

- (e) Discuss the factors that must be considered in the selection of transfer-device.
- (f) Give a list of some of the typical micro-mechanical systems. What are their areas of applications ?

5 Attempt any two parts :

10x2=20

(a) Give atleast 5 applications of robots in each of the following operations :

- (i) Materials handling and transfer
- (ii) Processing
- (iii) Assembly and inspection
- (iv) Storage and retrieval

(b) Explain the methods of powered lead-through and manual lead-through programming of robots. What problems are encountered in powered-lead through programming ?

(c) In the context of robotic arm joints, explain what is meant by control resolution, accuracy and repeatability ?

One of the joints of a certain industrial robot has L Type joint with a range of 0.5m. The bit storage capacity of the robot controller is 10 bits for the joint. The mechanical errors form a normal distribution with mean = 0 and SD = 0.06 mm. What is the repeatability of this joint ?



Printed Pages : 4

TME-702

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0401

Roll No.

B. Tech.

(SEM. VII) EXAMINATION, 2008-09
COMPUTER AIDED MANUFACTURING

Time : 3 Hours]

[Total Marks : 100

- Note :
- (i) All questions carry equal marks.
 - (ii) Attempt all questions.
 - (iii) Any data not given can be assumed suitably, if required.

I Attempt any four parts :

5x4=20

- (a) In factory operations, list the situations where manual labor is usually preferred over automation.
- (b) Explain the basic differences between NC and CNC machines.
- (c) Discuss why CNC machines have better accuracy and productivity compared to conventional machine tools.
- (d) List out the advantages and disadvantages of NC systems. Under what circumstances use of NC would be preferred ?
- (e) With the help of a neat sketch, describe the principle of open-loop and closed-loop positioning systems. How machine tool feed control is achieved in such cases ?



(f) Give a list of advanced automations functions available in some of the CNC machines. Give a brief description of atleast two of the functions.

2 Attempt any two parts : 10x2=20

- (a) List the advantages of computer-aided part programming. What factors must be considered in the selection of a programming system? Discuss.
- (b) Write a program in word-address format, to drill 3 holes in a plate, 15mm thick as shown in Fig. 1. Feed = 150mm/min, drill speed = 1400 rpm. Drill diameter = 10mm.

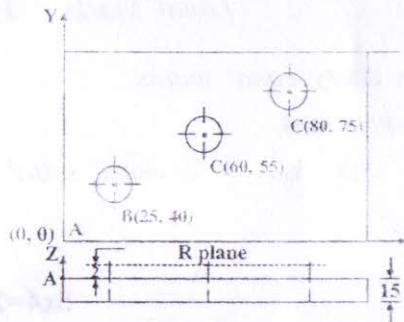


Fig. 1

- (c) Prepare an APT program for milling a mild steel plate as shown in Fig. 2. Milling cutter size = 20 mm dia., Set point Co-ordinates 0, 0, -25. Spindle speed = 2000 rpm, feed = 300 mm/min.

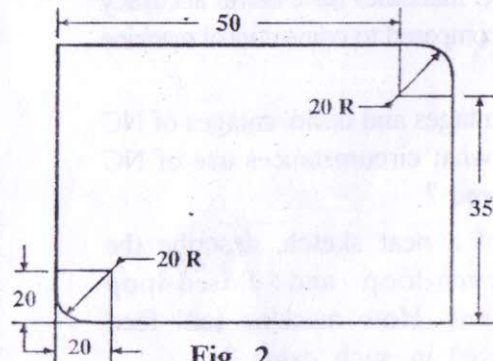


Fig. 2

3 Answer any four parts : 5x4=20

- (a) Briefly describe the function of DC servo-drive in CNC machine tools.
- (b) Discuss the advantages and disadvantages of stepper motors. Why separate motors are used for driving different axes?
- (c) Discuss the basic requirements of feed-drives in CNC machine tools.
- (d) Describe how a precise control of servo-motor speed is achieved through the use of tachometers.
- (e) Discuss the advantages, disadvantages and possible areas of applications of adaptive controls for NC machine.
- (f) In order to machine a semi-circular plate, $R = 50\text{mm}$, Counter-clockwise interpolation is to be performed. Using the following data specify the co-ordinates of the first 4 vertices of the polygon approximating the desired circle.
Center point co-ordinate = 25, 25
Inner tolerance = 0.1mm.

4 Answer any four parts : 5x4=20

- (a) Define what is group-technology. Enumerate its benefits and disadvantages.
- (b) Describe the technique of production flow analysis as employed for part grouping. What are its benefits over coding and classification?
- (c) Differentiate between cellular manufacturing and flexible manufacturing. Indicate their areas of application.
- (d) What are the advantages of CAPP? Describe the salient features of variant type of CAPP system.

