

B. PRODUCTION 4TH YEAR 2ND SEMESTER EXAMINATION, 2017

COMPUTER INTEGRATED MANUFACTURING

Time: Three hours

Full Marks: 100

Answer ten questions taking at least eight from group-A

GROUP - A

1. Show the major components of a CNC lathe or milling machine indicating the locations of actuators and internal sensors for the various joints and the electrical interface between them & the various components of the CNC machine controller. 10
2. Show how the rotation matrix is obtained for the new position of any point after rotation of that point only about the X axis by an angle θ clockwise. 10
3. Show the typical configuration of hardware components in a CAD system. Write the basic differences between Constructive Solid Geometry (CSG) modeling and Boundary Representation (B-rep) modeling methods 4+6
4. State the basic differences between CNC machine tools and conventional Automatic machine tools. Why is the use of CNC machine tools and robots justified in batch production where there are changes of products in batches and wide variety of products? 5+5
5. Discuss the differences between point-to-point, straight line (paraxial) and continuous path (contouring) control in the context of CNC machine tool with examples. 10
6. With neat sketches show the axis system in CNC lathe and CNC milling machine. Also discuss on the generalized axis system in CNC Machine Tools. 10
7. What are the basic differences between manual part programming and computer aided part programming for CNC m/c tools? What are the basic differences between Post Processor and APT Processor? What do you mean by drive surface, part surface and check surface in CNC part programming? 3+3+4
8. What do you mean by 'location variable' in a robot language? Why is 'TEACHING' required? Write a robot program in VAL-II for picking objects from a fixed location L1 and to place them at a fixed location L2 50 times. 3+2+5
9. Write a robot program in VAL-II for a de palletizing operation, where a robot has to pick up 30 objects from a pallet, and to place them in a fixed location. The pallet has an array of 5 rows and 6 columns. The rows and columns are parallel to x-axis and y-axis respectively, and are 30 mm & 40 mm apart respectively. 10

[Turn over

- 10 Write a manual part program for the finishing cycle of turning of a job as shown in fig. 1 to be machined in a CNC lathe. (STPT indicates start point, all dimensions are in mm) 10

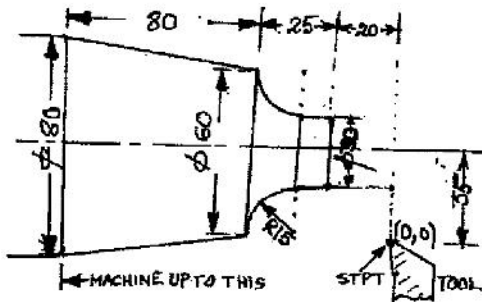


Fig. 1

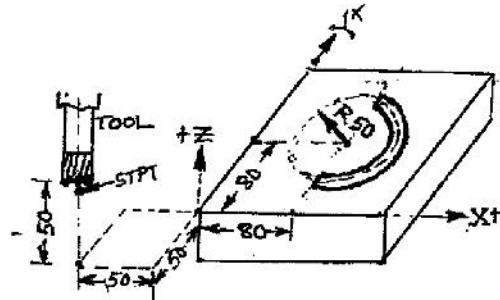


Fig. 2

11. Write a manual part program to machine a semicircular slot as shown in fig. 2 in a CNC milling machine using an end mill cutter. 10
12. Write an APT program for drilling holes (depth 5 mm) in a job shown in fig.3 using a CNC drilling machine. 10

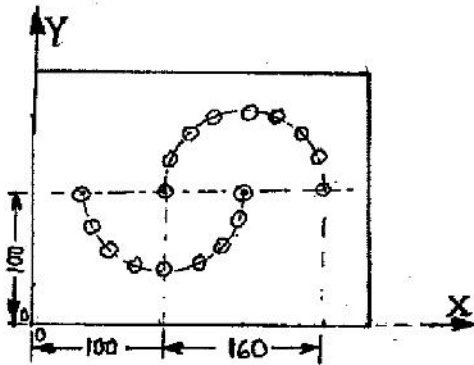


Fig. 3

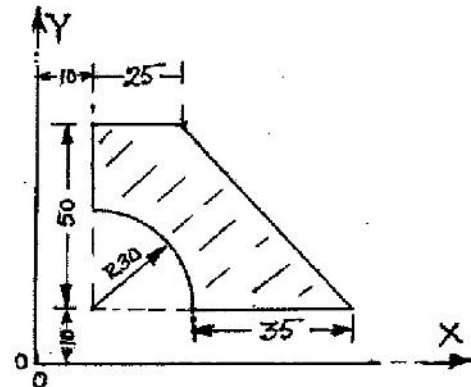


Fig. 4

13. Write a program in APT language for milling the edges of a job shown in fig. 4 using a CNC milling machine using an end mill cutter. 10

GROUP - B

14. Discuss about the physical activities and information processing activities in CIM. Show the relationship with a model. What are the hardware and software elements required for CIM? 10
15. Describe Computerized Machine ability Data System implemented in CAPP, and explain how it helps in solving the problem of selecting proper cutting speed and feed. What are the two different types of Computerized machinability Data System? 8+2
16. Why is aid of computer necessary for MRP in a CIM environment? Explain the needs for Automated Process Planning and the use of Computer for this purpose. 5+5
17. Write down the objectives of Computer Aided Quality Control (CAQC)? What is Computer Aided Inspection? Discuss about some computer aided non-contact type inspection methods. 4+2+4
18. What are the different types of Computer Aided Process Planning (CAPP) methods? Explain any one of them 2+8