Duration: 3hrs **[Max Marks: 80]**

N.B.: (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

1 Attempt any FOUR **[20]**
a What are the applications of 3D solid CAD model.
b Determine the coordinate of a 3D point P (5, 7, 9) when rotated by 30 degree in CCW direction about Z axis.
c Explain the use of RP in biomedical field.
d Briefly explain the elements of NC Machine Tool System with neat sketch.
e Compare Bezier Curve and B-Spline Curve.

2 a A cubic Bezier curve is defined by the control points as (20,20), (60,80), **[10]** (120,100) and (150, 30). Find the equation of the curve and its midpoint.
b Explain Fused Deposition modelling with its advantages, disadvantages and **[10]** applications.

3 a A triangle PQR with vertices P (2,5), Q (6,7) and R (2,7) is to be reflected about **[10]** the line y=0. 5x+3.Determine (i) the concatenated transformation matrix and (ii) co-ordinates of the vertices for the reflected triangle.
b Explain the major steps involved in rapid prototyping, list the various rapid **[10]** prototyping techniques and explain any one of them with neat sketch in brief.

4 a Explain in brief the elements of CNC machine tool system. Write down **[10]** advantages, limitations and applications of CNC machine tool system.
b Write short note on 3D printing with neat sketch. **[10]**

5 a Write complete part programing for the forged component shown in following **[10]** figure by taking finishing cut of 1 mm.
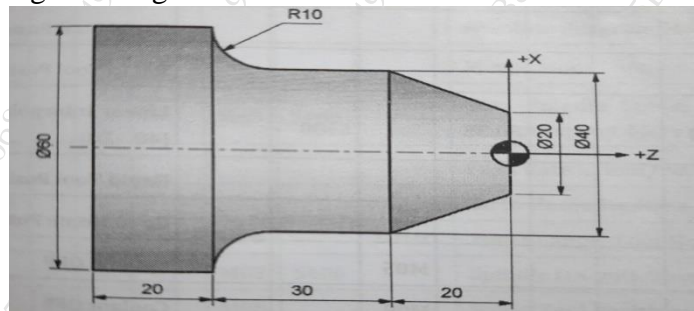
b Explain the process of obtaining CAD solid model of body parts using CT output **[10]** data.

6 a Explain in brief Augmented Reality (AR) and Virtual Reality (VR). **[10]**
b Explain the concept of homogeneous co-ordinate system and its significance. **[10]**

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