 2, part A, B, D.

3ME3216 Pressure Vessel and Piping Design [3 0 0 3]

Course Learning Outcome

After successful completion of the course, student will be able to

- understand fundamentals of pressure vessel and piping design.
- get acquainted with the existing codes (ASME section VIII) for piping and vessel design.
- design and analyze pressure vessels for internal as well as external pressure.
- design various components of pressure vessel subjected to fluctuating load

Syllabus:

Stresses in pressure vessel, stress categories, stress intensities, design of shell and tube under external and internal pressure, design of formed head, reinforcement required for openings, weld joint categories and weld design for pressure vessel, layered vessel.

Design of pressure vessel components such as shell, heads, nozzles, flanges as per ASME & IS codes.

Design of externally pressurized vessels, tall vertical vessels while considering various loadings such as internal pressure, external pressure, wind load, seismic load, snow load, etc and combined load, design of support for vertical & horizontal vessels.

Fatigue of various components of pressure vessels.

Piping Elements, materials used for piping, pipe size techniques, stresses in pipe, thermal stresses in pipe, pipe support design, stress analysis in piping, and Dynamic analysis of piping

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

References:

1. M.V. Joshi & V.V. Mahmani, Process Equipment Design, McMilan India.
2. J.F. Hanvey, Pressure Vessels Design, von nostrand co. Inc., Wiley
3. Brownell and Young, Process Equipment Design, Wiley.
4. Denis R. Moss, Pressure Vessel Design Manual, Gulf.
5. ASME Code Section 8, div. 1, div. 2, and section 2, part A, B, D.
6. IS for Wind, Seismic and Snow Load Design.
7. Hand Book of Piping Design.
8. ASHRAE Fundamentals.

3ME4225 Mechatronics [3 0 0 3]

Course Learning Outcome:

After successful completion of the course, student will be able to

- acquire knowledge of mechatronics system
- understand functionality of various components used in mechatronics system
- select the sensors,actuators and controllers for given application
- design and analyze mechatronics system

Syllabus:

Introduction: Definition of Mechatronics, Mechatronics in manufacturing Systems, Measurement Systems, Control Systems, Microprocessor Based Controllers Examples, Comparison between Traditional and Mechatronics approach.Review of fundamental of Electronics, Data conversion devices, sensors, micro sensors, transducers, electrical contacts, actuators and switches, contact less input devices, signal processing devices, timers, output devices.

Actuation System:

Mechanical Actuation Systems: Types of motion, Freedom and constraints, Loading, Gear Trains, Pawl & Ratchet, Belt & Chain drive, Bearing, Selection of Ball & Roller bearings, Mechanical aspects of motor selection.

Electrical Actuation Systems: Solenoids, D.C Motors, A.C.Motors Stepper Motors, Specification and control of stepper motors, Servomotors: D.C Servomotor and A.C Servomotor. Pneumatic & Hydraulic Systems: Power supplies, DCV, PCV, Cylinders, Rotary actuators.

System Models:

Building blocks of Mechanical, Electrical, Fluid and Thermal Systems, Rotational Transnational Systems, Electromechanical Systems, Hydraulic Systems.

Controllers: System Models Controllers and Programming Logic Controllers Continuous and discrete process Controllers, Control Mode, Two Step mode, Proportional Mode, Derivative Mode, Integral Mode,PID Controllers, Digital Controllers, Velocity Control, Acceleration, force and torque controllers, Adaptive Control, Digital Logic Control, Micro Processors Control, Servo Amplifiers.

Definition, Basic block diagram and structure of PLC,Input/Output processing,PLC Programming: Ladder diagram, its logic functions, latching and sequencing, PLC mnemonics,Timers, internal relays and counters,Shift registers, Master and jump controls Data handling,Analog input/output,Selection of PLC.

Design of Mechatronics Systems:

Design process stages,Traditional Vs Mechatronics designs,Possible design solutions: Timed switch, Wind-screen wiper motion, Bath room scale - Case studies of mechatronics systems: A pick-and-place robot, Car park barrier, Car engine management system, Automatic Camera and Automatic Washing Machine only

Mechatronics Controls in Manufacturing Automation: Monitoring of manufacturing processes, On-line quality monitoring, Model-based systems, Hardware-in-the-loop simulation, Supervisory control in manufacturing inspection, Integration of hetrogeneous systems.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

References:

1. HMT, Mechatronics, 1st Edition 1998, Tata McGraw Hill, New Delhi.
2. Devdas Shetty and Kolk, Mechatronics System Design, 1st Reprint, 2001, PWS Publishing Co., Boston.
3. James H.Harter, Electromechanics, 1st Edition 2003, Prentice-Hall of India, New Delhi.
4. M.D.Singh and J.G.Joshi, Mechatronics, 1st Edition 2006, Prentice-Hall of India, New Delhi.
5. W.Boltan, Mechatronics, 2nd Edition, Addition-Wesley Longman Ltd, New York,1999.

