Curriculum Structure for
Multi-Disciplinary Minor (MDM)
Degree in
Mechanical Engineering

(In light of NEP 2020)

(NEP_Version II)

Offered By

DEPARTMENT OF MECHANICAL ENGINEERING

For students admitted in 2023-24 onwards

Government College of Engineering, Amravati
(An Autonomous Institute of Government of Maharashtra)
Near Kathora Naka, Amravati, Maharashtra
PIN 444604
www.gcoea.ac.in

A. Preamble:

The mechanical engineering minor is tailored to students who want to understand the fundamentals of mechanical engineering other than courses covered in engineering sciences. The students will develop abilities in design, analysis and experimentation through foundation of math, physics, chemistry including modelling, energy engineering, mechanics of materials, product design and hydraulics.

The students can combine the skills and technological expertise of this minor with a major in technology of aligned branch to prepare for a wide variety of opportunities in industrial fields and in demand careers.

B. Structure of the MDM course:

ME Department offer Multidisciplinary Minor Basket , Track-1 (Mechanical Engineering)														
Category	**Course Code**	**Name of the Course**	**Teaching Scheme**				**Evaluation Scheme**							**Credits**
							Theory				**Practical**		**Total**	
			TH	TU	PR	Total	CT1	**CT2**	TA	ESE	ICA	ESE		
MM1	ME1315	Production Technology	3			3	15	15	10	60			100	3
MM2	ME1415	New and Renewable Energy Sources	3			3	15	15	10	60			100	3
MM3	ME1515	Automobile Engineering	3			3	15	15	10	60			100	3
MM4	ME1615	Basic of Product Design	3			3	15	15	10	60			100	3
MM5	ME1715	Industrial Management and Quality Control	2			2	15	15	10	60			100	2
Total			**14**	**0**	**0**	**14**	**75**	**75**	**50**	**300**	**0**	**0**	**500**	**14**

If desire --Note (for example) : MM3/MM4/MM5 May split as 3(th) +1 (pr) ie 2 courses OR MM3 As 3(th) +1 (pr) course and MM4/MM5 As Project, accodingly change evlaution scheme etc

C. Eligibility criteria: Students enrolled in B. Tech program other than Mechanical Engineering are eligible. The allotment of minor degree Programme will be as per the policy of the Institute. Intake: Minimum 15, E **Detailed syllabus:**

Course Code	ME1315							Course category			MM1
Course Name	PRODUCTION TECHNOLOGY										
Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory					Practical		Total	
				CT1	CT2	TA	ESE	ESE Duration	ICA	ESE		
03	00	00	03	15	15	10	60	2 hrs 30 min	0	0	100	03

Course Objectives

I. To identify the necessity and importance of manufacturing.
II. To learn the fundamentals of major classes of manufacturing processes.
III. To understand the working principles of different casting and welding operations
IV. To differentiate between these processes in terms of application, function, advantages, Disadvantages, quality and productivity

Pattern and Mould Making: Introduction to basic manufacturing processes, Pattern materials, allowances, Types of patterns,. Basic principle and Terminology of sand casting, gating system, types of gate , Directional and Progressive solidification. General properties of moulding sands, Types of sands, Preparation of sand moulds of different types.

Casting methods: Permanent mold casting, slush casting, shell molding, Investment or lost wax casting, vacuum process, centrifugal casting, Continuous casting, Die casting equipment's and processes for Gravity, pressure and vacuum casting methods, Comparison between casting methods. Defects in casting: Inclusions and sand defects, Gas defects, shrinkage defects, contraction defects.

Forming Processes: Principle and working of Hot and cold working processes. Different types of hot and cold working processes.

Welding Processes: Introduction to welding processes: working principle and applications of Arc welding, TIG welding, MIG- welding, Gas-Welding, Resistance welding. Introduction to riveting, soldering and brazing.

Machining Processes: Working of Lathe, Drilling and Milling machine. Various machining operations, Introduction to CNC Lathe and Milling machine

Text Books:

1. Manufacturing Process-II H. S.Bawa, 3 rd Edition, Tata Mc Graw hill Publishing Co. Ltd.2004
2. Workshop Technology-I, B. S. Raghuwanshi, 2 nd Edition, Dhanpat Rai and Sons, 2001

References Books:

1. Manufacturing Science Ghosh and Malik, Affiliated East – West PressLtd, 3rd Edition, 2002
2. Processes and Materials of Manufacture, R A LindBerg, 2nd Edition,PHI Pub 2001
3. Rao P N Manufacturing Technology : Metal Cutting and Machine tools, 3rd Edition, Tata McGraw Hill 2001
4. Workshop Technology, Hajra Chaudhary, 4 th Edition, Dhanpat Rai and Sons 2001

Course Outcomes:

After completion of course, student will be able to:

ME 1315.1 Able to understand principles of casting, forming, welding and plastic processing.
ME 1315.2 Able to understand advantages and limitations of casting, forming, welding Processes.
ME 1315.3 Able to understand cause and remedies for different types of defects in cast, Formed, welded product.
ME 1315.4 Able to select appropriate manufacturing process based on function, material,

Quality requirement, production volume of a product.

ME 1315.5 Able to find out defects in welding and understand surface treatment

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME 1315.1	2	2	-	-	-	-	1	-	-	-	-	-	2	1	-
ME 1315.2	3	2	-	-	--	-	-	-	-	-	-	-	2	2	-
ME 1315.3	2	3	-	-	--	-	1	-	-	-	-	-	3	1	-
ME 1315.4	2	1	1	-	-	1	2	-	-	-	-	1	3	-	-
ME 1315.5	2	2	1	-	-	-	1	-	-	-	-	1	2	1	-

0 - Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

Course Code	ME1415								Course category			MM2
Course Name	NEW AND RENEWABLE ENERGY SOURCES											
Teaching Scheme				Examination Scheme								Credits
Th	Tu	Pr	Total	Theory					Practical		Total	
				CT1	CT2	TA	ESE	ESE Duration	ICA	ESE		
03	00	00	03	15	15	10	60	2 hrs 30 min	00	00	100	03

Course Objectives:

I. To identify different renewable energy sources and to understand world as well as Indian energy scenario.

II. To study the basic concepts of solar radiation and to understand the various applications of solar energy.

III. To learn principles of energy conversion from alternate sources including wind, biomass, biogas, geothermal, ocean,

IV. To study the concepts and applications of fuel cells.

V. To study the concepts and applications of thermoelectric convertor and MHD generator.

Course Contents:

Introduction: Need to adopt renewable energy. Various renewable energy sources and current energy scenario of India, Role and potential of new and renewable source.

Principles of solar radiation: basic concepts of solar energy, the solar constant, extra-terrestrial and terrestrial solar radiation, basic solar geometry, instruments for measuring solar radiation and sun shine, solar radiation data.

