

**MRSPTU M.TECH. MECH. (CAD, MANUFACTURING & AUTOMATION) SYLLABUS
2016 BATCH ONWARDS**

**M. TECH. MECHANICAL ENGINEERING (CAD, MANUFACTURING &
AUTOMATION)
(1st Year)**

Total Contact Hours = 24

Total Marks = 800

Total Credits = 22

SEMESTER 1 st		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
MMEE4-101	Research Methodology & Design of Experiment	4	0	0	50	100	150	4
MMEE4-102	Mechatronics	4	0	0	50	100	150	4
MMEE4-103	Computer Aided Process Planning	4	0	0	50	100	150	4
MMEE4-104	Computer Aided Design	4	0	0	50	100	150	4
MMEE4-105	Lab -I	0	0	4	50	-	50	2
Departmental Elective – I (Select any one)		4	0	0	50	100	150	4
MMEE4-156	Management Information System							
MMEE4 -157	Automatic Control System							
MMEE4 - 158	Industrial Automation							
Total	Theory = 5 Lab = 1	20	0	4	300	500	800	22

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RESEARCH METHODOLOGY

Subject Code –MMEE4-101

**L T P C
4 0 0 4**

Duration – 45 Hrs

Nature and objectives of research Methods of Research: historical, descriptive and experimental Alternative approaches to the study of the research problem and problem formulation. Formulation of hypotheses, Feasibility, preparation and presentation of research proposal.

UNIT-I (11 Hrs)

Introduction to Statistical Analysis: Probability and Probability Distributions; Binomial, Poisson, Exponential and Normal Distributions and Their Applications. Sampling: Primary and Secondary Data, Their Collection and Validation, Methods of Sampling: Simple Random Sampling, Stratified Random Sampling and Systematic Sampling.

UNIT-II (10 Hrs)

Regression and Correlation Analysis. Tests of Significance Based On Normal, T and Chi-Square Distributions. Analysis of Variance.

UNIT-III (13 Hrs)

Basic Principles of design of experiments, completely randomized and randomized block designs Edition, tabulation & testing of hypotheses, Interpolation of results, presentation, styles for figures, tables, text, quoting of reference and bibliography.

UNIT-IV (11 Hrs)

Use of Software For Statistical Analysis Like SPSS, Mini Tab Or MAT Lab, Report Writing, Preparation Of Thesis, Use Of Software Like MS Office.

The Course Will Include Extensive Use of Software, Report Writing and Seminars In The Tutorial Class.

Recommended Books

1. C.R. Kothari, Research Methodology, Wishwa Prakashan.
2. P.G. Tripathi, Research Methodology, Sultan Chand & Sons, N. Delhi.
3. Fisher, Design of Experiments, Hafn.
4. Sadhu Singh, Research Methodology in Social Sciences, Himalya Publishers.
5. Stoufferetal, Measurement & Prediction, Wiley, N. York
6. J.W. Barnes, Statistical Analysis for Engineers & Scientists, McGraw Hill, N. York.
7. Donald Cooper. Business Research Methods, Tata McGraw Hill, N. Delhi.

MECHATRONICS

Subject Code –MMEE4-102

**L T P C
4 0 0 4**

Duration – 40 Hrs

UNIT-I (6 Hrs)

Control Engineering: Open Loop and Closed Loop Control System, System Components, Hydraulic, Thermal, Pneumatic Processes and Their Electrical Analogies.

UNIT-II (15 Hrs)

Process Control: Concept of Measurement of Electrical and Non-Electrical Parameters, Displacement, Force, Temperature, Pressure Etc. and Related Signal Conditioning Techniques. Valves, Drives and Actuators, PID Controllers, Multivariable and Multi-Loop Processes, Basic Circuits Using Pneumatic and PLC's.

UNIT-III (6 Hrs)

Sensors and Signal Conditioners: Transducers for Industrial Processes, Signal Conditioning, Output Devices and Displays.

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UNIT-IV (13 Hrs)

Microprocessors and Interfacing: Microprocessors/ Microcontroller Architecture and Programming Memory, Input/Output Operations and Interfacing, Peripherals, Typical Applications of Microprocessors, System Design Concept Through Case Studies.

Recommended Books

1. Koren Computer Control of Manufacturing system by, McGraw Hill.
2. Groover, Production Systems and CIM, PHI.
3. Maleki, Flexible Manufacturing systems, Prentice Hall.
4. BC. Kuo, Feedback Control Systems, PHI.
5. EO. Doebelin, Measurement Systems, McGraw Hill.

