# MVSR Engineering College, Nadergul.
## Department of Mechanical Engineering
## ME (CAD/CAM)
## COURSE OUTCOMES

| CO No. | Course outcome | POs, PSOs mapped |
|---|---|---|
| M 2113.1 | Define and describe FMS, differentiate between cellular manufacturing and FMS, FMS layouts. describe Planning and preparation guidelines for FMS | PO1, PO3, PO8, PO12. |
| M2113.2 | Define and describe Just in time manufacturing and its benefits, describe group technology classification and coding and its benefits. | PO1, PO2, PO8, PO12. |
| M2113.3 | Design FMS using bottleneck and extended bottle neck models, describe construction and operation of turning and machining centre, coordinate measuring machine. | PO1, PO2, PO3, PO5, PO7, PO8, PO12. |
| M2113.4 | Describe Automated storage and retrieval system, AGVS. Design storage space, queuing carousels. | PO1, PO3, PO4, PO12. |
| M2113.5 | Describe Tool management and specify cutting tool controls, work holding and work changing equipment. Describe General fixturing design of manual and automated transfer lines. | PO1, PO2, PO3, PO4, PO8, PO12. |
| M2113.6 | Describe Computer hardware and software, PLC's, communication networks in FMS implementation | PO1, PO5, PO12. |

Class: M.E. I year
Name of the Course: Flexible Manufacturing Systems
Course Code: ME2113
At the end of the course student is able to

# MVSR Engineering College, Nadergul.
## Department of Mechanical Engineering
## ME (CAD/CAM)
## COURSE OUTCOMES

Class: M.E. I year
Name of the Course: CAD/CAM Lab (Lab –I)
Course Code: ME2431
At the end of the course student is able to

| CO No. | Course Outcome | POs, PSOs mapped |
|---|---|---|
| ME2431.1 | Use parametric CAD software for geometric modelling of mechanical designs and visualize of machine components and assemblies before their actual fabrication through modelling, animation, shading, rendering, lighting and coloring. | PO1, PO2, PO4, PO7, PO10, PO12,PSO2 |
| ME2431.2 | Apply of CAD computational analysis tools to engineering design and create a complete CAD documentation for an engineering design. | PO1, PO2, PO3, PO4, PO5, PO9, PO10,PSO1,PSO2 |
| ME2431.3 | Model complex shapes including freeform curves and surfaces | PO1, PO2, PO7, PO9,PO10,PSO1, PSO2 |
| ME2431.4 | Explain the basic concepts of CNC programming and machining | PO1, PO2, PO3, PO10, PO11, PO12, PSO1,PSO2 |
| ME2431.5 | Implement CNC programs for milling and turning machining operations | PO1, PO2, PO3, PO4, PO5, PO10, PO11,PO12,PSO1, PSO2 |

# MVSR Engineering College, Nadergul.
## Department of Mechanical Engineering
## ME (CAD/CAM)
## COURSE OUTCOMES

Class: M.E. I year
Name of the Course: Computation Laboratory
Course Code: ME 2032
At the end of the course student is able to

| CO No. | Course Outcome | POs, PSOs mapped |
|---|---|---|
| ME2032.1 | Classify the types of Trusses (Plane Truss & Spatial Truss), Corner bracket , Beams (2D & 3D) with various cross sections to determine Stress, Strains and deflections under static, thermal and combined loading | PO1,PO2, PO4,PO5,PSO1 |
| ME2032.2 | Generalize Plane stress, plane strain conditions & also determine the stress and deflection of beam. | PO1,PO2,PO4, PSO1 |
| ME2032.3 | Analyse cylindrical shell, performing analysis on flat & curved shells using axisymmetric shell element to determine stresses, strains with different boundary conditions. | PO1,PO2,PO4, PSO1 |
| ME2032.4 | Predict the natural frequencies and modes shapes using Modal, Harmonic analysis. Also finding the critical load using Buckling analysis | PO1,PO2,PO4, PSO1 |
| ME2032.5 | Simulate steady state, Transient heat transfer analysis of infinite slab, Transient heat transfer of castings, and Drop test of a container. | PO1,PO2,PO4, PSO1 |
| ME2032.6 | Evaluate the stiffness matrix, B matrix and loading matrices of beam/ in plane/solid elements. | PO1,PO2,PO5, PSO1 |