Solar energy collection: classification, Study of flat plate and concentrating collectors, Applications of various collectors

Solar energy storage: Various ways of energy storage, Sensible, latent heat and stratified storage, solar ponds.

Solar thermal Applications: solar water heaters, solar cockers, solar dryers, Solar thermal power plant

Solar photovoltaic systems: Solar cell fundamentals, classification, solar photovoltaic systems and its applications.

Wind Energy: Introduction, Basics of Wind Energy Conversion, Current status and future prospects, -Classification of wind turbines, Aerodynamics of wind turbines, performance characteristics, Betz criteria. Wind energy conversion systems, Advantages and drawbacks of wind energy

Bio-Mass: Principles of Bio-Conversion, usable forms of biomass and conversion technologies, Anaerobic/aerobic digestion, Bio-gas digesters, biomass gasification, biomass to ethanol production, biomass to biodiesel production.

Fuels cells: Principle, construction, working, classification, advantages and disadvantages. Review of hydrogen as future energy source

Other renewable energy sources: geothermal energy, Ocean energy , Direct energy conversion magneto- hydrodynamic (MHD)

Text Books:

1. Non conventional Energy Reseources, B. H. Khan, Tata McGraw-Hill Education
2. Solar Energy, Sukhatme & Nayak Tata McGraw-Hill Education,
3. Non-Conventional Energy Sources, G.D. Rai,

Reference Book:

1. Renewable Energy Resources, John Twidel& Anthony D. Weir, 2nd Edition, Talor & Francis,
2. Principles of Solar Energy, D. Yogi Goswami, Frank Krieth& John F Kreider,
3. A. Duffie and W.A. Beckman, Solar Energy - Thermal Processes, John Wiley,
4. H.P.Garg & J.Prakash,, Solar Energy fundamental & applications., Tata McGraw Hill Publication

Course Outcomes:

Upon successful completion of this course student should be able to :

ME1415.1 Identify renewable energy sources and their utilization in India

ME1415.2 Apply basic principles to design solar thermal and photovoltaic systems

ME1415.3 Illustrate the concept of wind energy conversion

ME1415.4 Analyse the working of energy conversion system using various alternative sources like biomass, geothermal, ocean and MHD

ME1415.5 Explain the concepts and applications of hydrogen as afuel and various fuel cells,

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME1415.1	3	3	2	0	0	0	0	0	0	0	0	0	3	2	0
ME14152	3	0	3	3	0	0	0	0	0	0	0	0	2	3	0
ME1415.3	3	0	2	0	0	0	0	0	0	0	0	0	0	3	0
ME1415.4	2	1	2	1	0	0	0	0	0	0	0	0	0	1	0
ME1415.5	2	0	2	3	0	0	0	0	0	0	0	0	0	2	0

0 - Not correlated 1 - Weakly Correlated 2 - Moderately Correlated 3 - Strongly Correlated

Course Code	ME1515							Course category			MM3
Course Name	AUTOMOBILE ENGINEERING										
Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory					Practical		Total	
				CT1	CT2	TA	ESE	ESE Duration	ICA	ESE		
03	00	00	03	15	15	10	60	2 hrs. 30 min	00	00	100	03

Course Objectives:

To make the students aware and understand:

1. Analysis of the automobile and its sub-systems.
2. Application of engineering principles to automotive design.
3. Electronic engine Management and its terminology
4. Automatic transmission system and four wheel drive
5. Alternative fuels and its uses in automobiles

Course contents:

Engine, Engine Part and Mounting: Introduction, History, Classification of automobiles, Major components of Automobile and its functions, Subsystems of automobile. Functions and locations, Engine parts-types, Construction and functions. Aerodynamics in Automobile.

Fuel System, Multiple Cylinder Engine & Cooling system: Basic principles & working of MPFI and CRDI, Auto emission and its control General considerations, Electronic engine Management, turbo chargers (WGT, VGT), engine emission control by 3-way catalytic converter system, Emission control technology, Emission norms (Euro & BS). Types of cooling system, Anti-freeze mixtures.

Electrical Setup & Ignition System: Battery Capacity, Standard capacity rating, Battery life, recharging of battery, Battery: construction, Types, Rating, Electronic ignition system, intelligent ignition system in two and four wheelers.

Transmission System: Manual Gear box and its types**,** Clutch, Automatic transmission system, CVT, Four wheel drive, Torque tube drive, Function, Types of steering, Steering gears, Power steering

Wheels and Tyres, Brakes, Suspension System:: Types of tyres, Mechanical, hydraulic brakes, disc brakes, Air brakes, and Vacuum brakes, ABS. Introduction to suspension system**,** Need and Types.

Introduction to alternative energy sources, natural gas, LPG, biodiesel, bio-ethanol, gasohol and hydrogen fuels in automobiles, modifications needed, performance, combustion & emission. Electric and Hybrid vehicles, application of Fuel Cells.

Text books:

1. Automobile Engineering Kirpal Singh, 7 th ed., Standard Publishers, New Delhi, 1997.
2. Automobile Engineering Jain K.K. and Asthana R.B., Tata McGraw Hill, New Delhi, 2002.
3. Advanced Engine Technology Heisler H., SAE International Publ., USA, 1998.

Reference Books

1 Automotive Mechanics, Joseph Heitner, 2nd Edition, CBS Publisher, New Delhi, 2004
2 Automobile Engineering, G. B. S. Narang, 2nd Edition, Khanna Publication, New Delhi, 2006

Course Outcomes: After completion of course, student will be able to:

ME1515.1 Describe the vehicle construction, chassis, lubrication system and cooling system in automobile, 3-way catalytic converter.

ME1515.2 Describe the principle and working of Carburetors, CRDI, MPFI, electronic fuel injection system and Ignition system.

ME1515.3 Differentiate between clutch, gear box, rear axle drives, fluid flywheel, and torque converter.

