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

PAPER ID : 2978/2788 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. VII) ODD SEMESTER THEORY EXAMINATION 2012-13

COMPUTER AIDED MANUFACTURING

Time : 3 Hours *Total Marks : 100*

Note :— *(1) Attempt* ***all*** *questions.*

(2) All questions carry equal marks.

1. Attempt any **FOUR** parts of the following :— **(4×5=20)**

   (a) Define Computer Aided Manufacturing (CAM). In what way have the computer had an impact on manufacturing ? Explain direct and indirect role of computers in manufacturing.

   (b) What is automation ? "Numerical control can be defined as a form of programmable automation." — Explain this statement. Why complete automation is not acceptable to Indian Society ?

   (c) What is Numerical Control ? Explain the problems that are associated with conventional NC. How it can be overcome in CNC ?

   (d) Discuss the various types of NC motion control system with the help of suitable diagrams.

   (e) Discuss the factors by which accuracy and productivity of NC machines can be increased.

2. Attempt any **TWO** parts of the following :— **(2×10=20)**

   (a) (i) What is NC part programming ? Discuss the procedure for developing manual part program and compare it with the computer-aided part programming with the help of suitable diagram.

(ii) In an NC drilling operation, two holes must be drilled in sequence at the following coordinate locations;

Hole 1 : x = 2.000 y = 2.500

Hole 2 : x = 4.000 y = 2.500

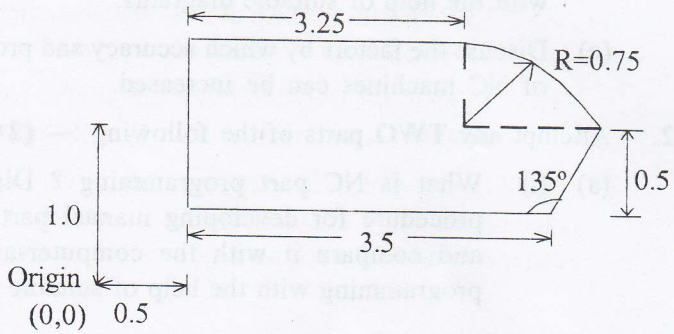
No preparatory or miscellaneous words are required. Tool is changed manually, so that no t-word is required. The holes are to be drilled to half inch diameter at 75 sfpm and 0.005 inch/rev. Write the two instruction block in each of the three block formats.

(b) (i) What are three names for the three surfaces that the cutter moves, in a start up statement ? Is it important that these surfaces must be listed in any kind of order in the start up statement ? What happens if they are not ?

(ii) Explain clearly between fixed cycles/canned cycles and subroutines/subprograms. Explain how canned cycles can reduce the programming efforts ?

(c) (i) Explain clearly the role of computer in computer assisted part programming.

(ii) Write the APT geometry statements necessary to fully define the component illustrated in the figure below. Attempt to keep number of statements to a minimum. Also write motion statements. Generate any additional check lines if necessary. Start from the origin and proceed anticlockwise around the workpiece, also sketch the path of the tool.



3. Attempt any **FOUR** parts of the following :— **(4×5=20)**

(a) Explain the logical block of information in a CNC part program. Which of the modes, constant RPM or constant cutting speed do you use for the machining of tapered surfaces ? Explain the effects of two modes on the surface finish.

(b) Describe the automatic speed control of DC motor with closed loop feedback with tachometer and develop the formula for angular speed.

(c) What is control system ? Differentiate between an open loop and closed loop control system. Explain the working of an NC machine having provision for velocity and positioning feedback.

(d) (i) A cylinder of 6.1″ in diameter is to be reduced to 5.9″ in one turning cut, with a feed of 0.006"/ revolution and cutting speed of 500 ft/min on a NC lathe.

Calculate the following :

programmed spindle speed in rpm, programmed feed rate and, metal removal rate.

(ii) Differentiate clearly between a CNC and DNC system. Explain the two alternative system configuration by which the communication link between the control computer and the machine tool in DNC.

(e) (i) Explain with the help of diagram/table, the principle of working of a circular interpolator.

(ii) Explain the following terms related to NC control system : Resolution, Accuracy and Repeatability.

(f) Under what conditions, an adaptive control is recommended ? Discuss the ACC and ACO types of adaptive control with help of suitable examples.

4. Attempt any **TWO** parts of the following :— **(2×10=20)**

(a) (i) Discuss the various types of transducers used for positioning feedback system.

(ii) What are the various methods for robot programming ? Explain the features of VAL or AML robot programming.

(b) Briefly explain the guidelines for implementing group technology. Explain the advantages achieved by group technology and its limitations.

(c) What are the problems associated with the traditional process planning system ? How these problems are overcome in automated process planning system ?

5. Attempt any **TWO** parts of the following :— **(2×10=20)**

(a) What are the various components of a computer integrated manufacturing systems (CIMS) ? Explain the key functions of CIMS.

(b) Differentiate clearly between a CNC machine and robot. Discuss the various types and generations of robots with applications.

(c) Explain the term 'Artificial Intelligence'. How is it used in an intelligent manufacturing system ?