(e) Discuss the factors that must be considered in the slection 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 capaicty 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 ?

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(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.

1 Attempt any [illegible] **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.

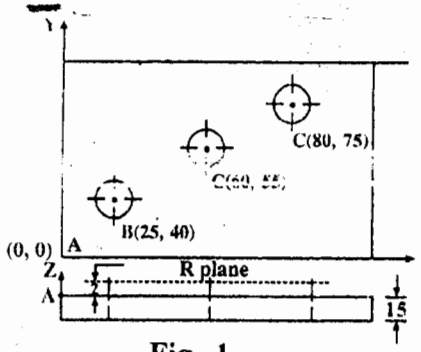

Fig. 1

(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.

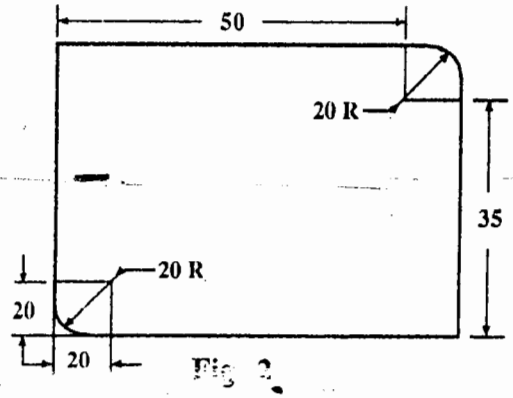

Fig. 2

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 seperate 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 [illegible] 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 past 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