Name: **Enrolment No:**	

UPES

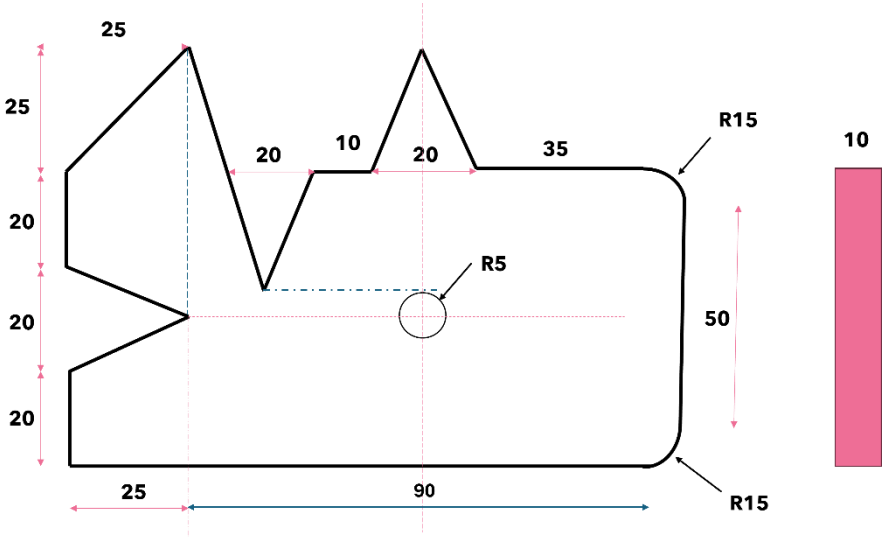
END-Semester Examination, MAY 2025

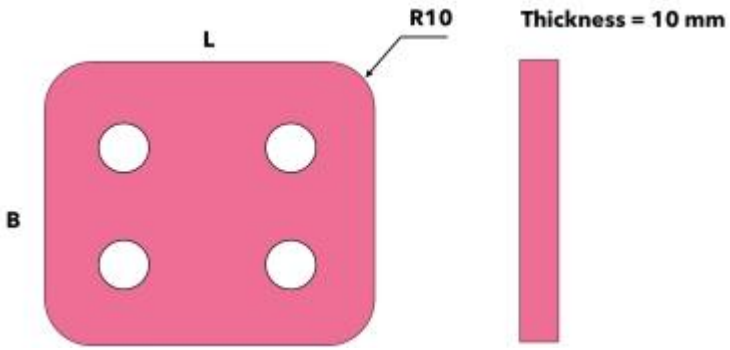
Programme Name **: B.Tech Mechanical Engg.** Semester **: VIII**
Course Name **: CAD/CAM** Time **: 3 hrs**
Course Code **: MEPD4001** Max. Marks**: 100**
Nos. of page(s) **: 4**
Instructions: It is **mandatory** to structure your answer into **clearly defined sections** and **include diagrams wherever applicable.**

SECTION A
(5Qx4M=20Marks)

S. No.		**Marks**	**CO**
Q 1	Distinguish between open loop system and closed loop system.	**4**	**CO1**
Q 2	Classify the following equipment and machines as either open-loop or closed-loop systems. a. Traffic signal b. Water sprinkler with a timer c. Automatic washing machine d. Immersion heater rod e. Refrigerator f. Smart thermostat g. Servo motor system h. Manual water pump i. Ceiling fan j. Manual water pump Electric iron with thermostat	**4**	**CO3**
Q 3	i. Identify the operation that does not qualify as a primitive operation in computer graphics a) Translation b) Rotation c) Reflection d) Division	**4**	**CO1**

	ii. Determine the technique utilized for rendering 3D graphics among the following options. a) Ray tracing b) Rasterization c) Vector graphics d) Bezier curves iii. The purpose of a viewport in CAD software is? a) To define the viewing volume in 3D space b) To represent the final rendered image c) To control the camera position d) To display the graphics output on the screen iv. Identify the frequently utilized file format for exchanging CAD data among the provided options. a) JPEG b) PDF c) DWG d) MP4 v. Identify the transformation matrix which is used to perform scaling in computer graphics? a) Translation matrix b) Rotation matrix c) Scaling matrix d) Shearing matrix vi. Identify the primary function of a Numerical Control (NC) system ? a) Manual operation control b) Continuous monitoring of machine temperature c) Automated tool change d) Conversion of part program instructions into machine movements vii. The programming language commonly used for NC systems is: a) Java b) C++ c) G-code d) HTML viii. The purpose of a post processor in NC programming is? a) To generate machine-specific G-code b) To optimize toolpath algorithms c) To monitor machine performance in real-time d) To design 3D models for machining		

