University of Mumbai Examination 2022
Examinations Commencing MAY22
Program: **Mechanical Engineering**
Curriculum Scheme: 2019
26/5/2022
Examination: SE Semester: IV
Course Code: MEC404 and Course Name: **CAD/CAM**

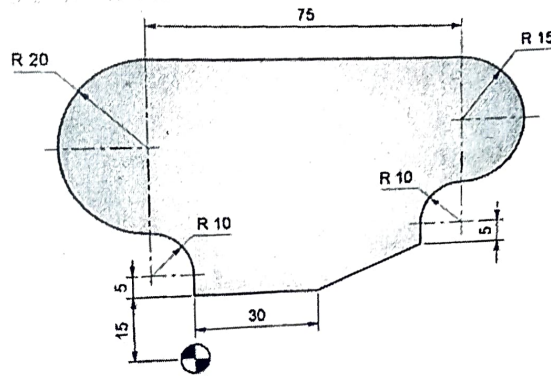Time: _____ hour   Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	In shearing along X axis, the image coordinate X' is , (Shx-Shearing factor along X direction, object coordinates are (X,Y))
Option A:	X'=0
Option B:	X'=1
Option C:	X'= Y+X(Shx)
Option D:	X'=X+ Y(Shx)
2.	Combination of geometric primitives are used for following type of modeling
Option A:	Wire frame modeling
Option B:	Surface modeling
Option C:	Constructive Solid Geometry (CSG)
Option D:	Parametric modeling
3.	With reference to the manual part programming of CNC Machine, Tool change and coolant off refers to:
Option A:	M03 and M07
Option B:	G03 and G07
Option C:	M06 and M09
Option D:	M06 and M08
4.	For a billet having dia 40mm and tool is set at postionZ-1 and X40 to take 1mm facing cut , followed by ejection of 2mm ,the line of code would be (Given:zero,zero of the work part is Set at center and last free end of the billet and using dimetral format,absolute CS)
Option A:	N200 G01 X-1 F100; N300 G00 Z2;
Option B:	N200 G00 X0 F100; N300 G00 Z2;
Option C:	N200 G01 X0 F100; N300 G01 X2;
Option D:	N200 G00 X-1 F100; N300 G01 Z2;
5.	Choose the correct sequence to generate prototype.
Option A:	STL file - CAD Model - Slicing - Post processing - Build object
Option B:	CAD Model - STL file - Slicing - Build object - Post processing
Option C:	CAD Model - Slicing - STL file - Post processing - Build object
Option D:	CAD Model - STL file - Post processing - Build object - Slicing
6.	For a Bezier curve, having 5 control points $P_0P_1P_2P_3P_4$, and having value of parameter "u" as, "0" at P_0 and "1" at P_4 , the resulting equation of a this Bezier

	curve will be,
Option A:	$P(u) = P_0(1-u)^4 - 4(P_1)(u)(1-u)^3 - 6(P_2)(u)^2(1-u)^2 - 4(P_3)(u)^3(1-u) - P_4(u)^4$
Option B:	$P(u) = P_0(1-u)^4 + 4(P_1)(u)(1-u)^3 \quad + \quad 6(P_2)(u)^2(1-u)^2 + 4(P_3)(u)^3(1-u) + P_4(u)^4$
Option C:	$P(u) = P_0(1+u)^4 + 4(P_1)(u)(1+u)^3 \quad + \quad 6(P_2)(u)^2(1+u)^2 + 4(P_3)(u)^3(1+u) + P_4(u)^4$
Option D:	$P(u) = P_0(1-u)^4 + 4(P_1)(u)(1-u)^3 - 6(P_2)(u)^2(1-u)^2 - 4(P_3)(u)^3(1-u) + P_4(u)^4$

7.	The Z coordinate of a 3D point A(9, 12, 15, 3) is
Option A:	3
Option B:	5
Option C:	12
Option D:	15

8.	In which process solid wire is used as the medium for building a solid body layer by layer?
Option A:	Stereo-lithography Approach (SLA)
Option B:	Selective Laser Sintering (SLS)
Option C:	Fused deposition modeling (FDM)
Option D:	Laminated object manufacturing (LOM)

9.	Tool is currently at point A and now it has to travel from Point A to B in a circular path, in clockwise direction, with radius of 10 mm. The coordinate position of source Point A is (50,50) and coordinate position of destination Point B is (60,40), and the programming is in absolute positioning system. Then the command for this movement would be,
Option A:	G03 X60 Y40 R10;
Option B:	G02 X40 Y60 R10;
Option C:	G02 X60 Y40 R10;
Option D:	G03 X40 Y40 R10;

10.	Standard file format to be used for Medical Imaging is
Option A:	STL
Option B:	STEP
Option C:	DICOM
Option D:	IGES

Q2 (20 Marks=5MX4)	Solve any Four out of Six (5 marks each)
A	Compare between analytical and synthetic curves.
B	Explain the working principle of Cone Beam CT with its advantages and disadvantages.
C	Draw and explain product life cycle with CAD/CAM.
D	Explain augmented reality and virtual reality along with its examples.
E	Explain any turning canned cycle with appropriate example used in Part Programming.
F	Explain wire frame modeling and compare with solid modeling.

Q3 (20 Marks =10Mx2)	Solve any Two Questions out of Three 10 marks each
A	Construct a Bezier Curve of order three with four vertices of the control polygon $P_0(3,4)$, $P_1(4,7)$, $P_2(6,7)$, $P_3(5,4)$. Generate at least five points on the curve.
B	A triangle PQR with vertices P (2,2), Q (5,2) and R (4,7) is to be reflected about the line y=0.5x+3. Determine: (i) the concatenated transformation matrix and (ii) the coordinates of the vertices for a reflected triangle. Show the original triangle and reflected triangle on the graph paper.
C	A triangle ABC having vertices A (10, 5), B (20, 15) and C (25, 30) is rotated by 40 degree CCW about a point P (5, 5). Determine the composite transformation matrix and the new coordinates of the triangle.

Q4. (20 Marks)	
A	**Solve any Two** **5 marks each**
i.	Explain the scope of the Virtual Manufacturing.
ii.	Explain Magnetic Resonance Imaging with its advantages, disadvantages and applications.
iii.	Explain the basic steps in Rapid prototyping process.
B	**Solve any One** **10 marks each**
i.	Write the complete Manual Part Program using G & M codes to machine the outline of geometry for the part as shown in figure. The thickness of the plate is 3mm thick. The end mill is 10 mm in diameter. Assume suitable speed and feed for machining parameters.
ii.	Explain in brief with neat sketch Fused deposition Modeling along with its advantages, disadvantages and applications.

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