

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

PAPER ID : 2978/2788 Roll No.

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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.

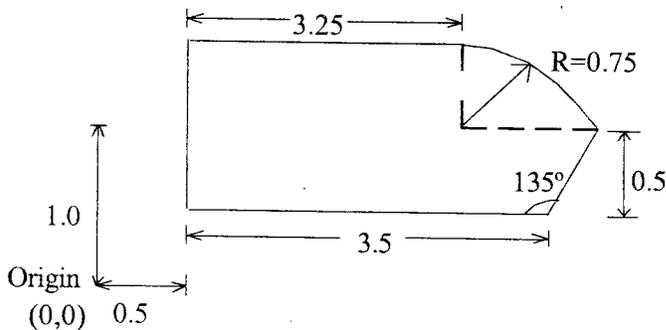
- (ii) In an NC drilling operation, two holes must be drilled in sequence at the following coordinate locations;

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.



EME031/EPL031/DLT-44277

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 ?