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Subject Code:- AME0514

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**NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA**

**(An Autonomous Institute Affiliated to AKTU, Lucknow)**

**B.Tech**

**SEM: V - CARRY OVER THEORY EXAMINATION - APRIL 2023**

**Subject: Computer Aided Engineering**

**Time: 3 Hours**

**Max. Marks: 100**

**General Instructions:**

**IMP:** Verify that you have received the question paper with the correct course, code, branch etc.

**1.** This Question paper comprises of **three Sections -A, B, & C.** It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

**2.** Maximum marks for each question are indicated on right -hand side of each question.

**3.** Illustrate your answers with neat sketches wherever necessary.

**4.** Assume suitable data if necessary.

**5.** Preferably, write the answers in sequential order.

**6.** No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

**SECTION A**

**20**

**1. Attempt all parts:-**

- 1-a. The use of computer to control the operation of the production process is known as (CO1) 1
- (a) CAD  
(b) CAE  
(c) CAM  
(d) CAQ
- 1-b. CAD prepares 2D and 3D drawings which are (CO1) 1
- (a) Non digital  
(b) Digital  
(c) Both digital and non digital  
(d) None
- 1-c. Two types of graphical interaction are (CO2) 1
- (a) Partitioning and positioning  
(b) Partitioned and painting

- (c) Positioning and pointing
- (d) None of the above
- 1-d. Good graphics programming avoids the use of \_\_\_\_ operations whenever possible. (CO2) 1
- (a) Multiplications
- (b) Division
- (c) Floating point
- (d) Integer
- 1-e. Which of the following is not a synthetic entity? (CO3) 1
- (a) Hyperbola
- (b) Bezier curve
- (c) B-spline curve
- (d) Cubic spline curve
- 1-f. The boundary condition of Hermite curves are \_\_\_\_\_ (CO3) 1
- (a) two end-points and the two tangent vectors
- (b) two end-points only
- (c) two tangent vectors only
- (d) none of these
- 1-g. RGB is a (CO4) 1
- (a) Curve
- (b) Color system
- (c) Cubic spline
- (d) None of these
- 1-h. When projection lines are perpendicular to the view plane then such type of projection is called (CO4) 1
- (a) Parallel
- (b) Perspective
- (c) Orthographic
- (d) Oblique
- 1-i. Finite element method is also called (CO5) 1
- (a) Infinite element analysis
- (b) Frequency element analysis
- (c) Finite element analysis

(d) Partial element analysis

- 1-j. To solve the FEM problem, it subdivides a large problem into smaller, simpler parts that are called (CO5) 1
- (a) Finite elements
  - (b) Infinite elements
  - (c) Dynamic elements
  - (d) Static elements

**2. Attempt all parts:-**

- 2.a. Describe the computer graphics input and output devices. (CO1) 2
- 2.b. List the main types of 2D transformation. (CO2) 2
- 2.c. Tabulate the advantages and disadvantages of B-splines over Bezier curves. (CO3) 2
- 2.d. What is the purpose of solid modeling? (CO4) 2
- 2.e. What are different types of elements used in FEM? (CO5) 2

**SECTION B**

**30**

**3. Answer any five of the following:-**

- 3-a. Explain the working principle of Laser Printers with neat sketch and its uses. (CO1) 6
- 3-b. Name any three reasons for implementing CAD in design? (CO1) 6
- 3-c. A triangle having vertices coordinates (10, 20), (10, 10), (20, 10) is rotated by 30 degrees about z-axis in counter clockwise direction. Obtain a new coordinate of vertices. (CO2) 6
- 3-d. Obtain translation matrix for  $t_x = 2$ ,  $t_y = 3$  in homogenous coordinate system. (CO2) 6
- 3.e. Why do you prefer Bezier form of cubic curves to the Hermite form for interactive computer graphics? Explain with suitable examples. (CO3) 6
- 3.f. What is meant by quadric surface? What are the different types of quadric surfaces? Explain in brief. (CO4) 6
- 3.g. Derive the element stiffness matrix and nodal load vectors for 2 node 1D element. (CO5) 6

**SECTION C**

**50**

**4. Answer any one of the following:-**

- 4-a. Explain the solid state monitors along with emissive displays and non-emissive displays. (CO1) 10

- 4-b. What is CAE? Explain the application of CAE. Differentiate between the Classical design and Computer Aided Design. (CO1) 10

**5. Answer any one of the following:-**

- 5-a. Obtain the transformation matrix for reflection along diagonal line ( $y = x$  axis). (CO2) 10
- 5-b. Using midpoint Bresenham's circle generating algorithm, determine pixel positions along circle octant in the first quadrant from line  $x = 0$  to line  $x = y$ . The radius of circle is 10 units. Plot the generated pixel positions. (CO2) 10

**6. Answer any one of the following:-**

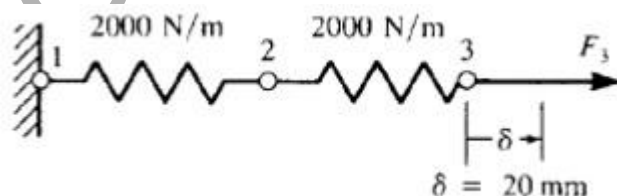
- 6-a. Describe the differences between Hermite splines, Bezier splines, and B-spline. (CO3) 10
- 6-b. Construct enough points on the Bezier curve whose control points are  $P_0 (4, 2)$ ,  $P_1 (8, 8)$  and  $P_2 (16, 4)$  to draw an accurate sketch Also Determine the followings. (a.) What is the degree of the curve? (b.) What are coordinates at  $u = 0.5$ . (CO3) 10

**7. Answer any one of the following:-**

- 7-a. Write a comparison among the wireframe modeling, surface modeling and solid modeling schemes for creating 3D objects. (CO4) 10
- 7-b. How do you create a solid model by the Boolean operations in Constructive Solid Geometry? Explain CSG schemes of solid modeling with suitable examples. (CO4) 10

**8. Answer any one of the following:-**

- 8-a. For the spring assemblages shown in following below figures, determine the nodal displacements, the forces in each element, and the reactions. Use the direct stiffness method for this problem. (CO5) 10



- 8-b. Explain the desirable features of FEM packages like ANSYS, ABAQUS, NISA etc. (CO5) 10