Q 4	Explain NC positioning systems.	**4**	**CO1**
Q 5	Explain fixed zero and floating zero concept.	**4**	**CO1**
SECTION B (4Qx10M= 40 Marks)			
Q 6	Create a block diagram illustrating the Adaptive Control with Optimization system specifically applied to selective laser welding and provide a **detailed explanation of each block**. Additionally, explain the **variables involved** in this system that are used to maintain a desired **MPW (Melt Pool Width)**	**10**	**CO4**
Q 7	Explain the concept of Concurrent Engineering and discuss its key principles. Illustrate how Concurrent Engineering improves product development processes compared to traditional engineering approaches, giving suitable examples.	**10**	**CO2**
Q 8	Evaluate the challenges and opportunities of implementing cloud-based CAD/CAM solutions in the manufacturing industry, considering factors such as data security, collaboration, and scalability.	**10**	**CO3**
Q 9	Explain rendering in the context of computer graphics and the different types of rendering techniques.	**10**	**CO2**
SECTION-C (2Qx20M=40 Marks)			
Q 10	**Instructions:** Study the provided diagram carefully and write the corresponding G-code program to machine the part depicted. Assume a CNC milling machine with X, Y, and Z axes is available for machining. Use appropriate G-code commands and specify any necessary parameters.  **Part Description:** Thickness of the specimen (Z-axis): 10 mm	**20**	**CO4**

	Determine the hole coordinate first. Hole : X= ? mm, Y= ? mm **Requirements:** 1. Develop a G-code program to mill the part profile, including the outer contour and internal hole features. 2. Specify appropriate cutting parameters, tool selection, and toolpath strategies for efficient machining. 3. Include necessary commands for tool changes, toolpath transitions, and coolant activation if required. 4. Ensure the final G-code program is well-structured, organized, and ready for execution on a CNC milling machine.		
Q 11	Study the provided diagram carefully and write the corresponding G-code program to machine the part depicted. Assume a CNC milling machine with X, Y, and Z axes is available for machining. Use appropriate G-code commands and specify any necessary parameters.  **Part Description:** The diagram illustrates a simple rectangular part with four holes located at specific coordinates. The dimensions of the part are as follows: Length, L (X-axis): 100 mm Breadth, B (Y-axis): 80 mm Thickness (Z-axis): 10 mm The hole coordinates are as follows: Hole 1: X=20 mm, Y=20 mm Hole 2: X=20 mm, Y=60 mm Hole 3: X=80 mm, Y=20 mm Hole 4: X=80 mm, Y=60 mm **Requirements:** 1. Develop a G-code program to mill the rectangular part profile, including the outer contour and internal hole features. 2. Specify appropriate cutting parameters, tool selection, and toolpath strategies for efficient machining.	**20**	**CO4**

3. Include necessary commands for tool changes, toolpath transitions, and coolant activation if required.
4. Ensure the final G-code program is well-structured, organized, and ready for execution on a CNC milling machine.

OR

Instructions:
Study the provided diagram carefully and write the corresponding G-code program to machine the part depicted. Assume a CNC lathe machine with X, Y, and Z axes is available for machining. Use appropriate G-code commands and specify any necessary parameters.

Requirements:
1. Develop a G-code program to perform turning operation
2. Specify appropriate cutting parameters, tool selection, and toolpath strategies for efficient machining.
3. Include necessary commands for tool changes, toolpath transitions, and coolant activation if required.
4. Ensure the final G-code program is well-structured, organized, and ready for execution on a CNC lathe machine.