ME1515.4 Identify the wheels, tyres, steering gear box, suspension system telescopic, and leaf spring

ME1515.5 Appraise the recent trends in alternate fuels and automobile safety system

CO – PO –PSO Mapping:

Course Outcomes	Program Outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME1515.1	3	2	3	0	2	3	2	1	3	3	2	2	3	3	3
ME1515.2	3	2	3	3	2	0	2	1	3	3	2	0	3	3	0
ME1515.3	0	2	3	3	2	3	2	1	0	3	2	2	0	3	3
ME1515.4	3	0	3	3	2	3	0	1	3	3	2	2	3	3	3
ME1515.5	3	2	3	3	2	3	2	1	3	3	0	2	3	0	3

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

CO – PO –PSO Mapping AS PER NBA JULY 2024 FORMAT (wef, 1st JAN 2025)

Course Outcomes	Program Outcomes													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
ME1515.1	3	2	3	0	2	3	1	3	3	2	2	3	3	3
ME1515.2	3	2	3	3	2	0	0	3	3	2	0	3	3	0
ME1515.3	0	2	3	3	2	3	1	0	3	2	2	0	3	3
ME1515.4	3	0	3	3	2	3	0	3	3	2	2	3	3	3
ME1515.5	3	2	3	3	2	3	1	3	3	0	2	3	0	3

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

Course Code			ME 1615						Course category			MM
Course Name			BASICS OF PRODUCT DESIGN									
Teaching Scheme				Examination Scheme								Credits
Th	Tu	Pr	Total	Theory					Practical		Total	
				CT1	CT2	TA	ESE	ESE Duration	ICA	ESE		
03	00	00	03	15	15	10	60	2 hrs 30 min	00	00	100	03

Course Objectives:

To make the students aware and understand:

1. Engineering design and structured design methods.
2. Concepts of product design, product features and its architecture.
3. Design for Manufacture and Design for Assembly.
4. Use of CAD software to create 3D solid models.
5. Principles to execute a design from concept to finished product

Course Contents:

Design Fundamentals: The importance of engineering design, types of design, the design process, relevance of product life cycle issues in design, designing to codes and standards- societal considerations in engineering design, generic product development process.

Customer oriented design & Societal Considerations: Identification of customer needs, customer requirements, Quality Function Deployment Product Design Specifications, Human Factors in Design, Ergonomics and Aesthetics. Societal consideration, Contracts, Product liability.

Material selection processing and Design : Material Selection Process, Economics – Cost Vs. Performance, Weighted property Index, Value Analysis, Role of Processing in Design, Classification of Manufacturing Process, Design for Manufacture, Design for Assembly.

Design Methods: Creativity and problem solving, creative thinking methods, generating design concepts, systematic methods for designing, functional decomposition.

Industrial Design concepts: Human factors design, user friendly design, design for serviceability, design for environment, prototyping and testing, cost evaluation, categories of cost, overhead costs, activity-based costing, methods of developing cost estimates, manufacturing cost, value analysis in costing

Text Books:

1. Kevin Otto and Kristin wood , Product Design, , 2nd edition, Pearson Education Inc.2019
2. K.T. Ulrich and S.D. Eppinger Product design and development, , Tata McGraw Hill, 2015
3. Chitale & Gupta , Product Development, 4thedition,Tata McGraw Hill,2016

Reference Books and Websites:

1. Niebel & deeper , Product design & process Engineering, McGraw hill, 1980
2. Beatriz Costa, Product Design process, Imaginary Cloud Publication, 2019
3. Hardi Meybaum , The Art of Product Design: Changing How Things Get Made, Wiley, 2014

Course Outcomes:

On completion of the course, students will be able to:

ME1615.1 Describe an engineering design and development process
ME1615.2 Create 3D solid models of mechanical components using CAD software
ME1615.3 Demonstrate use of Quality Function Deployment in Product Design
ME1615.4 Apply mathematical principles to execute a design from concept to finished product
ME1615.5 Estimate cost of the product

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME1615.1	2	0	2	2	0	0	0	2	1	0	1	0	1	1	0
ME1615.2	3	2	2	2	0	0	0	2	0	0	2	0	0	0	0
ME1615.3	3	2	1	2	0	0	0	2	0	0	1	0	1	0	0
ME1615.4	3	2	0	2	0	0	0	2	1	0	0	0	0	1	0
ME1615.5	3	1	1	2	0	0	0	2	1	0	1	0	0	1	0

0 - Not correlated 1 - Weakly Correlated 2 - Moderately Correlated 3 - Strongly Correlated

CO – PO –PSO Mapping AS PER NBA JULY 2024 FORMAT (wef, 1st JAN 2025)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
ME1615.1	2	0	2	2	0	0	2	1	0	1	0	1	1	0
ME1615.2	3	2	2	2	0	0	2	0	0	2	0	0	0	0
ME1615.3	3	2	1	2	0	0	2	0	0	1	0	1	0	0
ME1615.4	3	2	0	2	0	0	2	1	0	0	0	0	1	0
ME1615.5	3	1	1	2	0	0	2	1	0	1	0	0	1	0

0 - Not correlated 1 - Weakly Correlated 2 - Moderately Correlated 3 - Strongly Correlated

Curriculum Structure for
Multi-Disciplinary Minor (MDM) Degree in Automation and Robotics

(In light of NEP 2020)

(NEP_Version II)

Offered By

DEPARTMENT OF MECHANICAL ENGINEERING

For students admitted in 2023-24 onwards

Government College of Engineering, Amravati
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A. Preamble:

The mechanical engineering minor is tailored to students who want to understand the fundamentals of mechanical engineering other than courses covered in engineering sciences. The students will develop abilities in design, analysis and experimentation through foundation of math, physics, chemistry including modelling, energy engineering, mechanics of materials, product design and hydraulics.

The students can combine the skills and technological expertise of this minor with a major in technology of aligned branch to prepare for a wide variety of opportunities in industrial fields and in demand careers.

B. Structure of the MDM course:

ME Department offer Multidisciplinary Minor Basket , Track-2 (Automation and Robotics)														
Category	**Course Code**	**Name of the Course**	**Teaching Scheme**				**Evaluation Scheme**							**Credits**
							Theory				**Practical**		**Total**	
			TH	TU	PR	Total	CT1	**CT2**	TA	ESE	ICA	ESE		
MM1	ME1316	Hydraulics and Pneumatics	3			3	15	15	10	60			100	3
MM2	ME1416	Automation in Manufacturing	3			3	15	15	10	60			100	3
MM3	ME1516	Mechatronic Systems	3			3	15	15	10	60			100	3
MM4	ME1616	Industrial Robotics	3			3	15	15	10	60			100	3
MM5	ME1716	Computer Integrated Manufacturing	2			2	15	15	10	60			100	2
Total			**14**	**0**	**0**	**14**	**75**	**75**	**50**	**300**	**0**	**0**	**500**	**14**

If desire --Note (for example) : MM3/MM4/MM5 May split as 3(th) +1 (pr) ie 2 courses OR MM3 As 3(th) +1 (pr) course and MM4/MM5 As Project, accordingly change evaluation scheme etc.

