Exam Date & Time: 13-Jan-2024 (02:30 PM - 05:30 PM)



# MANIPAL ACADEMY OF HIGHER EDUCATION

## FIFTH SEMESTER B.TECH END SEMESTER MAKE UP EXAMINATIONS, JAN 2024 CAD-CAM [MME 3151]

#### Duration: 180 mins.

#### Marks: 50

#### A

#### Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed 1) A ruled surface is defined by two Bezier curves. One curve has control points  $[3 4 5]^T$ ,  $[5\ 6\ 7]^{T}$ , and  $[8\ 9\ 9]^{T}$ . The other curve has control points  $[1\ 2\ 3]^{T}$ ,  $[4\ 5\ 6]^{T}$ , and  $[7\ 8\ 9]^{T}$ . Assume the origin of the ruled surface parameters at the lower left corner of the surface, (5) A) compute the coordinates of the point on the surface at v=0.92 and u=0.43. B) What is the significance of homogeneous coordinate system approach while solving problems related to geometric transformations. (3) C) Write the salient features of solid modelling by Constructive solid geometry approach (2)Compute the coordinates of the required machining points and write a suitable CNC (4)2) part program to perform the contour slotting operation on the component as shown in the Figure 2A. Depth of the contour = 1mm. A)



Billet Size : 100 x 100 x 10 mm

Cutter Dia: 8 mm

### FIGURE 2A

	B)	Explain how Adaptive Control Optimization can be applied to machining of metals and alloys.	(3)
	C)	With an appropriate sketch and from basic parametric equations, derive the recursive equations for a horizontal parabola whose axis and vertex coinicides with global X axis. Assume suitable notations for the various parameters of the parabola	(3)
3)		With sketches, explain any four types of FMS layouts.	
			(4)
	A)		
	B)	Non-contact method of inspection and testing is beneficial compared to contact method. Justify the statement and also list the instruments used in both the testing methods.	(3)
	C)	By applying properties of the Bezier curve, find the equation of the tangent vectors at the start and end points of the Bezier curve which has 4 control points.	(3)
4)		A tabulated surface is defined by extruding a cubic spline curve defined by position vectors $P0 = [3 \ 5 \ 0]^T$ , $P1 = [6 \ 8 \ 0]^T$ and tangent vectors $P0' = [7 \ 9 \ 0]^T$ and $P1' = [2 \ 4 \ 0]^T$ . The particular states is defined by $P1 = P0$ . Compute the second instance of the second ins	(1)
	A)	surface for $u=0.77$ and $v=0.45$ .	(4)

B)

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	With appropriate diagrams, explain the three types of LAN configuration applicable to CAD systems.	
C)	Discuss any three types of sensors used in the industrial robots.	(3)
5)	A parallelogram is defined by the points (4,8), (8,8), (9,12) and (5,12). Reflect the parallelogram about the line $Y = (0.3639 * X) + 2$ and compute the coordinates of the transformed parallelogram.	(5)
A)		
B)	How part are grouped in Optiz method of part classification and coding system.	(3)
C)	Differentiate absolute and incremental method of CNC programming.	(2)

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