

Time allowed: 3 Hours

Max. Marks: 50

**NOTE:** Attempt five questions in all, including Question No. 1 (Section-I) which is compulsory and selecting two questions each from Section B- C.

x-x-x

**Section A**

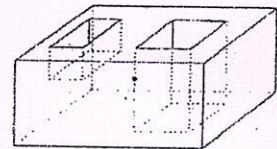
- |    |      |  |     |
|----|------|--|-----|
| 1. | i.   | Describe tool length compensation? Write its code also.                      | 5x2 |
|    | ii.  | Differentiate explicit vs. implicit equations.                               |     |
|    | iii. | Write the equation of Bezier curve having 3 control points.                  |     |
|    | iv.  | What is the difference between 2.5 d and 3d Cad Model?                       |     |
|    | v.   | Differentiate between rapid and feed mode and mention corresponding G codes. |     |

**Section B**

- |    |     |   |   |
|----|-----|---|---|
| 2. | i.  | What is shear transformation? Explain 2d shear transformations by taking suitable examples and neat sketches.   | 5 |
|    | ii. | An object with vertices A (2, 2), B (4, 4), C (6, 2) and D (4, 6) is rotated about A by 90° counterclockwise direction followed by reflection about y=x line. Find and plot the initial and final position of the object. | 5 |
| 3. | i.  | Find the midpoint of a hermite cubic curve with two end points as (1, 1) and (6, 5) and corresponding tangent vectors as (0,4) and (4, 0).  | 7 |
|    | ii. | What is parametric representation of curves? Why it is more used compared to non parametric representation.   | 3 |
| 4. | i.  | What are knot values in B-Spline curve and how they affect the curve shape? How continuity, knot values and segments of B-spline curves are determined. Explain.  | 5 |
|    | ii. | What is geometrical modeling? Differentiate between Solid Modeling and Wire Frame Modeling  | 5 |

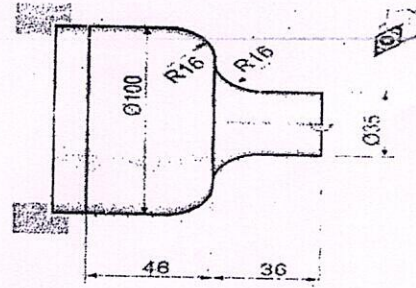
**Section C**

- |    |     |  |   |
|----|-----|--|---|
| 5. | i.  | How CNC machines can be classified based on motion control systems. Describe with suitable examples.                                     | 5 |
|    | ii. | Describe parametric representation of surfaces? Discuss the representation of ruled surface.   | 5 |
| 6. | i.  | What is the importance of Euler's Formula in b-rep? Find the number of edges for the solid as shown in the diagram using Euler's Formula | 5 |
|    | ii. | What is APT part programming. Briefly explain the concept of drive surface and check surface in APT with example.                        | 5 |





7. i. Write a part program for turning the component on CNC lathe as shown in diagram. Write suitable assumptions also.



- ii. What is adaptive control. Discuss the significance of adaptive control in CNC machines.

X-X-X