Eligibility criteria: Students enrolled in B. Tech program other than Mechanical Engineering are eligible. The allotment of minor degree Programme will be as per the policy of the Institute. Intake: Minimum 15,**Detailed syllabus:**

Course Code	ME1316								Course category			MM1
Course Name	HYDRAULICS AND PNEUMATICS											
Teaching Scheme				Examination Scheme								Credits
Th	Tu	Pr	Total	Theory					Practical		Total	
				CT1	CT2	TA	ESE	ESE Duration	ICA	ESE		
03	00	00	03	15	15	10	60	2 hrs 30 min	00	00	100	03

Course Objective:

I. To understands the basicfeatures and functions of Hydraulic motors.
II. To understands the working of actuators and flow control valves.
III. To Iearn the difference between hydraulics and pneumatic circuit.
IV. To study the concept of pneumatic circuit and system.
VI. To apply various methods for trouble shooting of hydraulic and pneumatic systems

Course contents :

Hydraulic Actuators and Control Component: Hydraulic Actuators: Cylinders - Types and construction, Application, Hydraulic cushioning - Hydraulic motors - Control Components : Direction Control, Flow control and pressure control valves - Types, Construction and Operation - servo and Proportional valves - Applications - Accessories: Reservoirs, Pressure Switches - Applications - Fluid Power A SI Symbols - Problems.

Hydraulic Circuits and Systems: Accumulators, Intensifiers, Industrial hydraulic circuits - Regenerative, Pump Unloading, Double- Pump, Pressure Intensifier, Air-over oil. Sequence. Reciprocation, Synchronization. Fail-Safe, Speed Control, Hydrostatic transmission, Electro hydraulic circuits, Mechanical hydraulic servo systems.

Pneumatic and Electro Pneumatic Systems: Properties of air - Perfect Gas Laws - Compressor - Filters. Regulator, Lubricator. Muffler, Air control Valves, Quick Exhaust Valves, and Pneumatic actuators. Design of Pneumatic circuit - Cascade method - Electro Pneumatic System - Elements - Ladder diagram - Problems, Introduction to fluidics and pneumatic logic circuits.

Trouble shooting and Applications: Installation, election. Maintenance. Trouble Shooting and Remedies in Hydraulic and Pneumatic systems, Design of hydraulic circuits (or Drilling. Planning, Shaping, Surface grinding, Press and Forklift applications. Design of Pneumatic circuits for Pick and Place applications and tool handling in CNC Machine tools - Low cost Automation - Hydraulic and Pneumatic power packs.

Text Book:

1. Fluid Power with Applications, Anthony Esposito, Pearson Education 2005.
2. Oil Hydraulics Systems- Principles and Maintenance, Majumdar S.R.,Tata McGraw-Hili. 2001.

Reference Books:

I. Pneumatic controls. Joji,P .. Wiley India Pvt. Ltd .. 2008.
2. Oil Hydraulic Power and its Industrial Applications, Ernst, W., ew York. McGraw Hill.
3. Design of Hydraulic Control Systems, Lewis, E. E., and H. Stern, New York, McGraw

I-lill..
4. Hydraulic and Pneumatic Controls. Shanmugasundararn. K. Chand & Co, 2006.
5. The analysis and Design of Pneumatic Systems, Blaine W. Andersen., John Wiley and Sons, Inc.
6. Fluid Power Control, Blackburn, F.G. Reethof, and J.L. Shearer, , New York, Technology Press of M. I. T.

Course Outcomes:

On completion or course. Student will be able to:

ME1316.1. Explain the working of hydraulic motor

ME1316.2 Summarize the features and functions actuators and Flow control valves.

ME1316.3 Explain the different types or Hydraulic circuits and systems.

ME1316.4 Explain the working of different pneumatic circuits and systems.

ME1316.5. Summarize the various trouble shooting methods and applications of hydraulic and Pneumatic systems

CO PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME1316.1	3	3	2	0	0	0	0	0	0	0	0	0	3	2	0
ME1316.2	3	0	3	3	0	0	0	0	0	0	0	0	2	3	0
ME1316.3	3	0	2	0	0	0	0	0	0	0	0	0	0	3	0
ME1316.4	2	1	2	1	0	0	0	0	0	0	0	0	0	1	0
ME1316.5	2	0	2	3	0	0	0	0	0	0	0	0	0	2	0

Course Code	ME1416							Course category			MM2
Course Name	AUTOMATION IN MANUFACTURING										
Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory					Practical		Total	
				CT1	CT2	TA	ESE	ESE Duration	ICA	ESE		
03	00	00	03	15	15	10	60	2 hrs 30 min	00	00	100	03

Course objective:

I. To impart the concept of automation in manufacturing systems.
II. To inculcate the knowledge of Group Technology and automation.
III. To acquire the fundamental concepts of hydraulic systems, actuators their design and control devices, sequence and their operation.
IV. To induce the knowledge of rapid prototyping Technology and automated assembly system

Course contents:

Introduction: Definition, concepts of automation, Automation in manufacturing System, Principles and Strategies of Automation, Basic Elements of an Automated System, Advanced Automation Functions, Levels of Automations. Introduction to automated material handling and storage – ASRS, AGV.

Types of Automation - Automation strategies, Group Technology & Coding Methods, Flexible Manufacturing System – Types, Advantages, Limitations. Computer Integrated Manufacturing and Computer Aided Process Planning.

Rapid Prototyping: Introduction to Rapid Prototyping, classification of RP Processes, working principle, models &specification process, application, advantages & disadvantages, Stereo Lithography Apparatus (SLA), Laminated Object Manufacturing,(LOM), 3D Printing, Fused Deposition Modelling (FDM). Rapid Tooling and STL format.

Planning issues: components of FMS, types of flexibility, tradeoffs, computer control and functions, planning, scheduling and control of FMS, scheduling and knowledge-based scheduling. Hierarchy of computer control, supervisory computer, introduction to turning center, machining center, cleaning and deburring equipment, coordinate measuring machines: types, working and capabilities.

Characteristics of JIT: Pull method, small lot sizes, work station loads, flexible work force, line flow strategy. supply chain management Preventive maintenance - Kanban system, value engineering, MRD JIT, lean manufacture, quality concepts and management

Automated assembly System: Design for Automated Assembly, Types of Automated Assembly Systems, Part Feeding Devices, Analysis of Multi-station Assembly Machines, Analysis of a Single Station Assembly Machine. Automated Inspection and Testing: Automated Inspection Principles and Methods, Sensor Technologies for Automated Inspection, Coordinate Measuring Machines, Other Contact Inspection Methods, Machine Vision, Other optical Inspection Methods.

Text books:

1. Mikell P Groover, "Automation, Production System and Computer Integrated Manufacturing", Prentice Hall Publications, ISBN 81-203-0618-X, 2014
2. Robot and Manufacturing Automation, C. Ray Asfahl ,Amazon,
3. Assembly Automation and Product Design, Geoffrey Boothroyd,
4. Industrial hydraulic control, Peter Rohner, Wiley

Reference books:

1. Automatic Assembly. Boothroyd , C. Poli, L. Murch, Marcel Dekker Inc.
2. Mechanization by pneumatic control, Werner Deport and Kurt Stool, Vol. I and II.