3ME4215 Supply Chain Management [3 0 0 3]

Course Learning Outcome:

After successful completion of the course, student will be able to

- understand the concept of supply chain management.
- evaluate different supply chain strategies for a given situation.
- decide the appropriate demand forecasting method.
- interpret the need of appropriate production planning and inventory control policies in a supply chain.

Syllabus:

Concept of Supply Chain, integrated supply chain, Growth of Supply chain, Strategic decision in supply chain. Make or Buy Decision, Supplier development

Definition of Supply Chain Management, Scope, Supply Chain Management as a Management Philosophy, Function of SCM, Why Supply Chain Management, Value chain for Supply Chain Management. Customer focus in Supply Chain Management, Buyers Perspective, Suppliers Perspective, Stages of Development in Supplier Relations.

Supply Chain Strategies – (i) Cycle View (ii) Push & Pull View. Achievement of strategic fit through different steps, Obstacles to achieving Strategic Fit.

Supply Chain Drivers and Metrics: Drivers of supply chain performance, Frame work for structuring drivers, Facilities, Inventory, Transportation, Information, Sourcing, Pricing.

Demand Forecasting in Supply Chain: Role of forecasting in a supply chain, Characteristics of forecasts, Component of forecast and forecasting methods, Basic approach to Demand forecasting, Time-series forecasting methods, Measure of forecast errors.

Aggregate Planning in a Supply Chain: Role of Aggregate Planning in a Supply Chain, Aggregate planning problems, Aggregate planning Strategies.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

References:

1. Sunil Chapra and Peter Meindl, Supply Chain Management, Pearson
2. Dr. R.P. Mohanty and Dr. S.G. Deshmukh, Essentials of Supply Chain Management, Jaico Pub. House.
3. David Simchi-Levi, Philip Kamiusky, Edith Simchi-Levi, Designing & Managing the Supply Chain, McGraw Hill.
4. Rahul V. Alterkar, Supply Chain Management: Concepts and Cases, PHI

3ME3301 Major Project Part I – Full Time [0 0 0 15]

Course Learning Outcome

The course provides an opportunity to the student to explore their knowledge in the area of their interest. Student will apply idea into application through experiments/ simulation. It will also help them to decide the project area / topic for further research work in their life. . As an outcome of the course, student will be able to develop:

- Problem formulation techniques.
- Analysis techniques of published data.
- Identification of scope and objectives of research work.
- Techniques for the design of experiments.
- Associated administration for project work.
- Development of compilation skill.
- Writing skill.
- Presentation skill.
- Technical Paper writing.
- Report preparation techniques.
- Fundamentals, information, reviews and in-depth knowledge in the desired area.

Syllabus

The Major Part I is aimed at training the students to analyze independently any problem in the field of Design Engineering. The project may be analytical or computational or experimental or combination of them based on the latest developments in the said area. At the end of the semester, the students will be required to submit detailed report. The Major Project Part I should consists of objectives of study, scope of work, critical literature review of the Major Project and preliminary work pertaining to the said work.

3ME3401 Major Project Part II – Full Time [0 0 0 15]

Course Learning Outcome

The course provides an opportunity to the student to explore their knowledge in the area of their interest. Student will apply idea into application through experiments/ simulation. It will also help them to decide the project area / topic for further research work in their life. . As an outcome of the course, student will be able to develop:

- Problem formulation techniques.
- Analysis techniques of published data.
- Identification of scope and objectives of research work.
- Techniques for the design of experiments.
- Associated administration for project work.
- Development of compilation skill.
- Writing skill.
- Presentation skill.
- Technical Paper writing.
- Report preparation techniques.
- Fundamentals, information, reviews and in-depth knowledge in the desired area.

Syllabus:

Major Project Part II is a continuation of the work done by the student during semester III. The student is required to submit thesis as a partial fulfillment of the M. Tech degree. The thesis should consist of detailed study of the problem under taken, concluding remarks and scope of future work, if any. The project report (thesis) is expected to show clarity of thought and expression, critical appreciation of the existing literature and analytical, computational and experimental aptitude of the student.