# MVSR Engineering College, Nadergul.
## Department of Mechanical Engineering
## ME (CAD/CAM)
## COURSE OUTCOMES

Class: M.E. I year
Name of the Course: Optimization Techniques
Course Code: ME2308
At the end of the course student is able to

| CO No. | Course Outcome | POs, PSOs mapped |
|---|---|---|
| ME2308.1 | Apply simulation techniques by using Monte Carlo simulation along with random number methods for inventory controls and queuing models. | PO1,PO2,PO4 |
| ME2308.2 | Understand and apply decision theory models such as decision making under certainty, uncertainty, under risk and tree analysis for various real life problems. | PO1,PO2,PO3,PSO1 |
| ME2308.3 | Understand integer programing by gomorys, branch and bound methods for real application of linear programing models and mixed integer programing problems. | PO1, PO2,PSO1 |
| ME2308.4 | Apply bellmans principle of optimality of dynamic programing for research application of linear programing and capital budgeting problems. | PO1,PO2,PSO1 |
| ME2308.5 | Understand unconstrained and constrained problems by applying lagrangian and Kuhntucker conditions for research problems. | PO1,PO2,PO3,PO5,PSO1 |

# MVSR Engineering College, Nadergul.
## Department of Mechanical Engineering
## ME (CAD/CAM)
## COURSE OUTCOMES

Class: M.E.
Name of the Course: PRODUCT DESIGN AND PROCESS PLANNING
Course Code: ME 2111
At the end of the course student is able to

| CO No. | Course Outcome | POs, PSOs mapped |
|---|---|---|
| ME 2111.1 | Identify the functions of design of a product in a system in a given situation and select a suitable product ; identify the procedure for technological innovation of a product; explain the importance of brainstorming and Delphi techniques in innovation | PO1, PO3, PSO1 |
| ME 2111.2 | Explain the importance of design, human machine interaction in project selection and evaluation methods including ergonomic considerations | PO 1, PO4, PSO1 |
| ME2111.3 | Explain the importance of research in new product development; describe the process of patenting including search of patents, patent laws and international code and discriminate the scope of IPR for a product patent. | PO 1, PO2, PO4, PSO1 |
| ME 2111.4 | Discuss the features of design of a new product with respect to manufacture, quality testing and marketing; and steps to evaluate a new product for introduction; | PO 1, PO 3, PO7, PSO1 |
| ME 2111.5 | Develop process planning including creating process sheets; explain value engineering, group technology and concurrent engineering in the selection of manufacturing process. | PO 1, PO 9, PSO2 |

# MVSR Engineering College, Nadergul.
## Department of Mechanical Engineering
## ME (CAD/CAM)
## COURSE OUTCOMES

Class: M.E. I year
Name of the Course: Vibration Analysis and Condition Monitoring
Course Code: ME2309
At the end of the course student is able to

| CO No. | Course Outcome | POs, PSOs mapped |
|---|---|---|
| ME2309.1 | Identify the cause of vibration and learn its effects on structures. Recall vibrations of single degree of freedom systems under free, damped and forced vibration conditions. | PO1,PO2. |
| ME2309.2 | Formulate Mathematical expressions on Two degrees of freedom under steady state and transient characteristics of vibrations and deduce solutions for Multi degrees of freedom. | PO1,PO2,PO4, PSO1,PSO2 |
| ME2309.3 | Explain the basics of Condition Monitoring and classify various vibration measuring instrument to record and interpret the data and monitor the condition of the systems through vibration parameters. | PO1,PO2, PO7 |
| ME2309.4 | Describe monitoring techniques for structural Monitoring and effective functioning of the systems. | PO1,PO2,PO6,PO7. |

