

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - VIth Semester–Examination – May- 2012

Subject code: X61901

Subject Name: Computer Aided Design

Date: 08/05/2012

Time: 10:30 am – 01:00 pm

Total Marks: 70

Instructions:

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

- Q 1 (a) Explain advantages of CAD over Conventional design 07
(b) Explain Bresenham's algorithm to plot a line whose slope is between 0^0 to 45^0 . 07

- Q 2 (a) What is graphic standard? Explain different CAD standards 07
(b) Perform a 45 degree rotation of a triangle A(0,0), B(1,1), C(5,2) 07
1) About the origin and
2) About point P(-1, -1)

OR

- (b) A triangle ABC with vertices A(1,3), B(-1,-4) and C(-1,2) is rotated through 90 degree and then 180 degree clockwise. Determine the vertices after doing above 2-dimensional rotation. 07

- Q 3 (a) Write a short note on Liquid Crystal Display 04
(b) The center of an ellipse is at (2,4,6). The major axis is 20 unit and minor axis is 12 unit. Write the parametric equation of ellipse and calculate the coordinates of points on ellipse if it is divided in 12 parts. 10

OR

- Q 3 (a) Explain Constructive Solid Geometry 07
(b) Write a program for design of shaft subjected to combine twisting moment and bending moment. 07

- Q 4 (a) Discuss different types of analysis for FEM, also mention advantages and limitations of FEM. 07
(b) Axial load $P = 300$ KN is applied at 20° C to the rod as shown in fig.1 The temperature is then raised to 60° C. The coefficient of thermal expansion for Aluminium is 23×10^{-6} per $^{\circ}$ C and Steel is 11.7×10^{-6} per $^{\circ}$ C. $A_{Al} = 900 \text{ mm}^2$, $A_{Steel} = 1200 \text{ mm}^2$, $E_{Al} = 70 \times 10^9 \text{ N/m}^2$, $E_{Steel} = 200 \times 10^9 \text{ N/m}^2$. Using FEM, 07
(1) Determine the nodal displacement and element stresses.
(2) The reaction forces at the supports

OR

Q 4 A stepped shaft as shown in fig.2. Determine the stress and the deflection in each of the sections using elimination approach. Assume uniform material having $E = 90 \text{ GPa}$ and the axial force $F = 50 \text{ kN}$. Also check the example by using penalty approach. $A_1 = 500 \text{ mm}^2$, $A_2 = 400 \text{ mm}^2$, $A_3 = 300 \text{ mm}^2$, $L_1 = L_2 = L_3 = 600 \text{ mm}$. **14**

Q 5 (a) Explain following with respect to design optimization (1) Design vector (2) Objective function (3) Constraint **07**
(b) Discuss Johnson method of optimum design. **07**

OR

Q 5 (a) Explain compatible and incompatible problem in optimum design? **07**
(b) What is CAD database? Explain the advantage of database with popular database models **07**

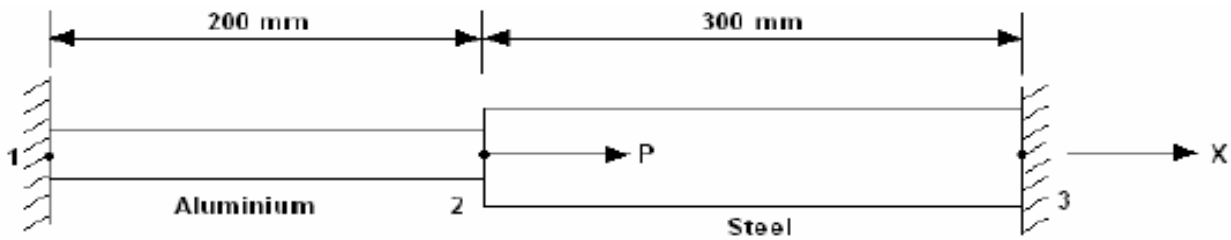


Figure 1

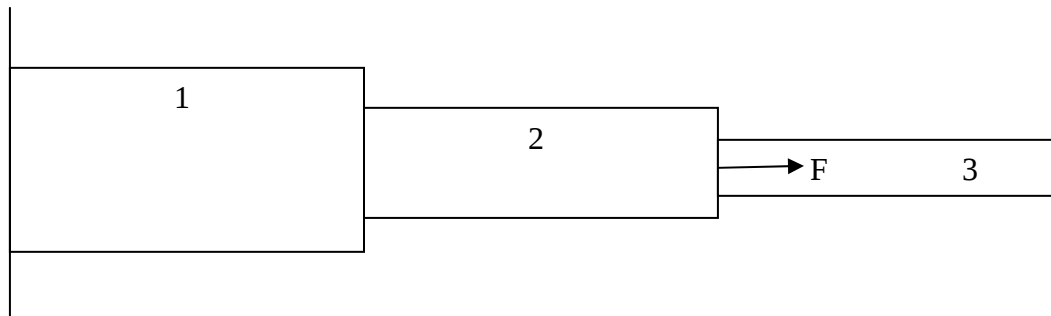


Figure 2
