

**7E4060**

**B.Tech. (Sem. VII) (Main) Examination, January - 2010**  
**Common for Mechanical Engineering and P. & I.**  
**(7ME1 & 7 PIS.3 Computer Aided Design)**

Time : 3 Hours]

[Total Marks : 80

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[Min. Passing Marks : 24

*Attempt overall five questions selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly).*

Use of following supporting material is permitted during examination.  
 (Mentioned in form No. 205)

1. \_\_\_\_\_ Nil \_\_\_\_\_ 2. \_\_\_\_\_ Nil \_\_\_\_\_

### UNIT - I

- 1 (a) Define CAD, CAM and CIM. Explain with examples of application. 6
- (b) What is computer graphics ? Explain raster scan display. 10

OR

- 1 Explain standard algorithm such as digital differential analyses (DDA) for line generation and Bresenham's algorithm for circle generation. 16

### UNIT - II

- 2 (a) Explain :
- (i) Parametric and non-parametric representation of curves.
- (ii) Implicit and explicit function.

4×2

(b) Derive the expression for a point on a cubic bezier curve.

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OR

2 The co-ordinates of four control points relative to a current WCS are given by :

$$P_0 = [2 \ 2 \ 0]^T; P_1 = [3 \ 3 \ 0]^T; P_2 = [3 \ 3 \ 0]^T; P_3 = [3 \ 2 \ 0]^T$$

Find the equation of the resulting Bezier curve also find points on

the curve for  $s = 0, \frac{1}{4}, \frac{1}{2}, \frac{3}{4}$  and 1.

16

### UNIT - III

3 Explain with parametric representation of following analytical surfaces :

- (i) Ruled surface
- (ii) Surface of revolution
- (iii) Coons patch
- (iv) Plane surface.

16

OR

3 (a) Show that a bicubic surface patch degenerates to a cubic spline if the four corner points of the patch are collapsed to two.

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(b) Explain

- (i) B rep and
- (ii) CSG in detail.

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### UNIT - IV

4 (a) Show that the transformation of the mid-point and the mid-point transformation for a line are identical.

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- (b) A line AB with  $A = [3 \ 2 \ 6 \ 1]$  and  $B = [5 \ 5 \ 8 \ 1]$  is rotated by an angle  $30^\circ$  about Y axis, followed by reflection about XY plane. Find the co-ordinates of the transformed line.

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OR

- 4 (a) Given a point  $P = (2, 4, 8)$  and using homogeneous representation :
- (i) Calculate coordinates of the transformed point  $P'$  if  $P$  is rotated about X, Y, Z axis by angles  $30^\circ$ ,  $45^\circ$  and  $90^\circ$  respectively.
- (ii) Calculate  $P'$  if  $P$  is translated by  $d = 3\hat{i} - 4\hat{j} - 5\hat{k}$  and then scaled uniformly by  $S = 1.5$ .
- (iii) Find the orthographic projection  $P_v$  of  $P$ .

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### UNIT - V

- 5 Explain techniques and algorithm for hidden line and surface removal.

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OR

- 5 (a) Explain point clipping and line clipping.
- (b) Explain Cohen-Sutherland algorithm.

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