

Time allowed: 3 Hours

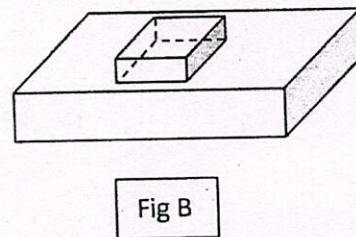
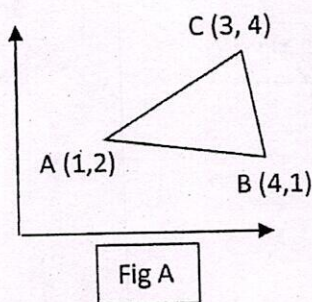
Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 (Section-I) which is compulsory and selecting two questions each from Section B- C. Make assumptions wherever you feel it necessary or in case of missing data.

x-x-x

Section A

1. Write brief answers to the following questions. (2 x 5 = 10)
- Name the steps in the general design process.
 - Briefly explain the types of automation used in manufacturing?
 - State with the help of a neat sketch, right hand rule for translational axis notation in CNC.
 - Write down parametric equation of a circle with center point at (2, 3) and radius of 8.
 - Write NC codes and syntax for the following:
- Dwell – Tool change –
2. What are the types of geometric modeling techniques? Explain with the help of neat sketches CSG technique. (10)
3. i. A geometric figure shown in figure A is to be rotated about point A by an angle of 60 degree anticlockwise. (7)
- List the transformations required for this rotation.
 - Find out the combined transformation matrix using homogeneous co-ordinates.
 - Find out co-ordinates of the transformed figure.
- ii. A line with the start point of (1,1) and end point of (4,5) is to be scaled by factor of 2. Find out transformed end points of the line. (3)



Section B

4. i. A Bezier curve is to be drawn with the help of the following four control points (2,4), (4,5), (9,5) and (10, 2). Write down equation of the Bezier curve. (4)
- ii. Also find midpoint of the Bezier curve. (2)
- iii. Find out equation of the Hermite curve with start point (2,4), end point (10,2), start tangent (1,3), end tangent (2,-1). (4)

Section C

5. a. With the help of Euler's formula, check the validity of the solid shown in figure B. (4)

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(2)

- b. Explain with the help of a suitable example, surface of revolution. Write its parametric equation. Also use this equation to find out parametric equation of the surface of revolution formed by a line on x-y plane with start point (1,2), end point (6,7) when rotated about the y - axis. (6)
6. a. Explain with the help of a part example, the APT computer aided part programming method. (5)
- b. Explain with the help of a suitable example the concept of canned cycle in CNC programming. (5)
7. a. Write down the process planning steps for machining a prismatic job shown in figure C. Also write its part program alongside the process planning steps indicated on it. Present the steps of the part program so that the reader easily understands it, also clearly indicating work zero and axis notations. The block size of the stock is 120 x 120 x 30. Take maximum depth of cut for milling of channels to be 2.5 mm. Make suitable assumptions wherever required. All dimensions are in mm. (7)
- b. Briefly explain adaptive control of CNC machines. (3)

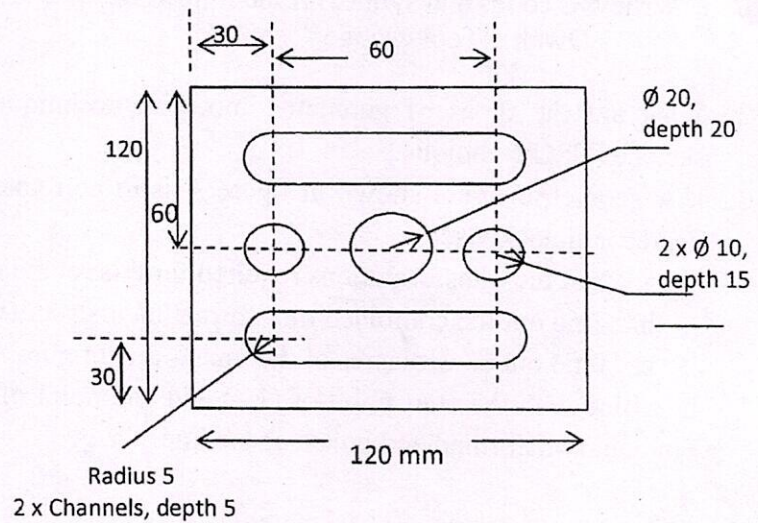


Fig C

x-x-x