Student Exam No. _____

GANPAT UNIVERSITY

B. TECH. VIII SEM. MECHATRONICS ENGINEERING

REGULAR EXAMINATION April - June 2015

2ME704 - COMPUTER AIDED DESIGN

Time: 3 Hours **Total Marks: 70**

Instruction: 1 **Attempt all questions.**
2 **Make suitable assumptions wherever necessary.**
3 **Figures to the right indicate full marks.**

Section I

Q-1 12

(a) Derive the transformation matrix for the Rotation. Further give the transformation matrix for scaling, reflection and shear.

(b) A triangle ABC having coordinates A (5, 8, -6), B (-2, 4, 8) and C (4, -4, 6) is to be rotated about the X axis by 30^0 anticlockwise. Determine the new coordinate of the triangle.

(c) Write a Matlab program for reflection about $y = 0.5x + 4$.

OR

Q-1 12

(a) Show that the composition of two rotation is additive by concatenating matrix representations for $R(\Theta_1)$ and $R(\Theta_2)$ to obtain:
$R(\Theta_1) \times R(\Theta_2) = R(\Theta_1 + \Theta_2)$

(b) A triangle PQR has vertices A (1, 3), B (4, 4) and C (6, 8). It has to be rotated by 60^0 CCW about point P (-1, 3). Determine (i) the composite transformations of matrix and (ii) the new coordinates of rectangle.

(c) Write a Matlab program for 2D rotation about Z-axis by 45°.

Q-2

(a) Write a C program to draw a line between points P (2, 3) and Q (6, 10) by using Bresamham's algorithm. 6

(b) Derive the decision parameter for midpoint circle drawing algorithm. 5

OR

Q-2

(a) Determine the pixel position on graphical display to draw circle which having center (5, 6) and radius 12 using Mid-point algorithm. 5

(b) Explain DDA algorithm and derive the equation for find out pixel position on graphical display. 3

(c) Define Persistence, Resolution and Aspect Ratio. 3

Q-3 **Attempt any three** 12

(a) Explain Inkjet printer with neat sketch.

(b) Define computer aided design. Compare computer aided design and conventional design with a neat sketch/block diagram.

(c) Explain raster scan display device with net sketch.

(d) List various CAD softwares available in the market. Discuss the points to be considered for purchasing CAD software.

Section II

Q-4

(a) Figure -1 shows the compound section fixed at both ends. Estimate the reaction forces at the supports and the stresses in each material when a force of 200 kN is applied at the change of cross section. 8

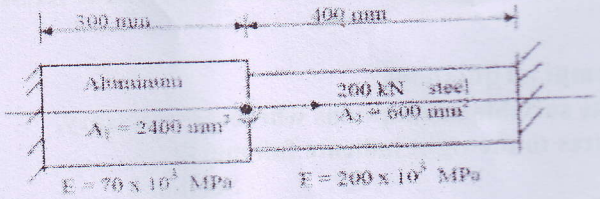

Figure.1

(b) Explain the penalty approach used in FEA. 4

OR

Q-4

(a) An axial stepped bar as shown in figure 2 is subjected to an axial pull of 50 KN. If the material of the bar is uniform and has a modulus of elasticity as 200 GPa. Determine the displacement and stresses of each of the section. Also find the reaction. 8

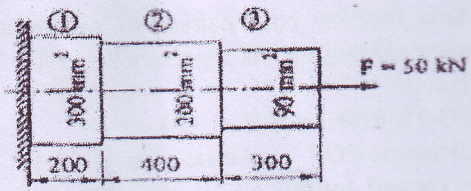

Figure.2

(b) Explain 2-D and 3-D elements used in finite element analysis. 4

Q-5

(a) Derive an element stiffness matrix for 2D truss problem. 6

(b) Write short note on automatic mesh generation with an example. 5

OR

Q-5

(a) Explain graphics standards in brief. 6

(b) Elaborate why finite element analysis is approximate method to solve engineering problems. 5

Q-6 **Attempt any three** 12

(a) What is wire frame modeling? Write its applications.

(b) Write properties & application of Bazier curve.

(c) Explain fillet surface and offset surface with neat sketch.

(d) Explain Boundary representation with neat sketch.

END OF PAPER