Reg.No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

V SEMESTER B.TECH (MECHANICAL ENGINEERING)

END SEMESTER EXAMINATIONS, DEC 2015/JAN 2016

SUBJECT: COMPUTER AIDED DESIGN [MME 301]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX.MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitable assumed, stating the same.

1A. Obtain the mathematical formulation of Bresenham's line algorithm. **(05)**

1B. A tabulated surface is defined by extruding a Bezier curve defined by position vectors $Q_0 = [2\ 3\ 0]^T$, $Q_1 = [6\ 5\ 0]^T$, $Q_2 = [9\ 5\ 0]^T$ and $Q_3 = [12\ 3\ 0]^T$. The direction vector is defined by $P_1 - Q_0$, where $P_1 = [4\ 9\ 4]^T$. Evaluate the points on the resultant surface at (i) u=0.2, v=0.4 (ii) u=0.75, v=0.65. **(05)**

2A. Using recursive relationship, determine the coordinates of the points on the circumference of a circle for first quadrant having centre at origin and radius 7 units. Take incremental angle as 30º. **(05)**

2B. Derive the parametric equation of a Hermite cubic spline curve and also its tangent vector and express them in the matrix form. **(05)**

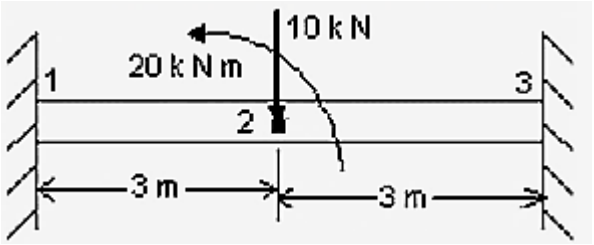
3A. A revolved surface is generated by revolving a Hermite cubic spline curve defined by position vectors $[4\ 7\ 0]^T$ and $[5\ 9\ 0]^T$ and tangent vectors $[6\ 8\ 0]^T$ and $[6\ 11\ 0]^T$ respectively. The curve is revolved about an axis parallel to X axis measured at a height of 4 units along global Y axis. Evaluate the coordinates of the point on the revolved surface at u=0.6 and v=π/3. **(05)**

3B. Explain the different types of databases used in CAD by means of sketches. **(05)**

4A. The position vectors of a triangle are (2,4), (4,6) & (3,6). Obtain the coordinates of the triangle when it is reflected about the line defined by the equation Y= 0.5X+2. Also, plot the initial and transformed triangle. **(06)**

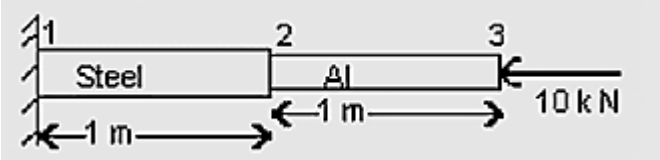
4B. Determine the coordinates of the pixels and plot a line from (1,2) to (4,7) using DDA algorithm. **(04)**

5A. For the beam shown in figure, determine the displacement and slope at the node 2 and the reactions at the supports. The Young's modulus of steel is 210 GPa and moment of inertia of cross-section is 4×10^{-4} m^4. **(06)**



5B. With a neat sketch, derive the recursive equations for a parabola which is symmetric about y-axis from their parametric equations. **(04)**

6A. For the truss assemblage shown in figure, determine the nodal displacements and the reactions. The area of cross-section of steel and aluminium are 4×10^{-4} m^2 and 2×10^{-4} m^2 respectively. The Young's modulus of steel and aluminium are 200GPa and 70 GPa respectively. **(06)**



6B. Explain the Shigley's Engineering Design process with a flowchart. **(04)**