

Roll No.

Total No. of Pages: 01

Total No. of Questions: 08

M.Tech (Mechanical Engineering), Semester 1st

ADVANCED ENGINEERING MATERIALS

Subject Code: 25C1MEP-101

M.Code: 46689

Date of Examination: 06-05-2025

Time: 3 Hrs.

Max. Marks: 100

INSTRUCTIONS TO CANDIDATES:

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.

Q. No.	Question	Course Outcome	Bloom's Level
1.	Identify the important properties required for engineering materials. Explain in detail.	CO1	L3
2a.	Explain the factors that contribute to increased strength in fiber-reinforced composites.	CO2	L2
2b.	Explain the characteristics, manufacturing methods, and uses of titanium-aluminium composites in high-temperature structural applications.	CO2	L2
3.	Examine the role of the interface between the reinforcement and the matrix in a composite and explain in detail.	CO2	L4
4.	Classify in detail ceramic materials and explain with suitable examples.	CO3	L3
5a.	Compare bio-ceramics with polymer-based biomaterials in terms of biocompatibility, strength, and durability.	CO3	L5
5b.	Explain the advantages and limitations of calcium phosphate ceramics in bone grafting and coating of metallic implants.	CO3	L5
6a.	Discuss the use of nanomaterials in electronics and semiconductor industries.	CO6	L6
6b.	Explain how surfactants influence the growth of nano-particles in a material?	CO6	L5
7.	Examine the requirements of materials for high and low temperature applications.	CO4	L4
8a.	Explain biocompatibility and discuss the properties and application of Magnesium alloys as a biomaterial.	CO5	L5
8b.	Discuss the environmental challenges associated with polymers and the development of biodegradable plastics.	CO5	L6

NOTE: Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the student.

Roll No.

Total No. of Pages: 01

Total No. of Questions: 08

M.Tech (Mechanical Engineering), Semester-2nd

TRIBOLOGY

Subject Code: 25C1MEP-202

M.Code: 97953

Date of Examination: 07-05-2026

Time: 3 Hrs.

Max. Marks: 100

INSTRUCTIONS TO CANDIDATES:

1. Attempt any FIVE questions in all, out of EIGHT questions.
2. Each question carries TWENTY marks.

Q. No.	Question	Course Outcome	Bloom's Level
1.	Describe the concept of cost of friction and wear and its impact on efficiency, reliability and maintenance of engineering systems.	CO1	L2
2.	Utilize the concept of energy dissipation to explain the origin of friction in sliding and rolling contacts.	CO2	L3
3.	a. Compare different types of deformation in tribological contacts and explain their influence on surface interaction. b. Analyze the assumptions and limitations of Reynolds equation in lubrication systems under practical conditions.	CO3	L4
4.	a. Write the mechanism of abrasive and adhesive wear with the help of suitable diagram. b. Select suitable bearing types for given operating conditions based on load, speed and environment.	CO4	L3
5.	Evaluate the influence of material properties such as hardness, toughness and surface finish on wear resistance in engineering materials.	CO2	L5
6.	a. Interpret the significance of Sommerfeld number, minimum film thickness and clearance in journal bearing performance. b. Evaluate the selection criteria of rolling element bearings for high-speed and heavy load applications.	CO4	L5
7.	Construct the neat diagram of hydrodynamic and hydrostatic lubrication to explain their mechanisms.	CO3	L3
8.	Explain the role of tribology in industrial applications such as metal working and mining, and discuss how it improves efficiency and component life.	CO3	L5

NOTE: Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the student.

11M-97953

Roll No.

Total No. of Pages: 01

Total No. of Questions: 08

M.Tech (Mechanical Engineering), Semester- 2

PRODUCT DESIGN AND DEVELOPMENT

Subject Code: 25C1MEP-PE1-09

M.Code: 97942

Date of Examination: 18-05-2026

Time: 3 Hrs.

Max. Marks: 100

INSTRUCTIONS TO CANDIDATES:

1. Attempt any FIVE questions in all, out of EIGHT questions.
2. Each question carries TWENTY marks.

Q. No.	Question	Course Outcome	Bloom's Level
1.	Explain the concept of creative thinking and illustrate its role in product innovation.	CO1	L2
2.	Apply suitable techniques to develop new product ideas in product design.	CO2	L3
3.	a. Analyze the process of product innovation and distinguish its key stages. b. Analyze responsibilities in new product development and examine their roles.	CO3	L4
4.	a. Apply value principles to improve product design efficiency. b. Select suitable evaluation methods for product selection.	CO2	L3
5.	Evaluate reliability in product design and justify its importance in product performance.	CO2	L5
6.	a. Design a new product development process using integrated approaches. b. Formulate a strategy for product launch using test marketing and economic analysis.	CO4	L6
7.	Analyze cost procedures and distinguish their impact on product development.	CO4	L4
8.	Evaluate how the choice of product cost estimation method can influence managerial decisions, and justify why selecting an appropriate method is critical for organizational success.	CO3	L5

NOTE: Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the student.

