

**B.Tech. SEM -V Mechanical 2014 Course (CBCS) : WINTER - 2018**  
**SUBJECT: ADVANCED COMPUTER GRAPHICS AND SOLID MODELLING**

Day: Tuesday  
Date: 27/11/2018

**W-2018-2422**

Time: 02.30 PM TO 05.30 PM  
Max. Marks: 60

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**N.B:**

- 1) All questions are **COMPULSORY**.
  - 2) Figures to the right indicate **FULL** marks.
  - 3) Draw appropriate figures **WHEREVER** necessary.
  - 4) Assume suitable data if necessary.
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**Q.1** Digitize a line from (10, 12) to (20, 18) on a raster screen using Bresenham's straight line algorithm. Show the result on Cartesian graph. **(10)**

**OR**

**Q.1** Describe flood fill algorithm of polygon filling with neat sketches. **(10)**

**Q.2** A triangle ABC has vertices A (2, 2), B (4, 4), C (3, 5). Find new Co-ordinates of triangle ABC if it is: **(10)**

- i) Mirror about line  $y = x$
- ii) Scaled with respect to point A using scaling factor 2 and 1.5 in x and y direction respectively.

**OR**

**Q.2** What is necessity of Homogenous Co-ordinate system? Write transformation matrix for translation rotation and scaling. **(10)**

**Q.3** A triangle is defined by vertices A (1, 2, 4), B (4, 3, 5) and C (5, 8, 3). The orthographic views are to be projected. Write transformation matrices and hence determine Co-ordinates of front view and Top view. **(10)**

**OR**

**Q.3** Derive the transformation matrix of 3D Rotation about any arbitrary line. **(10)**

**Q.4** A cubic Bezier curve is defined by control points as  $P_0 (1, 1)$ ,  $P_1 (2, 3)$ ,  $P_2 (4, 3)$ ,  $P_3 (5, 1)$ . Find the equation of curve and midpoint. **(10)**

**OR**

**Q.4** Derive parametric equation of hermit cubic spline curve. **(10)**

**Q.5** A line segment in the x,y plane defined by end points  $P_1 (0, 0)$ ,  $P_2 (0,5)$ . Sweep line by translating 20 units along x axis and rotating it through  $2\pi$  about x axis simultaneously. Find the points at  $U = 0$  and  $V = 0.5$ . **(10)**

**OR**

**Q.5** Find the parametric equation of ruled surface. **(10)**

**Q.6** Explain following terms with respect to solid modeling.  
i) Euler's equation                      ii) Boolean operation for CSG

**OR**

**Q.6** Explain different sub sections of STEP file. **(10)**

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