

Note:

1. Question 1 is Compulsory
2. Solve any three from remaining five
3. Figures to right indicate full marks
4. Assume suitable data if necessary

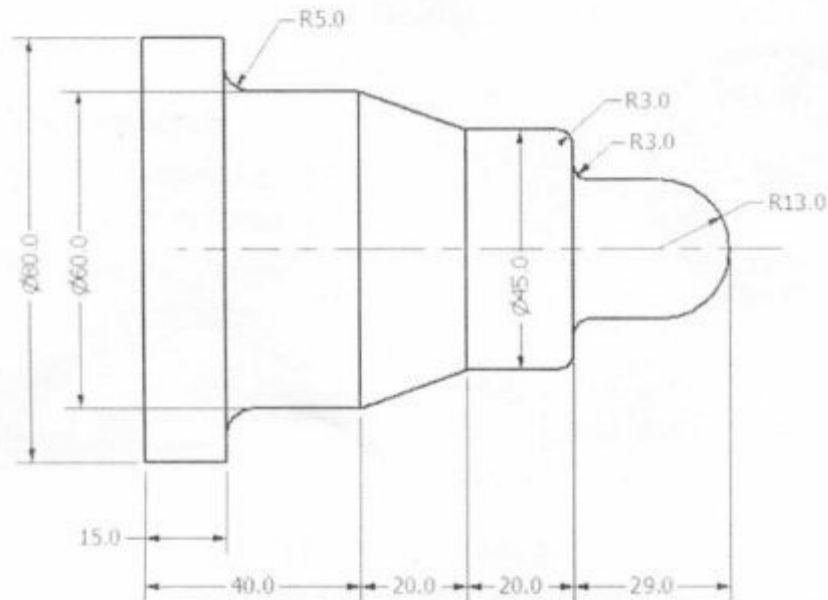


Question

Marks

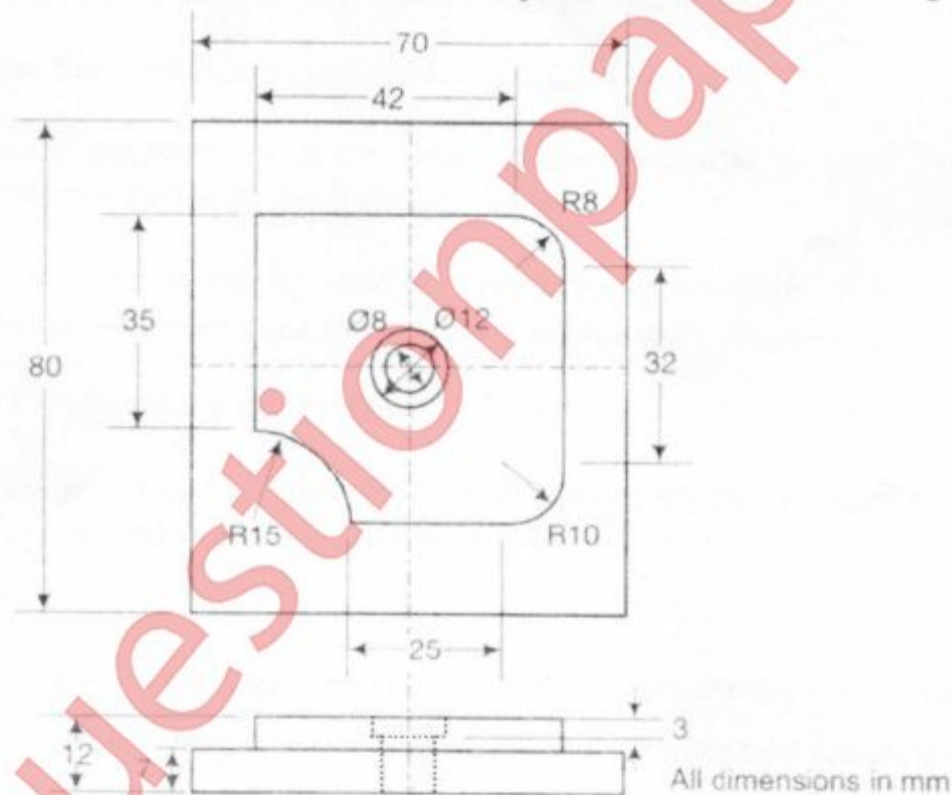
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|-----|--|----|
| Q.1 | a) Explain the convergence in FE analysis.   | 5  |
|     | b) Explain application of RP in MEMS.  | 5  |
|     | c) Explain the significance of Graphic Standards.  | 5  |
|     | d) Briefly explain the advantages and disadvantages of NC machines.  | 5  |
| Q.2 | a) A triangle PQR with vertices P(2,5), Q(6,7) and R(2,7) is to be reflected about the line $y=0.5x+3$ . Determine the final transformation matrix and the coordinates of the reflected triangle.  | 12 |
|     | b) How do you set work part zero, zero on a CNC machine?   | 04 |
|     | c) What are the feedback devices used in NC/CNC machine?   | 04 |
| Q.3 | a) Write a program in C++ using object oriented concept for 2D transformation which includes function for rotation.  | 08 |
|     | b) What do you mean by complex engineering problem? With suitable example, explain the complexities involved and the tools chosen to solve it.   | 08 |
|     | c) Enlist CIM hardware and software.   | 04 |
| Q.4 | a) What do you mean by Synthetic curves? What are the different types of synthetic curves and their continuity conditions?   | 10 |
|     | b) Write a manual part program in G - M codes for generating a part as shown in Figure 1 (on next page). Size of raw material is $\phi 85\text{mm}$ by $112\text{mm}$ . Explain each code. Assume suitable data if required. Use <b>canned cycle code</b> for Facing, Turning, and Taper Turning operations. | 10 |

{TURN OVER



(Fig. 1 The component to be machined. All dimensions are in mm.)

- Q.5 a) Explain the steps used in Rapid Prototyping process. 10  
 b) Write a complete APT part program to machine the outline of the geometry shown in fig.2 the top view up to a depth of 5 mm in one cut. The end mill used is 20 mm diameter. Assume suitable speed and feed for machining. Fig.2



(Fig.2 The component to be machined.)

- Q.6 Write a note on the following (any four) 20  
 a) Cohen-Sutherland Clipping Algorithm.  
 b) Major steps of FEM.  
 c) Fused Deposition Modelling(FDM)  
 d) Absolute versus incremental positioning in NC Machine tools.  
 e) Affine Transformation and its properties.