COMPUTER AIDED PROCESS PLANNING

Subject Code –MMEE4-103

**L T P C
4 0 0 4**

Duration – 40 Hrs

UNIT-I (10 Hrs)

Introduction to 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, Knowledge Based Systems, Inference Engine, Implementation, Benefits Retrieval CAPP System: Significance, Group Technology, Structure, Relative Advantages, Implementation, And Applications.

UNIT-II (10 Hrs)

Process Planning and Concurrent Engineering: Process Planning, CAPP, Concurrent Engineering, Design for Manufacturing, Advanced Manufacturing Planning. GVP COLLEGE OF ENGINEERING (A) 2015 M. TECH-CAD/CAM 39 Selection of Manufacturing Sequence: Significance, Alternative Manufacturing Processes, Reduction of Total Set-Up Cost for a Particular Sequence, Quantitative Methods for Optimal Section, Examples.

UNIT-III (10 Hrs)

Determination of Machining Parameters: Reasons For Optimal Selection of Machining Parameters, Effect of Parameters on Production Rate, Cost And Surface Quality, Different Approaches, Advantages of Mathematical Approach Over Conventional Approach, Solving Optimization Models of Machining Processes Determination of Manufacturing Tolerances: Design Tolerances, Manufacturing Tolerances, Methods of Tolerance Allocation, Sequential Approach, Integration of Design And Manufacturing Tolerances, Advantages Of Integrated Approach Over Sequential Approach.

UNIT-IV (10 Hrs)

Generation of Tool Path: Simulation of Machining Processes, NC Tool Path Generation, Graphical Implementation, Determination of Optimal Index Positions for Executing Fixed Sequence, Quantitative Methods

Implementation Techniques for CAPP: MIPLAN System, Computer Programming Languages for CAPP, Criteria for Selecting A CAPP System and Benefits of CAPP, Computer Integrated Planning Systems and Capacity Planning System.

Recommended Books

1. Mikell P. Groover, “Automation, Production systems and Computer Integrated Manufacturing”, 8th Edn., PHI, New Delhi, 2010.

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2. Dr. Sadhu Singh, "Computer Aided Design and manufacturing", Khanna publishers, 2000.

COMPUTER AIDED DESIGN

Subject Code –MMEE4-104

L T P C

Duration – 45 Hrs

4 0 0 4

UNIT-I (6 Hrs)

Introduction:

Design Process in General and Using Computers, Hardware and Software in CAD Applications.

UNIT-II (12 Hrs)

Two Dimensional Transformations:

Two Dimensional Geometric Transformations-Basic Transformations, Concatenation, Reflection, Shear and Transformations Between Coordinate Systems. Two and Three Dimensional Object Representations Parametric Representation of Synthetic Curves, Spline Representations, Cubic Spline Interpolation Methods, Bezier Curves and Surfaces, B Spline Curves and Surfaces, Conversion between Spline Representations

UNIT-III (10 Hrs)

Representation of Solids:

Half Spaces, Boundary Representation (B-Rep), Sweep Representation, Constructive Solid Geometry (CGS), Solid Manipulations. Three Dimensional Geometric Transformations: Transformations-Translation, Rotation, Scaling, Reflections, Shears, Concatenation Transformations.

UNIT-IV (12 Hrs)

Basic Concepts of Visual Realization, Hidden Line Removal, Hidden Surface Removal, Shading Surfaces and Solids, CAD Standards, CAD And CAM Integration, Introduction to Reverse Engineering and Rapid Prototyping, Practice On Available CAD Packages, Computer Programming for Geometric Modelling of Curves, Surfaces & Solids, Projects Involving Assembly and Kinematics Analysis of Mechanisms, Surface Modeling in any Available CAD Package.

Recommended Books

1. Groover and Zimmer, CAD/CAM, Prentice Hall.
2. I. Zeid , CAD/CAM: Theory and Practice, McGraw Hill.
3. M.E. M , Geometric Modeling.

LAB-I

Subject Code –MMEE4-104

L T P C

4 0 0 4

One Lab /Field/Industrial Oriented Project /Problem will be Allocated to Each Student Related to The Subjects Related to The Subjects Taught in 1st Semester.

MANAGEMENT INFORMATION SYSTEM

Subject Code –MMEE4-156

L T P C

Duration – 45 Hrs

4 0 0 4

UNIT-I (12 Hrs)

Information Systems: Information Systems -Establishing the Framework -Business Models - Information System Architecture- Evolution of formation Systems, Modern Information System,

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Modern Information System -Systems Development-life Cycle, Structured Methodologies - Designing Computer Based methods, Procedures Control Designing Structured Programs.

