

B.Tech 7th Semester Exam., 2019

COMPUTER AIDED DESIGN AND
MANUFACTURING

Time : 3 hours

Full Marks : 70

Instructions :

- (i) The marks are indicated in the right-hand margin.
 (ii) There are **NINE** questions in this paper.
 (iii) Attempt **FIVE** questions in all.
 (iv) Question No. 1 is compulsory.

1. Answer the following as directed (any seven) : $2 \times 7 = 14$

(a) In a CAD package, mirror image of a 2D point $P(5, 10)$ is to be obtained about a line which passes through the origin and makes an angle of 45° counter-clockwise with the X -axis. The coordinates of the transformed point will be _____.

(Fill in the blank)

(b) What is peck drilling? How is it performed in CNC manual part programming?

(c) The tool of an NC machine is at (5, 5) and has to move along a circular arc from (5, 5) to (10, 10) while performing an operation. The centre of the arc is at (10, 5).

Write an NC block to perform the above mentioned operation.

(d) NC milling machine is an example of _____ positioning system.

(Fill in the blank)

(e) In a CNC program block, N001 G02 G90 X10 Z10 ..., G02 and G90, refers to what?

(f) In a 2D CAD package, clockwise circular arc of radius, 5, specified from $P1(15, 10)$ to $P2(10, 15)$ will have its centre at _____.

(Fill in the blank)

(g) The widely used computer architecture for CAD/CAM application is

- (i) mainframe-based system
 (ii) minicomputer-based system
 (iii) microcomputer-based system

✓(iv) workstation-based system

(Choose the correct option)

- (h) Which of the following is the recent neutral graphics standard?
- ✓ (i) GKS
 - (ii) IGES ✓
 - (iii) STEP
 - (iv) DXF
- (i) Write the direction of axes in a 3-axis CNC vertical machining centre.
- (j) Write the modes of operating CNC machines.
2. (a) What different methods are available for preprocessing while using CAD system in conjunction with an FEM software?
- (b) Explain different data models used in DBMS of CAD/CAM system. 7+7
3. (a) What are the steps to be carried out for solving a physical problem with the help of FEM software?
- (b) Explain the hardware elements of CAD system and classify CAD systems based on hardware platforms. 7+7
4. (a) Explain the transformation of points with the help of suitable examples.

- (b) Explain the concept of three basic Boolean operations used in solid modelling. Give neat sketches showing the effect of these operators on any two basic primitives. 7+7
5. (a) Explain the classification of different surfaces that can be used in geometric modelling applications.
- (b) Explain how you classify the various geometric modelling systems based on their capabilities. 7+7
6. (a) Find the radius and centre of a circle that is passing through three points (30, 30), (60, 30) and (50, 40).
- (b) What are the importances of standards in CAD/CAM systems? Explain any one neutral data format (IGES or STEP) in exchange of product model data. 5+9
7. (a) Explain open-loop and closed-loop control systems in numerical control machines with their applications.
- (b) Explain the concepts of 'floating datum' and 'set point' with reference to CNC part programming. What is their relationship? Explain how they are used in programming in ISO format with suitable examples. 7+7

8. (a) What are the types of AGV? Explain the AGV applications.
- (b) Explain different AGV guidance and navigation mechanisms with their advantages and limitations. 7+7
9. (a) Explain the factors to be considered in system design of AGV system.
- (b) Explain the advantages of AGVs over other material handling systems. 8+6