# MVSR Engineering College, Nadergul.
## Department of Mechanical Engineering
## ME (CAD/CAM)
## COURSE OUTCOMES

Class: M.E. I year

Name of the Course: Additive Manufacturing Technologies and Applications

Course Code: ME 2112

At the end of the course student is able to

| CO No. | Course Outcome | POs, PSOs mapped |
|---|---|---|
| ME 2112.1 | Explain the process chain of Additive manufacturing and other rapid manufacturing Processes and their classification. Differentiate Additive manufacturing and CNC machines and related details. | PO 1, PO 5 |
| ME 2112.2 | Compare different Additive manufacturing processes and select a subtractive or an AM Systems (Liquid Based & Solid Based) for a particular application for product development of engineering components. | PO 1, PO 2, PO 3, PO 5 |
| ME 2112.3 | Explain the construction of Powder Based Additive manufacturing Systems and Rapid Tooling details. | PO 1, PO3, PO5 |
| ME 2112.4 | Describe various AM Software's issues for rapid prototyping and related operations for STL model manipulation. | PO 1, PO 2, PO 5, SPO 1 |
| ME 2112.5 | Illustrate technologies used for Additive manufacturing in terms of their parameters, application, limitations, materials, equipment, outcomes and implications. | PO 8, PO12 |

# MVSR Engineering College, Nadergul.
## Department of Mechanical Engineering
## ME (CAD/CAM)
## COURSE OUTCOMES

Class: M.E. I year
Name of the Course: Automation
Course Code: ME 2301
At the end of the course student is able to

| CO No. | Course Outcome | POs, PSOs mapped |
|---|---|---|
| ME2301.1 | Define automation and Summarize the basic concepts of automation and its significance in manufacturing industries with respect to the production economics like costs in manufacturing, Break even analysis etc. | PO1, PO2,PO11 |
| ME2301.2 | Discuss automation production lines, work part transfer mechanism, automation for machining operations including design and fabrication considerations. Explain the Detroit type automation and flow lines. | PO1, PO2, PO3 |
| ME2301.3 | Identify the assembly process, assembly systems. Design assembly line and solve problems of line balancing | PO2, PO3 |
| ME2301.4 | Identify the material handling equipment in automated industry like conveyor systems, AGVs and storage / retrieval systems | PO2, PO3, PO5 |
| ME2301.5 | Recognize various automated inspection and testing methods using sensor technologies. Predict the needs of future automated factory and the social impact. | PO3, PO6, PSO12 |

# MVSR Engineering College, Nadergul.
## Department of Mechanical Engineering
## ME (CAD/CAM)
## COURSE OUTCOMES

Class: M.E. I year
Name of the Course: Computer Aided Modeling and Design
Course Code: ME 2402
At the end of the course student is able to

| CO No. | Course Outcome | POs, PSOs mapped |
|---|---|---|
| ME 2402.1 | Explain CAD criteria for selection of workstations, Shigle Design Process, Design criteria, Geometric modeling, entities, 2D & 3D Primitives. 2D & 3D Geometric Transformations: Translation, Scaling, Rotation, Reflection and Shearing, concatenation. Graphics standards: GKS IGES, PDES. | PO1,PO2,PO3 |
| ME 2402.2 | Define wireframe entities. Describe interpolation and approximation of curves. Explain parametric and non-parametric representation of curves. Classify different curves like circle, helix and splines. Explain Synthetic curves and the concept of NURBS. | PO1,PO2 |
| ME 2402.3 | Define and Explain Surface modeling with different analytic and synthetic surfaces with their applications. Explain the design applications. Describe different 2D transformations with concatenation. | PO1,PO2,PO3 |
| ME 2402.4 | Describe Solid Modeling Techniques such as Graph Based Model, Boolean Models, Instances, Cell Decomposition & Spatial – Occupancy Enumeration.<br>Distinguish between the solid modeling approaches of C-rep and B-rep. | PO1,PO3,PO4, PO5 |
| ME 2402.5 | Understand the Advanced Modeling such as Feature Based Modeling, Assembling Modeling and Behavioral Modeling. Know the Design approaches of an Assembly Modeling. Explore the Capabilities of different Modeling & Analysis Packages. Know the Computer Aided Design of different mechanical components. Carryout Interference Detection by Motion analysis. | PO1,PO2,PO3, PO4,PO5 |

