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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: V**

Branch: Mechanical Engineering **Duration: 3 hrs.**

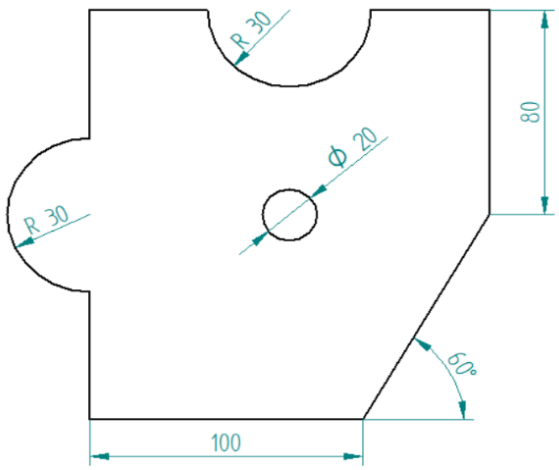
Course Code: 20ME5DCCCR **Max Marks: 100**

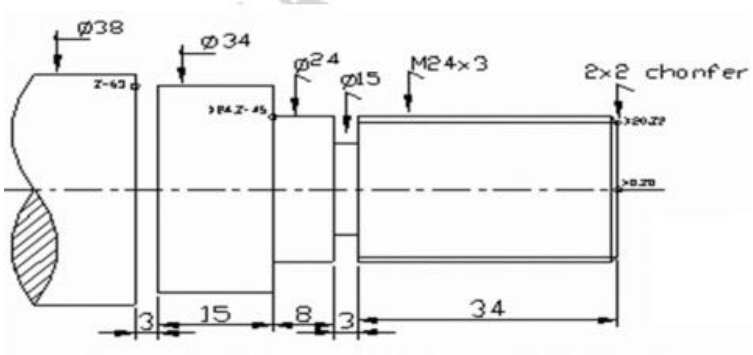
Course: CAD/CAM and Robotics

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	Write different phases of a product's lifecycle with the help of block diagram, and provide a brief description of the needs of each individual.	CO1	PO1	**15**
	b)	Briefly explain CAD-CAM system both with and without graphics standards.	CO1	PO1	**05**
		OR			
2	a)	Explain scaling, rotation and translation with suitable examples.	CO2	PO1	**09**
	b)	A square with an edge length of 10 units is located in the origin with one of the edges at an angle of 30^o with the X-axis. Calculate the new position of the square if it is rotated about the Z-axis by an angle of 30^o in the clockwise direction.	CO2	PO1	**06**
	c)	What is the need for homogeneous representation of transformation? Write homogeneous transformation matrices for translation and reflection in 3D.	CO2	PO1	**05**
		UNIT - II			
3	a)	Explain Bezier curve with the help of mathematical formulation.	CO2	PO1	**08**
	b)	A triangle is defined in a 2D coordinate system by its vertices (0,2) & (0,3) & (1,2). Perform the following transformations of this triangle i) Translate triangle in space by 2 units in x-direction and 5 units in y-direction. ii) Scale the original triangle by a factor 1.5 in x-direction and 3.0 in y-direction. Rotate the original triangle by 45^o(clock wise) about the origin.	CO2	PO1	**12**

			OR			
	4	a)	Write a note on basic surface entities.	*CO2*	*PO1*	**12**
		b)	A cubic Bezier curve is defined by the control points as (30, 30), (50, 80), (100, 100) and (150, 30). Find the equation of the curve and its midpoint.	*CO2*	*PO1*	**08**
			UNIT - III			
	5	a)	With the help of a neat block diagram, explain the function of each component of an CNC system.	*CO3* *CO4*	*PO1*	**10**
		b)	Explain drives and actuation systems with necessary diagram.	*CO3* *CO4*	*PO1*	**10**
			OR			
	6	a)	Explain designation of axes in CNC machines, and also write advantages and disadvantages of CNC system.	*CO4*	*PO1*	**10**
		b)	Briefly explain the following: i) Feedback Devices ii) CNC tooling philosophy.	*CO4*	*PO1*	**10**
			UNIT - IV			
	7	a)	Write brief note on G codes and M codes.	*CO5*	*PO1*	**05**
		b)	Write a manual part program for the component as shown in the Fig.7b, comments on each line of the program.	*CO5*	*PO2*	**15**
			 Fig. 7b			
			OR			
	8	a)	Write a manual part program with comments for the turning model as shown in Fig.8. Data for Thread M24x3, pitch 3mm, core 20.3194mm, depth 1.840mm. [All dimensions in mm]	*CO5*	*PO2*	**20**

			 Fig. 8			
			UNIT - V			
	9	a)	What are the different applications of robotics in various fields, and what are the fundamental principles or laws governing their behavior?	*CO2* *CO3*	*PO1*	**10**
		b)	Write a brief note on the following: i) End-effectors and ii) Sensors used in robots.	*CO2* *CO3*	*PO1*	**10**
			OR			
	10	a)	Sketch and explain anatomy of a robot.	*CO2* *CO3*	*PO1*	**08**
		b)	Explain the four basic configurations of robots with the help of a neat diagram.	*CO2* *CO3*	*PO1*	**12**

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