21/05/2025 SE MECHANICAL SEM-IV C-SCHEME CAD/CAM QP CODE: 10081222

**Duration: 3 Hours** **Max. Marks: 80**

**N.B. (1) Question No.1 is Compulsory**
**(2) Attempt any three questions out of remaining five questions.**
**(3) Figures to the right indicate full marks.**
**(4) Assume suitable data, if required and state it clearly.**

**Q. 1** Solve **ANY FOUR** **[20]**

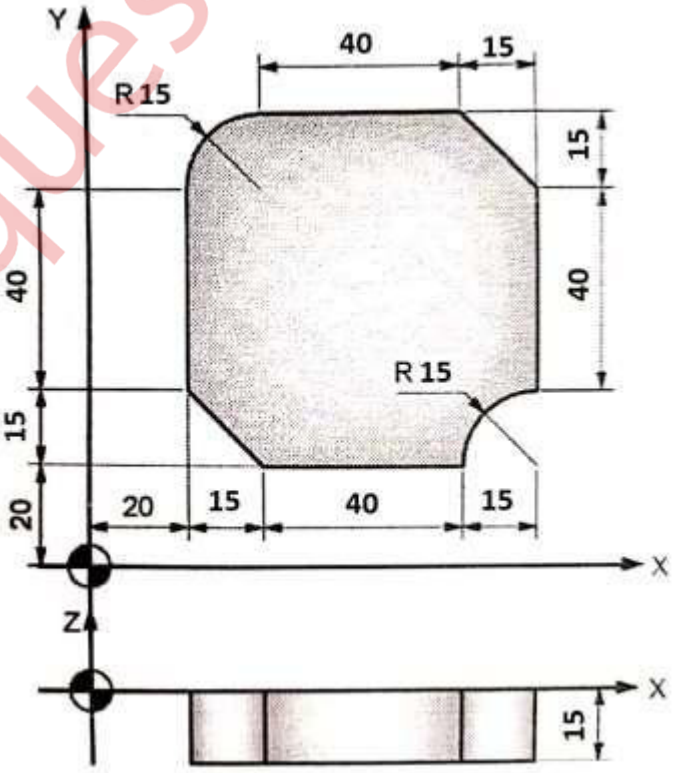
a What is the significance of CAD/CAM in the product life cycle?
b What are 2D transformation matrices for i) Translation ii) Rotation iii) Scaling iv) Mirroring.
c List the advantages, disadvantages, and applications of MRI scan.
d Explain at least 5 Standard G and M codes need to be included in the beginning and ending of any general program.
e Explain basic steps in rapid prototyping process.
f Write short note on scope of Virtual Manufacturing.

**Q. 2** a Explain working principle, application, advantages & disadvantages of Stereolithography Apparatus (SLA) **[10]**

b A triangle PQR has its vertices P(0,0), Q(4,0) and R(2,3). It is translated by 4 units in X direction and 2 units in Y direction. It is then rotated by 90 degree in anticlockwise direction about the new position of point R. Find the vertices of the triangle. **[10]**

**Q. 3** a i) Compare analytical and synthetic curves. **[5]**
ii) What are the applications of 3D solid CAD model. **[5]**

b. Write a CNC part program using G and M codes for contouring a component as shown in following figure having thickness 15 mm. Assume suitable data if needed. **[10]**

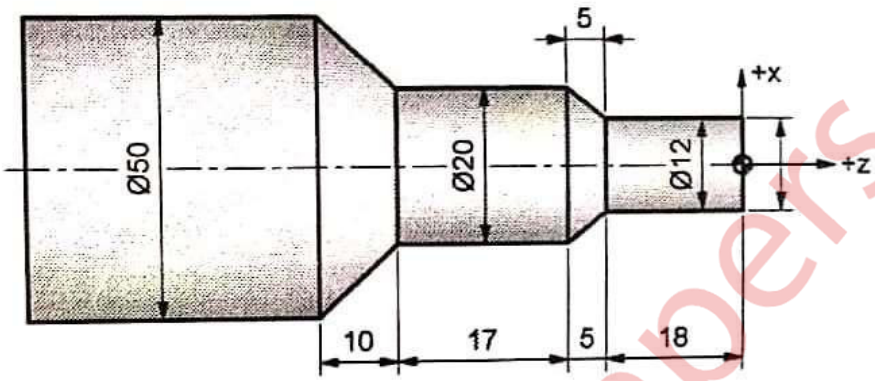


**Q. 4** a Explain the significance of medical scan data in biomedical modeling. How are medical scan data acquired and processed for further analysis? **[10]**

b A Hermite cubic spline is defined by points (1,1) and (6,5), having tangent vectors as (0,4) and (4,0). Find the coordinates of the mid-point and slope at the same point. **[10]**

**Q. 5** a Explain the working of Cone Beam CT with its advantages and disadvantages. **[10]**

b Write a manual part program for the finishing the following component as shown in figure. Illustrate the meaning of each code used in the program and the tool movement by showing the tool path. Assume suitable data if needed. **[10]**




**Q. 6** a Compare SLA, SLS, 3D Printing, FDM, and LOM in terms of their working principles and capabilities. **[10]**

b Discuss the potential challenges and limitations of Virtual Manufacturing. **[5]**

c Explain the socio-economic aspects of Virtual Manufacturing. **[5]**

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