U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

May 2023 Semester End Make-Up Examinations

Programme: B.E. **Semester: V**
Branch: Mechanical Engineering **Duration: 3 hrs.**
Course Code: 20ME5DCCCR **Max Marks: 100**
Course: CAD/CAM and Robotics **Date: 18.05.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may suitably be assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

UNIT - I

1 a) Describe (in brief) different phases of product cycle with the help of neat block diagram. **12**

b) The vertices of a triangle are situated at points (15, 30), (25, 35) and (5, 45). Find the coordinates of the vertices if the triangle is first rotated 10° counter clockwise direction about the origin and then scaled to twice its size. **08**

UNIT - II

2 a) Fit a cubic Bézier curve for the following control points: (1, 3), (4, 5), (5, 7) and (8, 4). Calculate the points at u = 0.4 and 0.6. **06**

b) Discuss Bernestein Polynomials and write the cubic Bezier curve equation. **07**

c) Discuss the properties of B-splines that are useful for CAD applications. **07**

OR

3 a) Write the short note on Faceted B-rep. **06**

b) Verify Euler equation for solid shown in Fig. 1. **06**

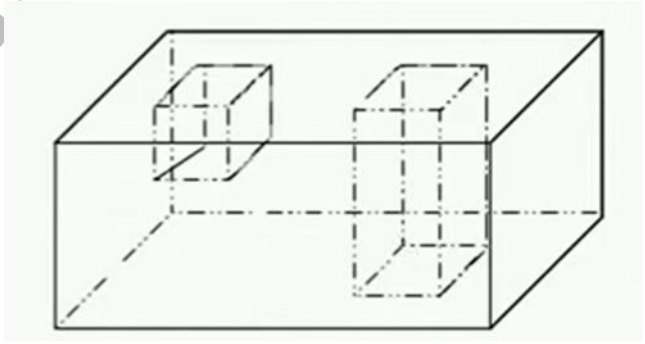

Fig. 1

c) Construct a CSG tree for a solid object shown in Fig. 2.and Fig.3 **08**

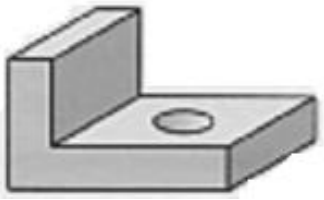

Fig.2

Fig.3

UNIT - III

4 a) With the help of a neat block diagram, explain the architecture of CNC machine. **07**

b) Explain how X-axis & Y-axis are designated in CNC machines. **07**

c) Discuss the benefits of Stepper motors for motion control applications. **06**

UNIT - IV

5 a) Write manual part programming with comments for the turning model as shown in Fig. 4. Data for Thread M24x3, pitch 3mm, core 20.3194mm, depth 1.840mm. **12**

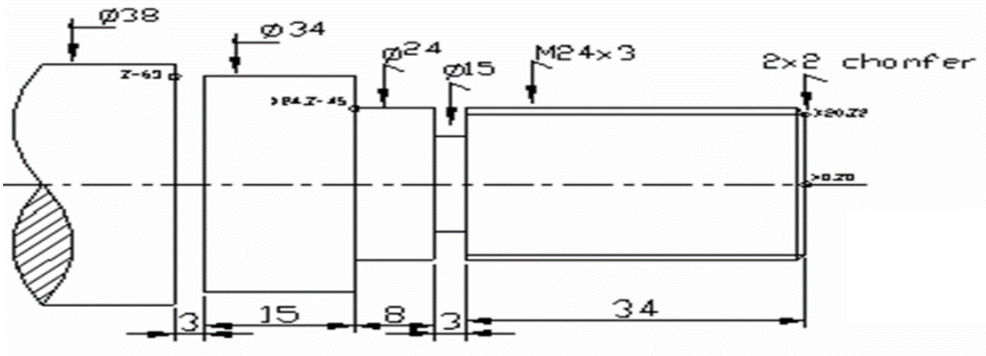

Fig. 4

b) Write a complete APT part program for the component shown in Fig. 5. Consider following parameters: **08**

i. Feed Rate is 5.39 inches per minute;
ii. Spindle speed is 573 rev per minute;
iii. Coolant is to be used to flush the chips;
iv. the cutter dis is to be 0.5 inches;
v. The tool home position is (0,-1,0)

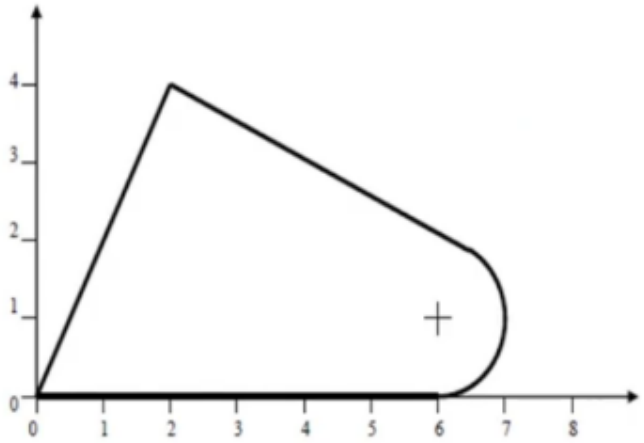

Fig.5

UNIT - V

6 a) Describe end effectors with respect to robots. **10**

b) Explain in detail with neat diagram the polar and cylindrical configuration of a robot. **10**

OR

7 a) Describe sensors with respect to robots. **12**

b) Discuss programming language with some example of programming statements for computer-controlled robots **08**

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