# MVSR Engineering College, Nadergul.
## Department of Mechanical Engineering
## ME (CAD/CAM)
## COURSE OUTCOMES

Class: M.E. I year

Name of the Course: Computer Aided Mechanical Design and Analysis

Course Code: ME 2306

At the end of the course student is able to

| CO No. | Course Outcome | POs, PSOs mapped |
|---|---|---|
| ME 2306.1 | Apply knowledge of mathematics, sciences and computations in solving the stresses & strains in pressure vessels | PO1,PO2,PO3,PO4 |
| ME 2306.2 | Identify, formulate and solve problems for a given flat plate | PO1,PO2,PO3,PO4 |
| ME 2306.3 | Assess the importance of fracture mechanics in designing a system or a component | PO1,PO2,PO3,PO4 |
| ME 2306.4 | Evaluate and understand to solve various problems on Eigen value and Eigen vectors | PO1,PO2,PO3,PO4, PO5 |
| ME 2306.5 | Understand the concept of dynamic analysis in solving single and multi degree freedom problems | PO1,PO2,PO3,PO4 |

# MVSR Engineering College, Nadergul.
## Department of Mechanical Engineering
## ME (CAD/CAM)
## COURSE OUTCOMES

Class: M.E. I year

Name of the Course: Control of Dynamic Systems

Course Code: ME 2302

At the end of the course student is able to

| CO No. | Course Outcome | POs, PSOs mapped |
|---|---|---|
| ME 2302.1 | Define first, second order and higher order systems to identify steady state errors for practical applications | PO1,PO3,PO5 |
| ME 2302.2 | Apply Zero pole replacements for root locus ,Bodo plot and Nyquist criteria for prediction of compensation techniques | PO1,PO2,PO4,PO5, PO6 |
| ME 2302.3 | Understand state space method controllability observability for different mechanical systems in real life applications | PO1,PO3,PO5,PO7 |
| ME 2302.4 | Classify nonlinear systems using phase plane techniques for existence of limit cyclesfor various real life problems | PO1,PO2,PO4,PSO1 |
| ME 2302.5 | Understand concept of stability using lyapunovans absolute stability for linear system linearization and non-autonomous systems for research problems | PO1,PO4,PO5,PSO1 |

# MVSR Engineering College, Nadergul.
## Department of Mechanical Engineering
## ME (CAD/CAM)
## COURSE OUTCOMES

Class: M.E. I year

Name of the Course: Computer Integrated Manufacturing

Course Code: ME 2403

At the end of the course student is able to

| CO No. | Course Outcome | POs, PSOs mapped |
|---|---|---|
| ME2403.1 | Summarize the need for CIM, evolution of CIM, fundamentals of CIM and the concept of concurrent engineering | PO1, PO2 |
| ME2403.2 | Recognize the role of data base management in CIM and discuss about DBMS architecture, Structural Query Language (SQL) and features of commercial DBMS like ORACLE etc. Discuss the concept of Product Data Management(PDM) | PO2, PO3 |
| ME2403.3 | Discuss the design process, use of computers in design and importance of product design within the CIM concept. Discuss the production planning concepts such as MRP, lot sizing techniques, MRP-II, cellular manufacturing and FMS. | PO2, PO3,PO5 |
| ME2403.4 | Identify fundamental networking concepts that help in integrating all the important components of an enterprise and discuss the different types of CIM models. | PO3, PO5, PO9,PSO2 |
| ME2403.5 | Discuss the future trends of manufacturing systems like lean manufacturing, concept of waste and relationship of waste to profit, supply chain management and agile manufacturing. | PO3,PO6,PO11, PO12, PSO2 |

