		Reg. No.									
Manipal Institute of Technology, Manipal Institute of Manipal University)											
III SEMESTER B.TECH (AUTOMOBILE ENGINEERING)											
END SEMESTER EXAMINATIONS, DEC/JAN 2015-2016											
SUBJECT: COMPUTER AIDED DESIGN [AAE 253]											
REVISED CREDIT SYSTEM Time: 3 Hours MAX. MARKS: 50										50	
Instructions to Candidates:											
	 Answer ALL the questions. Missing data may be suitable assumed. 										
1A.	. Sketch and explain computer aided design and manufacturing process.										5M
1B.	. What is the fundamental role of graphic package?								2M		
1C.	Sketch and explain the working of CRT display.										3M
2A.	. Write a note on image processing.								3M		
2B.	. Digitize the points on the line with end points (20, 10) and (30, 18) using Bresenham line drawing algorithm.								4M		
2C.	Use Bresenham midpoint line drawing algorithm to draw the line segment joining (15, 10) to (20, 14).									3М	
3A.	Draw a circle using Bresenham midpoint circle algorithm with center C (0, 0)								4M		

- **3B.** Derive and obtain the parametric expression for circle. **3M**
- **3C.** Discuss and derive Bresenham midpoint line drawing algorithm. **3M**
- **4A.** Derive the transformation that rotate an object point P (x, y) to P¹ (x¹, y¹), θ^0 **5M** about the origin.
- 4B. Plot the Bezier curve having the end points P₀ (1, 3) and P₃ (7, 2) the other 5M control points are P₁ (5, 6) and P₂ (6, 0). Plot for the values u= 0.1, 0.3, 0.5, 0.7, 0.9. If the characteristic polygon is drawn in sequence P₀-P₁-P₂-P₃.

and radius r = 6.

INSPI

- **5A.** Derive the stiffness matrix for spring element.
- **5B.** A ruled surface is defined by 2 Bezier curves $P_0 [-3 5 9]^T$, $P_1 [9 3 2]^T$, $P_2 [2 8 3]^T$ and the second curve is defined by $P_3 [3 3 -3]^T$, $P_4 [9 7 -4]^T$, $P_5 [9 -8 -1]^T$ and $P_6 [3 2 -1]^T$. Evaluate coordinate points at u=0.7 & v= 0.3.
- **5C.** The tabulated surface generated by extruding a Hermite cubic spline defined **4M** by $P_0 [3 \ 2 \ 0]^T$, $P_1 [7 \ 5 \ 0]^T$, $P_{0} [4 \ 2 \ 0]$, $P_{1} [2 \ 4 \ 0]$ along the vector P_2 - P_1 with $P_2 [4 \ 4 \ -6]$. Evaluate the points at u= 0.3 and v= 0.5.
- **6A.** For the plane truss composed of the three elements shown in the fig below subjected to the downward force of 10,000 lb applied at node 1. Determine the x and y displacements at node 1 and the stresses in each element. Let $E=30*10^6$ psi and A=2 in² for all the elements. The lengths of the elements are shown in the fig.



6B. For the bar assemblage shown in fig below. Determine a) the global stiffness **3M** matrix, b) the displacements at nodes 2 and 3, c) the reactions at the nodes 1 and 4. A force of 3000 lb is applied in the x direction at node 2. The length of each element is 30 in. Let $E = 30*10^6$ psi and A = 1 in² for the elements 1 and 2, and let $E = 15*10^6$ psi and A = 2 in² for element 3.



2M