[illegible]

Total No. of Pages: 02

Total No. of Questions: 08

M.Tech (Mechanical Engineering), Semester-2nd

COMPUTATIONAL FLUID DYNAMICS

Subject Code: 25C1MEP-204

M.Code: 97951

Date of Examination: 14-05-2026

Time: 3 Hrs.

Max. Marks: 100

INSTRUCTIONS TO CANDIDATES:

1. Attempt any FIVE questions in all, out of EIGHT questions.
2. Each question carries TWENTY marks.

Q. No.	Question	Course Outcome	Bloom's Level
1.	Illustrate computational fluid dynamics and state its purpose in engineering analysis. Explain how CFD assists engineers in studying complex fluid flow phenomena?	CO1	L2
2.	Express the physical meaning of the momentum equation in fluid flow. Illustrate how forces affect fluid motion?	CO2	L3
3.	a. Explore the role of CFD in reducing experimental costs in engineering design. Distinguish between simulation-based and experimental approaches. b. Examine the conservation equations in CFD formulation and differentiate between physical and mathematical representations.	CO2	L4
4.	a. Analyze the characteristics of elliptic partial differential equations. Illustrate their role in steady flow problems b. Distinguish between parabolic and hyperbolic equations along with their solution characteristics.	CO3	L4
5.	Recommend appropriate governing equation forms for incompressible flows. Justify the selection based on modelling requirements.	CO2	L5
6.	a. Justify the role of higher order discretization schemes in solution accuracy and their influence on numerical diffusion.. b. Explain the application of viscous flow analysis in internal flow problems and justify its relevance to engineering systems	CO6	L5
7.	Examine the concept of discretization in numerical methods and analyze a control volume mesh for a simple fluid flow problem.	CO4	L4
8.	Explain the computational steps required for the turbulence modeling to simulate the flow in a pipe for the industrial applications.	CO5	L5

NOTE: Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the student.

Total No. of Questions: 08

Total No. of Questions: 08

Total No. of Questions: 08

Total No. of Questions: 08

Total No. of Questions: 08

Total No. of Questions: 08

Total No. of Questions: 08

Total No. of Questions: 08

Total No. of Questions: 08

- Total No. of Questions: 08

Total No. of Questions: 08

Total No. of Questions: 08

Total No. of Questions: 08

Total No. of Questions: 08



Total No. of Questions: 08

Roll No.

Total No. of Pages: 01

Total No. of Questions: 08

M. Tech. (Mechanical Engineering), Semester-2nd

RESEARCH METHODOLOGY

Subject Code: 25C1MEP-201

M. Code: 97954

Date of Examination: 04-05-2026

Time: 3 Hrs.

Max. Marks: 100

INSTRUCTIONS TO CANDIDATES:

1. Attempt any FIVE questions in all, out of EIGHT questions.
2. Each question carries TWENTY marks.

Q. No.	Question	Course Outcome	Bloom's Level
1.	Explain the nature and objectives of research. Describe the steps involved in report writing.	CO1	L2
2.	Apply the principles of Design of Experiments (DOE) to classify different experimental designs with suitable examples.	CO4	L3
3.	a. Analyze different sampling techniques and justify their selection for a research problem. b. Examine the process of data collection and interpretation in research.	CO3	L4
4.	a. Analyze factorial design (2^k) experiments with suitable examples. b. Analyze the role of ANOVA in identifying significant factors in experiments.	CO4	L4
5.	Evaluate the importance of literature review and research design in improving the quality of research outcomes.	CO2	L5
6.	a. Develop a Taguchi design using orthogonal arrays for a given engineering problem. b. Design an ANOVA-based approach to analyze multi-factor experimental data and interpret results.	CO4	L6
7.	Write the fundamentals of Response Surface Methodology (RSM) and its application in process optimization.	CO5	L3
8.	Evaluate the role of statistical software (SPSS/Excel/Minitab/MATLAB) in data analysis and discuss ethical issues such as plagiarism and reproducibility.	CO1	L5

NOTE: Disclosure of Identical

NOTE: Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the candidate.