# MVSR Engineering College, Nadergul.
## Department of Mechanical Engineering
## ME (CAD/CAM)
## COURSE OUTCOMES

Class: M.E. I year

Name of the Course: Experimental Techniques and Data Analysis

Course Code: ME2110

At the end of the course student is able to

| CO No. | Course Outcome | POs, PSOs mapped |
|---|---|---|
| ME2110.1 | Understand and apply the cutting force measurement by different techniques and to generate suitable signals through different transducers for the practical problems. | PO1, PO2. |
| ME2110.2 | Apply different transducers for converting temperature into suitable signals for research problems | PO1,PO2,PO4,PSO1, PSO2 |
| ME2110.3 | Understand various surface measurement aspects and its measurement methods for a particular problem in research | PO1, PO2,PO7 |
| ME2110.4 | Design the experiment layout at minimum cost, time and to analyse the data generated from experiments for better solutions | PO1,PO2,PO4, PO6, PO7,PSO1 |
| ME2110.5 | Apply Taguchi methods for different optimization problems in research | PO1,PO2,PO4, PO6, PO7,PSO2 |

# MVSR Engineering College, Nadergul.
## Department of Mechanical Engineering
## ME (CAD/CAM)
## COURSE OUTCOMES

Class: M.E. I year

Name of the Course: Failure Analysis and Design

Course Code: ME 2404

At the end of the course student is able to

| CO No. | Course Outcome | POs, PSOs mapped |
|---|---|---|
| ME2404.1 | Define design and various aspects involved in design process | PO1,PO2,PO3, PO6,PO7, PO9,PO10 |
| ME2404.2 | Classify different types of creativity methods, Analyse different creative and inventive problem solving techniques | PO1,PO2,PO3, PO6,PO7, PO9,PO10 |
| ME2404.3 | Explain Buckling phenomenon, understand the concept of cylinder buckling under various loading conditions | PO1,PO2,PO4 |
| ME2404.4 | Identify what is fracture, fundamentals of fracture, fracture types and concepts of fatigue crack growth, fatigue life prediction and various stress theories of failure | PO1,PO2,PO4 |
| ME2404.5 | Describe the basic crack propagation concept, its propagation under combined loading, fracture toughness of weld metals. | PO1,PO2,PO4 |

# MVSR Engineering College, Nadergul.
## Department of Mechanical Engineering
## ME (CAD/CAM)
## COURSE OUTCOMES

Class: M.E. I year

Name of the Course: Finite Element Techniques

Course Code: ME 2401

At the end of the course student is able to

| CO No. | Course Outcome | POs, PSOs mapped |
|---|---|---|
| ME2401.1 | Summarize basic equations of elasticity and formulate finite element modeling of one dimensional element using Potential energy approach. | PO1 , PO2, PSO-1 |
| ME2401.2 | Formulate finite element modeling of truss and frame elements along with the concepts of transformation from local to global matrices. | PO1 , PO2, PO3,PO4,PSO-1 |
| ME2401.3 | Evaluate Hermitian shape function of beam element in natural coordinate system. | PO1, PO2, PO12,PSO-1 |
| ME2401.4 | Develop stiffness matrix for a plane stress & plane strain conditions on a CST, Axisymmetric elements by interpolating shape functions in natural coordinate system. | PO1 , PO2, PO3,PO4, PSO-1 |
| ME2401.5 | Evaluate the shape functions of Isoparametric elements and to present the use of numerical integration to evaluate the element matrices in typical 2D problems. Formulate finite element model to steady state heat transfer analysis using one & two dimensional elements. | PO1 , PO2, PO3,PO4,PSO-1 |
| ME2401.6 | Formulate mass and stiffness matrices of 1D & beam elements to establish Eigen values &Eigen vectors using Lagarangian and Hamilton principles. Develop finite element model for 3D problems in stress analysis and explain the concepts of convergence criteria. Introduction to Finite Element Analysis Software. | PO1 , PO2, PO3,PO4,PO5, PO12,PSO-1 |