3. Introduction to Manufacturing Technology, Date P. P., Principles and Practices, Jayco Publishers, Mumbai

Course Outcomes: Upon completion of this course the student will be able to:

ME1416.1 understand the concept of Automaton and apply them in the integration of various manufacturing Processes.

ME1416.2Implement the various classification and types of automation strategies.

ME1416.3Apply the Knowledge acquired in the fundamental concepts of hydraulic automation, their design and control devices, sequence and their operation through computer control.

ME1416.4Analyse various automated flow lines, Explain assembly systems and line balancing methods and Automatic assembly.

ME1416.5Apply the Knowledge acquired in rapid prototyping and programmable logic controllers.

CO – PO –PSO Mapping:

Course Outcomes	Program Outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME1416.1	3	2	2	2	0	1	0	0	0	0	0	2	1	2	0
ME1416.2	2	1	3	3	0	2	0	0	0	0	0	1	0	0	1
ME1416.3	2	2	2	2	0	0	0	0	0	0	0	1	0	1	0
ME1416.4	3	2	3	2	0	2	0	0	0	0	0	1	1	0	0
ME1416.5	2	2	2	2	0	0	0	0	0	0	0	0	0	1	0

0 - Not correlated 1 - Weakly Correlated 2 - Moderately Correlated 3 - Strongly Correlated

Course Code	ME1516							Course category			MM3
Course Name	MECHATRONIC SYSTEMS										
Teaching Scheme				Examination Scheme							Credits
Th	Tu	Pr	Total	Theory					Practical		Total	
				CT1	CT2	TA	ESE	ESE Duration	ICA	ESE		
03	00	00	03	15	15	10	60	2 hrs. 30	00	00	100	03

Course Objectives:

To make the students aware and understand:

1. Fundamentals of Mechatronic Systems and their applications in industrial automation.
2. Mathematical modelling of mechanical, electrical, and fluid systems.
3. Control strategies for mechatronic systems.
4. Concept of sensors, transducers, and actuators for system integration.
5. Concept of automation technique in manufacturing system.

Course Contents:

Fundamentals of Mechatronic Systems: Definition and Scope of Mechatronic Systems, Overview of Mechatronic System Components: Sensors, Actuators, Controllers and Interfaces, Applications of Mechatronic Systems in Industry.

Mathematical Modelling of Systems: Modelling of Mechanical, Electrical, and Fluid Systems; Spring-Mass-Damper Systems; Linear and Rotary Motion Systems; Laplace Transform and Transfer Functions; Simulation of Systems Using Lab VIEW

Control Systems for Mechatronic Applications: Open-Loop and Closed-Loop Control Systems, PID Controllers and Applications, Time-Domain and Frequency-Domain Analysis of Control Systems, Role of Automation in Control Systems, Case Studies: Mechatronic System Control in Industrial Automation.

Sensors, Transducers, and Actuators: Classification and Working Principles of Sensors (Temperature, Pressure, Proximity, etc.), Signal Conditioning for Sensors and Transducers, Overview of Actuators: Electrical, Hydraulic, and Pneumatic Actuators; Interfacing Sensors and Actuators with Controllers.

Applications of Mechatronic Systems in Manufacturing: Automation in Manufacturing Systems: Fixed, Programmable, and Flexible Automation, Flexible Manufacturing Systems (FMS): Definition, Types, and Applications; Automated Material Handling Systems (ASRS and AGVs).

Note: Industrial Visit

Text Books:

1. W. Bolton, Mechatronics, Pearson Education
2. Mechatronic system Design; Shetty Dedas, Kolk and Richard

Reference Books and Websites:

1. N.P. Mahalik, Mechatronics, Tata McGraw Hill Publication
2. Smaili and F. Arnold, Mechatronics, Oxford University Press, Indian Edition
3. M.D. Singh and J.G. Joshi, Mechatronics, Prentice Hall of India Pvt. Ltd.

Course Outcomes:

On completion of the course, students will be able to:

ME1516.1 Understand the fundamentals of mechatronic systems and their components

ME1516.2 Develop and analyze mathematical models of mechanical, electrical, and fluid systems

ME1516.3 Design and evaluate control strategies using open-loop and closed-loop systems
ME1516.4 Apply knowledge of sensors, transducers, and actuators for system integration
ME1516.5 Implement automation techniques in manufacturing Systems

CO – PO – PSO Mapping:

Course Outcomes	Program Outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME1516.1	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
ME1516.2	2	3	1	2	--	-	-	-	-	-	-	-	3	-	-
ME1516.3	3	2	1	2	--	-	-	-	-	-	-	-	2	-	-
ME1516.4	3	2	1	-	-	-	1	-	-	-	-	-	3	-	-
ME1516.5	2	1	1	-	-	-	-	-	-	-	-	-	2	-	-

0 - Not correlated 1 - Weakly Correlated 2 - Moderately Correlated 3 - Strongly Correlated

CO – PO –PSO Mapping AS PER NBA JULY 2024 FORMAT (wef, 1st JAN 2025)

Course Outcomes	Program Outcomes													
	PO1	PO2	PO3	PO4	PO5	PO6	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME1516.1	2	2	-	-	-	-	-	-	-	-	-	2	-	-
ME1516.2	2	3	1	2	--	-	-	-	-	-	-	3	-	-
ME1516.3	3	2	1	2	--	-	-	-	-	-	-	2	-	-
ME1516.4	3	2	1	-	-	-	-	-	-	-	-	3	-	-
ME1516.5	2	1	1	-	-	-	-	-	-	-	-	2	-	-

0 - Not correlated 1 - Weakly Correlated 2 - Moderately Correlated 3 - Strongly Correlated

Course Code	ME 1616	Course category	MM
Course Name	INDUSTRIAL ROBOTICS		

Teaching Scheme				Examination Scheme								Credits
Th	Tu	Pr	Total	Theory					Practical		Total	
				CT1	CT2	TA	ESE	ESE Duration	ICA	ESE		
03	00	00	03	15	15	10	60	2 hrs 30 min	00	00	100	03

Course Objectives:

To make the students aware and understand:

1. Various types of Industrial robots in industries.
2. Types of Robot Control System in industries.
3. End Effectors and Sensors, transformations, and its kinematics in robotics
4. Robot programming methods in rbotic system.
5. Approach for Robot implementation issues in robotics

Course Contents:

Introduction: Basic concepts - Robot anatomy - Robot configurations - Basic robot motions -Types of robots- Types of drives - Applications - Material handling - processing -Assembly and Inspection -safety considerations.

Fundamentals of Industrial Robots: Specifications and Characteristics, Basic components, configurations, Criteria for selection, various industrial applications.

