# B. PRODUCTION ENGINEERING 4TH YEAR 2ND SEMESTER EXAMINATION - 2019

## 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. 4+6

2. 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

3. 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

4. Write a manual part program for the finishing cycle of a turned job as shown in fig. 4 to be machined in a CNC lathe. 10

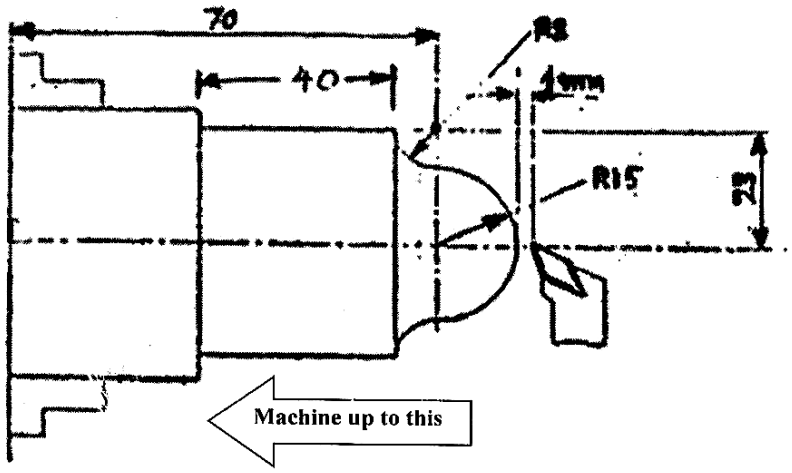


**Fig. 4**

[ Turn over

5. Write a manual part program to drill four holes (depth = 5 mm) as shown in fig.5 using a CNC machine. 10

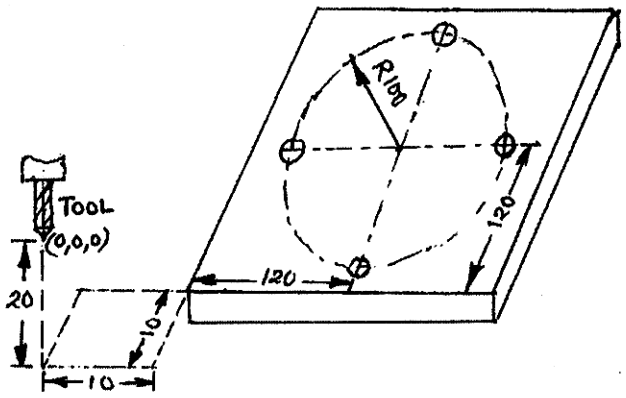


**FIG. 5**

6. 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

7. Write an APT program for drilling holes (depth is 5 mm and dia. is 3 mm) in a job shown in fig.7 using a CNC drilling machine. 10

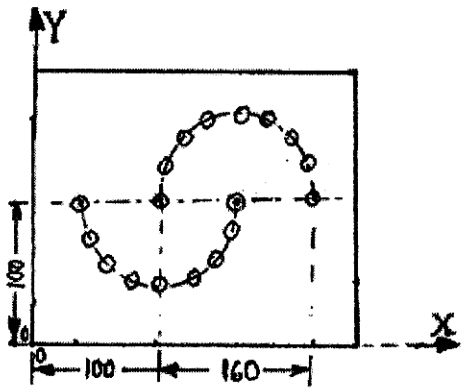


**Fig. 7**

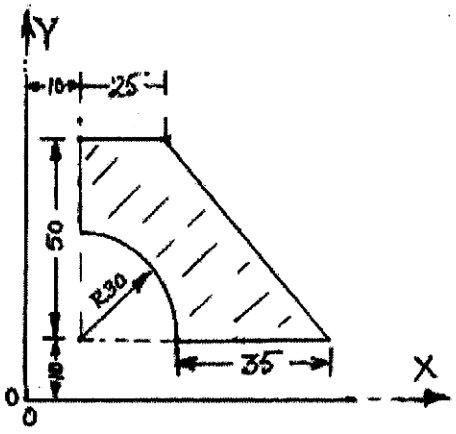


**Fig. 8**

8. Write a program in APT language for milling the edges of a job shown in fig. 8 using an end mill cutter in a CNC milling machine. 10

9. 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. 10

10. 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 $\Theta$ clockwise. 10

11. What parameters are required for defining a location variable in world coordinate system and joint coordinate system in VAL-II? What do you mean by point-to-point and continuous path motions in robots. Give examples of each type of motion commands in VAL II. 4+4+2

12. Write a robot program in VAL-II for a robot to pick up 30 objects from a fixed location, and to place them in a pallet in an array of 5 rows and 6 columns. The rows and columns are parallel to x-axis and y-axis respectively, and are 200 mm and 150 mm apart respectively. 10

## GROUP - B

13. 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? 8+2

14. Write down the objectives of Computer Aided Quality Control? What is Computer Aided Inspection? Discuss about some computer aided non-contact type inspection methods. 4+2+4

15. What are the different types of Computer Aided Process Planning (CAPP) methods? Explain any one of them. 2+8

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. 10

17. Describe Computerized Machinability 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? 5+5