Name: **Enrolment No:**	

UPES

End Semester Examination, May 2025

Course: Automation in Manufacturing **Semester : VIII**

Program: B.Tech- Mechanical Engineering **Time : 03 hrs.**

Course Code: MECH4047 **Max. Marks: 100**

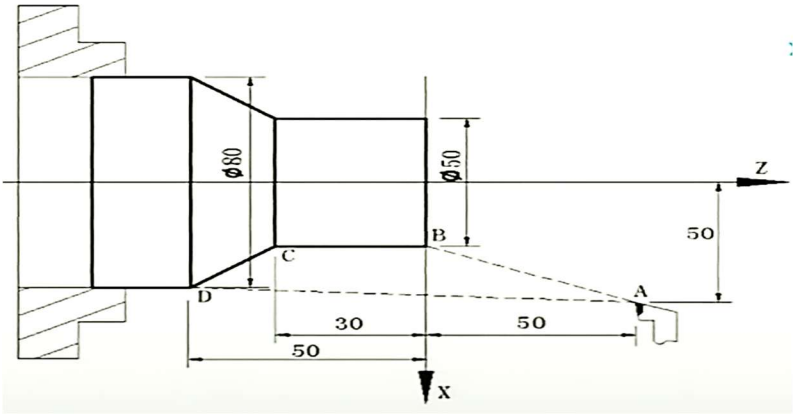
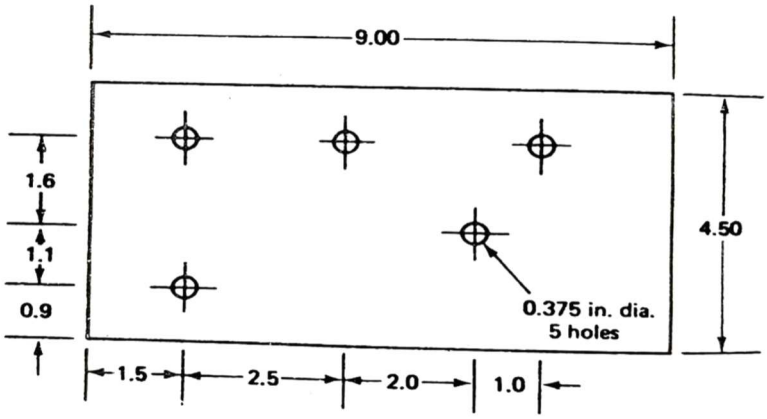
Instructions: Make a neat and clean schematic if required.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Draw and mention the various layers in the computer-integrated manufacturing (CIM) wheel.	**4**	**CO1**
Q 2	Nearly all actuators can be classified into one of three categories, according to the type of drive power. Name the three categories along with examples.	**4**	**CO1**
Q 3	Discuss the various motion commands used in the automated programmed tool (APT) system.	**4**	**CO3**
Q 4	Justify the need for graphics standards in CAD. Also, write the names of a few graphics standards.	**4**	**CO1**
Q 5	Enlist the various input and output devices used in PLC.	**4**	**CO2**

SECTION B
(4Qx10M= 40 Marks)

Q 6	Explain the various steps associated with the automatic tool changing process.	**10**	**CO1**
Q 7	Explain the following: a) Machine Center b) Pneumatic and Hydraulic Actuators	**10**	**CO1**
Q 8	Write an overview of the following CAM software: i. CAMWorks iii. CATIA ii. Fusion 360 iv Siemens NX CAM	**10**	**CO3**
Q 9	Make a brief comparison between a Programmable Logic Controller (PLC) and a computer. Draw the basic schematic showing the PLC connections.	**10**	**CO2**

SECTION-C (2Qx20M=40 Marks)			
Q 10	Define a microcontroller and explain the various components of the microcontroller. Also, write the basic criteria for microcontroller selection.	**20**	**CO2**
Q 11	Define interpolation and explain different types of interpolation used for manual part programming in a Numerical Control System. Write an NC part program for the part shown below. Assume the process parameters if required. Take S=300 and F=130.  **OR** The work part of the Figure below is to be completed in an NC drill press. The outline of the part has already been completed, and the five holes are to be drilled. The axis system for this sequence is to be located with the origin at the lower left-hand corner of the part. The part is 3/8 inch thick. a) Write the APT geometry statements to define the hole locations. b) Write the sequence of motion statements in APT to perform the drilling sequence. Use a point at x = -1 and y = -3 as the target point for the FROM statement. NOTE: All dimensions are in inches.  	**20**	**CO3**