Transformations and Kinematics: Vector operations - Translational transformations and Rotational transformations- Properties of Transformation matrices-Homogeneous transformations and Manipulator - Forward solution -Inverse solution.

Robotic Control Systems: Actuators, Power transmission systems, Robot controllers, Dynamic properties of robots- stability, control resolution, spatial resolution, accuracy, Repeatability, Compliance.

Robotic End Effectors and Sensors : Transducers and sensors- sensors in robotics and their classification, Touch (Tactile) sensors, proximity and range sensors, force and torque sensing. End Effectors- Types, grippers, various process tools as end effectors. Robot- End effectors. Interface, Active and passive compliance, Gripper selection and design.

Robot Programming: Lead through method, Robot program as a path in space. Methods of defining positions in space. Motion interpolation, branching: Textual robot programming languages

Robot Implementation Issues : Approach for implementing Robotics, Safety. Training and Maintenance Social Aspects of Robotics

Text Books:

1. Industrial Robotics: Technology, Programming and Applications, M. P. Grover. McGraw- Hill International Editions, 2018
2. Robotics and Control. Nagrath and Mitral. Tara McGraw-Hili, 2005.

Reference Books and Websites:

1. Robotics for Engineers, Y. Koren, McGraw Hill International Editions
2. Robotic Engineering: An Integrated Approach, Richard D. Klafter, at.el, Prentice Hall of India
3. Handbook of Robotics, off. Shimon Y. ,John Wiley & Sons Robotics for Engineers, Y. Koren, McGraw Hill, 1985
4. Robotics. Control. Sensing, Vision and Intelligence. Fu. K.S. Gonzalez, R.C., Lee. C. .McGraw Hill International. 1987

Course Outcomes:

On completion of the course, students will be able to:

ME1616.1 Explain the manipulator and its kinematics.
ME1616.2 Explain actuators, types of robotic configurations and their characteristics
ME1616.3 Understand the motions of robots and its control and various implementing Issues.
ME1616.4 Determine the solution to inverse kinematics and trajectory planning in robot movement
ME1616.5 Implement the knowledge of sensors, robot programming

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME1616.1	3	2	0	1	0	1	1	0	0	0	0	0	1	2	0
ME1616.2	2	2	0	1	3	2	0	0	0	0	0	1	0	0	1
ME1616.3	3	2	2	1	2	1	0	3	0	0	0	0	0	1	0
ME1616.4	3	3	3	1	0	3	0	3	0	2	0	0	1	0	0
ME1616.5	2	0	0	1	3	0	1	0	0	0	0	1	0	0	2

0 - Not correlated 1 - Weakly Correlated 2 - Moderately Correlated 3 - Strongly Correlated

CO – PO –PSO Mapping AS PER NBA JULY 2024 FORMAT (wef, 1st JAN 2025)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
ME1616.1	3	2	0	1	0	1	0	0	0	0	0	1	2	0
ME1616.2	2	2	0	1	3	2	0	0	0	0	1	0	0	1
ME1616.3	3	2	2	1	2	1	3	0	0	0	0	0	1	0
ME1616.4	3	3	3	1	0	3	3	0	2	0	0	1	0	0
ME1616.5	2	0	0	1	3	0	0	0	0	0	1	0	0	2

0 - Not correlated 1 - Weakly Correlated 2 - Moderately Correlated 3 - Strongly Correlated

Curriculum Structure for
Multi-Disciplinary Minor (MDM) Degree in
Industrial Management

(In light of NEP 2020)

(NEP_Version II)

Offered By

DEPARTMENT OF MECHANICAL ENGINEERING

For students admitted in 2023-24 onwards

Government College of Engineering, Amravati
(An Autonomous Institute of Government of Maharashtra)
Near Kathora Naka, Amravati, Maharashtra
PIN 444604
www.gcoea.ac.in

A. Preamble:

The mechanical engineering minor is tailored to students who want to understand the fundamentals of mechanical engineering other than courses covered in engineering sciences. The students will develop abilities in design, analysis and experimentation through foundation of math, physics, chemistry including modelling, energy engineering, mechanics of materials, product design and hydraulics.

The students can combine the skills and technological expertise of this minor with a major in technology of aligned branch to prepare for a wide variety of opportunities in industrial fields and in demand careers.

B. Structure of the MDM course:

ME Department offer Multidisciplinary Minor Basket , Track-3 (Industrial Management)														
Category	**Course Code**	**Name of the Course**	**Teaching Scheme**				**Evaluation Scheme**							**Credits**
							Theory				**Practical**		**Total**	
			TH	TU	PR	Total	CT1	**CT2**	TA	ESE	ICA	ESE		
MM1	ME1317	Organizational Behavior	3			3	15	15	10	60			100	3
MM2	ME1417	Human Resource Management	3			3	15	15	10	60			100	3
MM3	ME1517	Material Management	3			3	15	15	10	60			100	3
MM4	ME1617	Marketing Management	3			3	15	15	10	60			100	3
MM5	ME1717	Corporate Financial Reporting and Analysis	2			2	15	15	10	60			100	2
Total			**14**	**0**	**0**	**14**	**75**	**75**	**50**	**300**	**0**	**0**	**500**	**14**

If desire --Note (for example) : MM3/MM4/MM5 May split as 3(th) +1 (pr) ie 2 courses OR MM3 As 3(th) +1 (pr) course and MM4/MM5 As Project, accodingly change evlaution scheme etc

Eligibility criteria: Students enrolled in B. Tech program other than Mechanical Engineering are eligible. The allotment of minor degree Programme will be as per the policy of the Institute. Intake: Minimum 15, **Detailed**

Course Code	ME1317								Course category			MM1
Course Name	ORGANISATIONAL BEHAVIOUR											
Teaching Scheme				Examination Scheme								Credits
Th	Tu	Pr	Total	Theory					Practical		Total	
				CT1	CT2	TA	ESE	ESE Duration	ICA	ESE		
03	00	00	03	15	15	10	60	2 hrs 30 min	00	00	100	03

Course Objectives:

I. To develop understanding of individual and group behaviour in the organisation
II. To study the basic concepts of organisation behaviour and its application in organisation.
III. To learn principles of leadership and Power
IV. To study the Factors affecting organizational climate
V. To study the concepts and applications of prevention and management of stress

Introduction to organizational behavior: Definition, need and importance of organizational behavior, Nature and scope, Frame work: Organizational behavior models, Organization and the environmental factors. Organizational Theory, Organizational behavior modification. Misbehavior –Types

Individual Behavior: Personality, Types factors influencing personality Theories. Learning, Types of learners, the learning process – Learning theories. Attitudes: Characteristics Components, Formation, Measurement, Values. Perceptions: Importance, Factors influencing perception, Interpersonal perception Impression Management. Emotions and Moods in workplace

Group Behavior: Organization structure, Formation, Groups in organizations, Influence Group dynamics, Interpersonal Communication. Team building, Interpersonal relations, Group decision making techniques. Meaning of conflict and its types, Conflict Redressed process.

