Name: **Enrolment No:**	

UPES

End Semester Examination, May 2024

Course: CAD/CAM **Semester:** VIII
Program: Mechanical Engineering **Time:** 03 hrs.
Course Code: MEPD4001 **Max. Marks:** 100

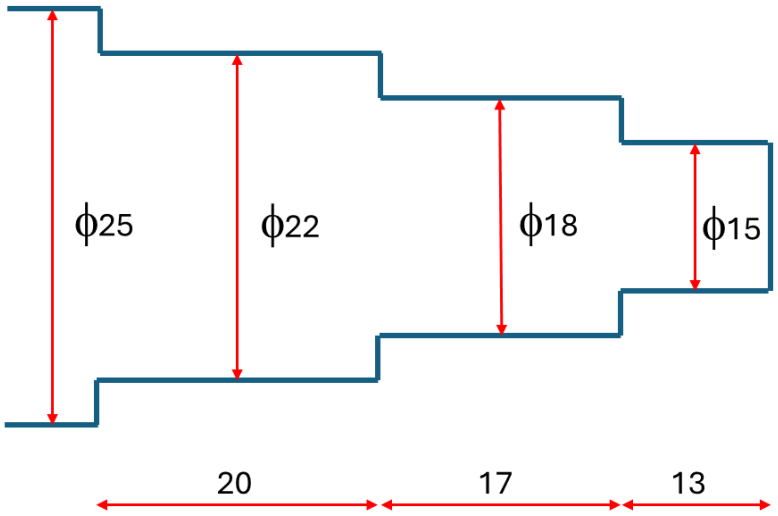
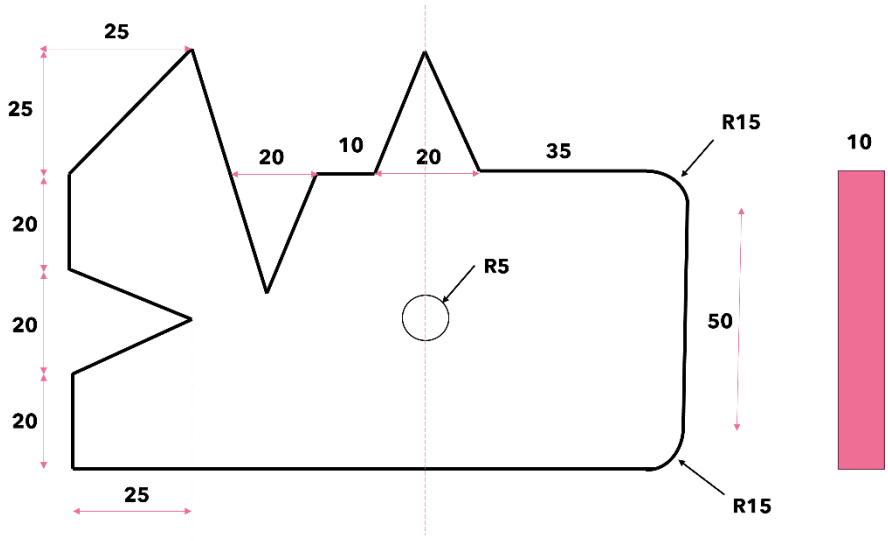
Instructions:
Answer all questions.
Read each question carefully before answering.
Provide clear explanations where necessary.
Use diagrams or sketches to support your answers when appropriate.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Describe some common challenges or limitations faced in concurrent engineering implementation and how they can be overcome.	**4**	**CO1**
Q 2	How do Bezier curves differ from B-spline curves? Provide examples to illustrate.	**4**	**CO2**
Q 3	Discuss the differences between wireframe, surface, and solid modeling techniques in CAD.	**4**	**CO2**
Q 4	i. Identify the operation that does not qualify as a primitive operation in computer graphics a) Translation b) Rotation c) Reflection d) Division 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	**4**	**CO3**

	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		
Q 5	i. 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 ii. The component of an NC system which is responsible for converting digital signals into analog signals for machine control is ? a) Controller b) Actuators c) Feedback devices d) Interface cards iii. Select the appropriate machining processes which is commonly controlled using NC systems? a) Manual milling b) Hand filing c) CNC turning d) Wood carving by hand iv. The programming language commonly used for NC systems is: a) Java b) C++ c) G-code d) HTML	**4**	**CO3**
SECTION B **(4Qx10M= 40 Marks)**			
Q 6	Analyze the role of CAD/CAM integration in the product development lifecycle, including its impact on design iteration, prototyping, and production planning.	**10**	**CO2**
Q 7	Discuss the applications of computer graphics in manufacturing industries, highlighting the benefits and challenges.	**10**	**CO2**

Q 8	Explain with a scenario the concept of dynamic error compensation in high-speed CNC machining, including methods for real-time error prediction and correction.	**10**	**CO4**
Q 9	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**
	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 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.	**20**	**CO4**

			
Q11	**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 Determine the hole coordinate first. Hole : X= ? mm, Y= ? mm	**20**	**CO4**

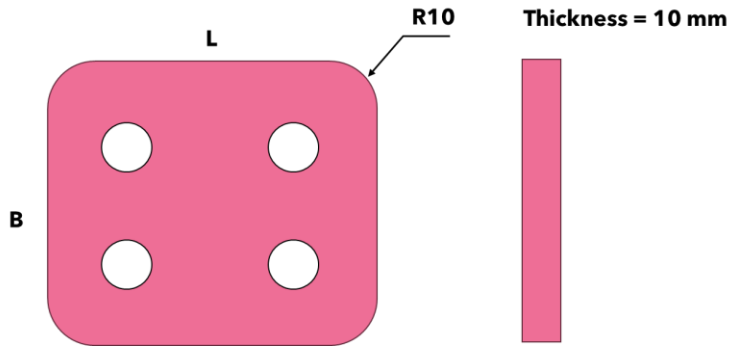
Requirements:

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.

Or

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:

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. 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.		