UNIT-II (12 Hrs)

Integrated Construction Management: Integrated Construction Management- Information System- Project Management- Information System- Functional Areas finance, Marketing Production, Personnel –levels, DSS, EIS, ES- Comparison Concepts and Knowledge representation –Managing International Information System

UNIT-III (9 Hrs)

Coding Techniques: Control -Testing Security- Coding Techniques- Defection of Error – Validating -Cost Benefit Analysis -Assessing the Value and Risk of Information System

UNIT-IV (12 Hrs)

Software Engineering: Software engineering qualities- Design-Production- Service, Software specification- Software Metrics, Software quality assurance –Systems Methodology –Objectives- Time and Logic, Knowledge and Human Dimension -Software life cycle models- Verification and Validation. 27 CEM-2013 SRM(E&T)

Recommended Books

1. O. Brian, “Introduction to Information System”, McGraw Hill.
2. O. Brian, “Management Information System”, Tata McGraw Hill.
3. Alter, “Information Systems: A Management Perspective”, Addison Wesley.
4. Arora & Bhatia, “Information Systems for Managers”, Excel.
7. Murdick, “Information System for Modern Management”, PHI.
8. Alexis Leon, “Enterprise Resource Planning”, Tata McGraw Hill.

AUTOMATIC CONTROL SYSTEMS

Subject Code –MMEE4-157

**L T P C
4 0 0 4**

Duration – 45 Hrs

UNIT-I (12 Hrs)

Motivation for Control: Review of Differential Equations, Impulse Response and Laplace Transformations, Introduction to State Equations and Transfer Functions. Interpretation of Poles and Zeros of Transfer Functions. Time Domain Response of Second Order System. Comm and Tracking and System Type, Rough/Hurwitz Test

UNIT-II (11 Hrs)

State Variable Analysis and Design, Introduction: Concepts of State Variables for Linear Discrete Time Systems, Diagonalization Solutions of State Equations, Concepts of Controllability and Observability, Pole Placement by State Feedback, Observer Systems, Problems

UNIT-III (12 Hrs)

Frequency Response and Frequency Domain Methods: Nyquist Stability Test, Bode Plots, Phase and Gain Margins, Bode Phase Formula, Robustness. Uncertainty and Performance Weights, Robust Stability Test, Robust Performance Test. Loop Shaping Necessary and Sufficient Conditions, Bode Integral Formula

UNIT-IV (10 Hrs)

Applications of Root Locus: Sensitivity of Roots of Characteristics Equation, Tool for Design and Analysis of Control Systems, Case Studies Using Mat Lab on Bode, Nyquist and Root Locus.

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Recommended Books

1. Franklin, Powell, and Enami-Naeini, Feedback Control of Dynamical Systems, 5th Edn., Addison-Wesley, **2006**.
2. I.J. Nagrath, M. Gopal, Control Systems Engineering, 5th Edn., New age International (P) Ltd, Publishers.

INDUSTRIAL AUTOMATION

Subject Code –MMEE4-158

**L T P C
4 0 0 4**

Duration – 45 Hrs

UNIT-I (8 Hrs)

Introduction: Automation in Production System, Principles and Strategies of Automation, Basic elements of an Automated System, Advanced Automation Functions, Levels of Automations. Flow Lines & Transfer Mechanisms, Fundamentals of Transfer Lines.

UNIT-II (12 Hrs)

Material handling and Identification Technologies: Overview of Material Handling Systems, Principles and Design Consideration, Material Transport Systems, Storage Systems, Overview of Automatic Identification Methods. Automated Manufacturing Systems: Components, Classification and Overview of Manufacturing Systems, Manufacturing Cells, GT and Cellular Manufacturing, FMS, FMS and Its Planning and Implementation. Quality Control Systems: Traditional and Modern Quality Control Methods, SPC Tools,

UNIT-III (13 Hrs)

Control Technologies in Automation: Industrial Control Systems, Process Industries Versus Discrete-Manufacturing Industries, Continuous Versus Discrete Control, Computer Process and its Forms. Computer Based Industrial Control: Introduction & Automatic Process Control, Building Blocks of Automation Systems: LAN, Analog & Digital I/O Modules, SCADA Systems & RTU. Distributed Control System: Functional Requirements, Configurations & some popular Distributed Control Systems.

UNIT-IV (9 Hrs)

Modeling and Simulation for Plant Automation: Introduction, need for System Modeling, Building Mathematical Model of a Plant, Modern Tools & Future Perspective. Industrial Control Applications: Cement, Thermal Water Treatment & Steel Plants.

Recommended Books

1. M.P. Groover Automation, Production Systems and Computer Integrated Manufacturing-, 5th Edn., Pearson Education, **2009**.