Leadership and Power: Leadership Meaning, importance, traits, styles and Theories. Leaders Vs Managers. Sources of power, Power centers, Power and Politics. Motivation at work importance, need, types and its effects on work behavior. Motivation Theories: Maslow's, Herzberg, etc.

Dynamics of Organizational Behavior: Organizational culture and climate, Factors affecting organizational climate, Importance. Organizational change, Importance, Stability Vs Change, Proactive Vs Reaction change, the change process, Resistance to change, Managing change.

Text Books:

1. Human Behavior at work Keith Devis, McGraw Hill 1997
2. Organizational Behavior; Concepts, Skills and Practices Kinicki Kreitner, McGraw Hill 1997.

Reference Book :

1. Dimension of Organizational Behavior T. Herbert Organization & Management R. D. Agrawal
2. Organizational Behavior and Performance Aszilagyl & Walace Organizational Behavior K. Aswathapa

Course Outcomes:

Upon successful completion of this course student should be able to:

1. ME1317.1 Identify the behaviour of an individual in the organisation
2. ME1317.2 Apply basic principles of organisational behaviour in the organisation
3. ME1317.3 Illustrate the concept of leadership and power in the organisation
4. ME1317.4 Analyse the dynamics of behaviour for good organisational culture and Climate.
5. ME1317.5 Explain the concepts and applications of stress management for Balancing work and life.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME1317.1	3	3	2	0	0	0	0	0	0	0	0	0	3	2	0
ME1317.2	3	0	3	3	0	0	0	0	0	0	0	0	2	3	0
ME1317.3	3	0	2	0	0	0	0	0	0	0	0	0	0	3	0
ME1317.4	2	1	2	1	0	0	0	0	0	0	0	0	0	1	0
ME1317.5	2	0	2	3	0	0	0	0	0	0	0	0	0	2	0

0 - Not correlated 1 - Weakly Correlated 2 - Moderately Correlated 3 - Strongly Correlated

Course Code	ME1417			Course category				MM2
Course Name	HUMAN RESOURCES MANAGEMENT							
Teaching Scheme				Examination Scheme				Credits
Th	Tu	Pr	Total	Theory				Practical		Total	
				CT1	CT2	TA	ESE	ESE Duration	ICA	ESE		
03	00	00	03	15	15	10	60	2 hrs 30 min	00	00	100	03

Course Objectives

I. To understand and appreciate the importance of the human resources vis-a-vis other resources of the organization
II. To familiarize the students with methods and techniques of HRM
III. To equip them with the application of the HRM tools in real world business situations.
IV. To study the methods of Human Resource Development
V. To understand the importance of collective bargaining

Human Resources Management: Context and Concept of People Management in a Systems Perspective, Organization and Functions of the HR and Personnel Department, HR Structure and Strategy; Role of Government and Personnel Environment including MNCs.

Recruitment and Selection : Human Resource Information System [HRIS], Manpower Planning, Selection, Induction & Orientation, Performance and Potential Appraisal, Coaching and Mentoring, HRM issues and practices in the context of Outsourcing as a strategy

Human Resources Development : Training and Development Methods, Design & Evaluation of T&D Programmes, Career Development, Promotions and Transfers, Personnel Empowerment including Delegation, Retirement and Other Separation Processes.

Financial Compensation: Productivity and Morale, Principal Compensation Issues & Management, Job Evaluation, Productivity, Employee Morale and Motivation, Stress Management, Quality of Work Life.

Building Relationships: Facilitating Legislative Framework, Trade Unions, Managing Conflicts, Disciplinary Process, Collective Bargaining, Workers Participation in Management - Concept, Mechanisms and Experiences.

Text books

1. Venkata Ratnam C. S. & Srivatsava B. K.,Personnel Management And Human Resources, Tata Mc-Graw Hill, NewDelhi,,
2. Aswathappa, Human Resource Mangement, Tata McGraw Hill, NewDelhi, 2010

Reference book:

1. Garry Dessler &Varkkey, Human Resource Management, Pearson, New Delhi, 2009
2. Alan Price, Human Resource Management, Cengage Learning, NewDelhi, 2007.

Course Outcomes:

Upon successful completion of this course student should be able to:

1. ME1417.1 Understand the function of personnel department
2. ME1417.2 Undertake manpower planning , recruitment and performance appraisal
3. ME1417.3 Design and evaluate training and development methods
4. ME1417.4 Identify training need on stress management, motivation to improve quality of work.
5. ME1417.5 Evaluate the functions of trade union.

CO – PO – PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME1417.1	3	2	2	0	0	0	0	0	0	0	0	0	3	2	0
ME1417.2	3	3	2	3	0	0	0	0	0	0	0	0	2	3	0
ME1417.3	3	0	3	0	0	0	0	0	0	0	0	0	0	2	0
ME1417.4	2	1	3	1	0	0	0	0	0	0	0	0	0	1	0
ME1417.5	2	0	3	2	0	0	0	0	0	0	0	0	0	3	0

0 - Not correlated 1 - Weakly Correlated 2 - Moderately Correlated 3 - Strongly Correlated

Course Code	ME1517								Course category			MM3
Course Name	MATERIAL MANAGEMENT											
Teaching Scheme				Examination Scheme								Credits
Th	Tu	Pr	Total	Theory					Practical		Total	
				CT1	CT2	TA	ESE	ESE Duration	ICA	ESE		
03	00	00	03	15	15	10	60	2 hrs 30 min	00	00	100	03

Course Objectives:

To make the students aware and understand

1. Basics of Material Management and its need
2. Functions of Purchasing Department and suppliers selection
3. Inventory Management and Analysis
4. Need and Process of International trading
5. Legal aspect and insurance in Buying

Course Contents:

Introduction: Importance, Need, Objectives and Advantages of Materials Management.

Purchasing Management: Objectives and Functions of Purchasing Department, Purchase Policy and Procedure, Negotiations, Purchase of High Capital Equipment, Material Requirement Planning (MRP)

Codification and Standardization: Basis of Codification, Characteristics of Good Coding System, Types of Coding, Standardization and its Benefits

Suppliers Selection: Selection Process, Vendor Rating, Techniques for Vendor Rating, Vendors Development and Supplier's Relationship. Supply Chain Management.

Inventory Management: Definition of Inventory, Types of Inventory, Norms for inventory, Costs of Inventory, Static and Dynamic Models , EOQ, Purchase Discounts, Q-system, P-system, Safety Stocks. ABC Analysis: Meaning, Advantages, Objective, and Limitations.

Stores Management: Purpose of Store Management, Location and Layout, Cost Aspects and Productivity, Problems and Developments, New Developments in Storing.

International Purchasing: Need, Procedure, Nature of Documents, Problems, Trading Organizations, Law of Agency, Law of Contract.

Insurance Buying: Responsibilities of materials manager, General Insurance Management, Aspect of Insurance Management.**Obsolete, Surplus and Scrap Management:** Definitions, Identifications and Control, Disposal of Scrap.

Text Books:

1. Dutta A.K., Materials Management: Procedures, Text and cases, Prentice Hall of India Pvt. Ltd., New Delhi.
2. Gopalakrishnan, P. and Sundareson, M., Materials Management: An Integrated Approach, Prentice Hall of India Pvt. Ltd., New Delhi.
3. Varma, M.M., Essentials of Storekeeping and Purchasing, Sultan Chand and Sons, New Delhi.

Reference Books and Websites:

1. Sharma S.C., Material Management and Materials Handling, Khanna Publishers, New Delhi.
2. Arnold, Champman and Ramakrishnan, Introduction to Materials Management 5th ed., 2007 Pearson Education, Inc.
3. Pooler Victor H. Purchasing and Supply Management, Creating the Vision, New York, Chapman & Hall, 1997.

Course Outcomes:

On completion of the course, students will be able to:

ME1517.1 Explain and Execute the Process of Material procurement

ME1517.2 Apply coding system for Inventory

ME1517.3 Select the Proper Vendor for the industry

ME1517.4 Calculate EOQ and safety stock

ME1517.5 Explain the process of international buying

CO – PO – PSO Mapping:

Course Outcomes	Program outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME1517.1	0	0	0	-	-	-	-	-	-	-	3	1	0	0	0
ME1517.2	1	2	2		3	-	-	-	-	-	2	-	-	-	-
ME1517.3	1	2	2		3	-	-	-	-	-	2	-	-	-	-
ME1517.4	1	2	2	3	3	-	1	-	-	-	2	-	-	-	-
ME1517.5	1	2	2	-	3	-	-	-	-	-	2	-	-	-	-

0 - Not correlated 1 - Weakly Correlated 2 - Moderately Correlated 3 - Strongly Correlated

CO – PO –PSO Mapping AS PER NBA JULY 2024 FORMAT (wef, 1st JAN 2025)

Course Outcomes	Program outcomes													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
ME1517.1	0	0	0	-	-	-	-	-	-	3	1	0	0	0
ME1517.2	1	2	2		3	-	-	-	-	2	-	-	-	-
ME1517.3	1	2	2		3	-	-	-	-	2	-	-	-	-
ME1517.4	1	2	2	3	3	-	-	-	-	2	-	-	-	-
ME1517.5	1	2	2	-	3	-	-	-	-	2	-	-	-	-

0 - Not correlated 1 - Weakly Correlated 2 - Moderately Correlated 3 - Strongly Correlated

Course Code	ME1617								Course category			MM
Course Name	MARKETING MANAGEMENT											
Teaching Scheme				Examination Scheme								Credits
Th	Tu	Pr	Total	Theory					Practical		Total	
				CT1	CT2	TA	ESE	ESE Duration	ICA	ESE		
03	00	00	03	15	15	10	60	2 hrs 30 min	00	00	100	03

Course Objectives:

To make the students aware and understand:

1. Buying decision making process.
2. Product Life Cycle and new Product Development.
3. Concept of Pricing – Factors influencing the pricing policy
4. Supply Chain Management in High-Tech Markets.
5. Application of marketing research

Course contents:

Introduction and Nature of Marketing: Evolution of Marketing Concept - Core concepts of marketing - Scope and Importance of Marketing. -Difference between Selling and Marketing - Marketing Myopia - Consumer Marketing Vs. Industrial Marketing.

Understanding Consumer Behaviour: nature, scope and importance of consumer behavior – Factors influencing Consumer Behavior - Buying decision making process - Market Segmentation, Targeting and Positioning (STP).

Price Decisions - Pricing objectives - Pricing policies and constraints - Different pricing method - New product pricing, Product Mix pricing strategies and Price adjustment strategy

Marketing mix - Product definition, levels of product, product classification, difference between goods and services, Product Life Cycle, New Product Development – Technology and Product Management

Promotion mix - Marketing Communication Tools for High-Tech Markets - Channels of distribution - Supply Chain Management in High-Tech Markets - Technology Marketing, Green Marketing, Introduction to market study

Application of Marketing Research: Product Research – Motivation research – Advertising Research – Sales Control Research – Rural Marketing research - Export Marketing research.

Text books:

1. Principles of Marketing, Philip Kotler and Gary Armstrong- 15/e, Pearson Education.
2. Marketing of High-Technology Products and Innovations Jakki J Mohr, Sanjit Sengupta and Stanley Slater, Pearson India.

Reference Books:

1. Marketing Management, V.S. Ramaswamy and S. Namakumari –, 4/e, Mc Millan Publications, New Delhi. 3
2. Marketing Management, Rajan Saxena, - 3/e, TMH, New Delhi

Course Outcomes: After completion of course, student will be able to:

ME1617. 1 Describe the Evolution of marketing concept, selling and marketing.
ME1617. 2 Describe the principle consumer marketing and industrial marketing.
ME1617.3 Differentiate between consumer behaviour, buying decision making.
ME1617.4 Identify the pricing strategies, pricing policies.

ME1617.5 Appraise the recent trends in green marketing

CO – PO –PSO Mapping:

Course Outcomes	Program Outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME 1617.1	3	2	3	0	2	3	2	1	3	3	2	2	3	3	3
ME 1617.2	3	2	3	3	2	0	2	1	3	3	2	0	3	3	0
ME 1617.3	0	2	3	3	2	3	2	1	0	3	2	2	0	3	3
ME 1617.4	3	0	3	3	2	3	0	1	3	3	2	2	3	3	3
ME 1617.5	3	2	3	3	2	3	2	1	3	3	0	2	3	0	3

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated

CO – PO –PSO Mapping AS PER NBA JULY 2024 FORMAT (wef, 1st JAN 2025)

Course Outcomes	Program Outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ME 1617.1	3	2	3	0	2	3	2	1	3	3	2	2	3	3	3
ME 1617.2	3	2	3	3	2	0	2	1	3	3	2	0	3	3	0
ME 1617.3	0	2	3	3	2	3	2	1	0	3	2	2	0	3	3
ME 1617.4	3	0	3	3	2	3	0	1	3	3	2	2	3	3	3
ME 1617.5	3	2	3	3	2	3	2	1	3	3	0	2	3	0	3

0- Not correlated 1 - Weakly Correlated 2- Moderately Correlated 3- Strongly Correlated