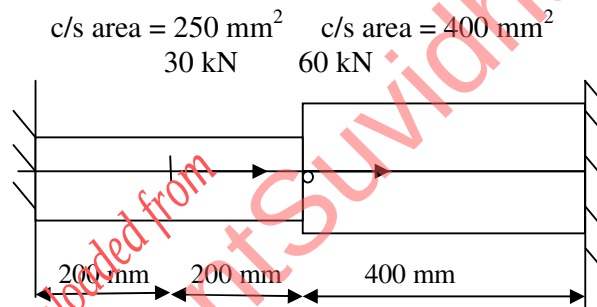


GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-VI • EXAMINATION – WINTER 2013

Subject Code: 161903**Date: 02-12-2013****Subject Name: Computer Aided Design****Time: 02:30 pm to 05:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Use of PSG design data book is permissible.
5. Draw neat sketch to justify your answer where necessary.

- Q.1** (a) List and explain the important parameters to be considered while selecting CAD systems. List the different application of CAD in mechanical engineering. **07**
- (b) Explain wireframe modeling in detail. Compare it with solid modeling. **07**
- Q.2** (a) Figure below shows the bar with dimensions and loads. Determine the nodal displacements, element stresses and reacting if the temperature rises by 60°C . Assume the modules of elasticity for the complete bar as 200 GPa and coefficient thermal expansion as $12 \times 10^{-6} \text{ per } ^{\circ}\text{C}$. **07**



- (b) Explain the concepts of FEM. Discuss the different steps involved in FEA in detailed. **07**
- OR**
- (b) Explain 2D and 3D elements used in FEM along with their applications. **07**
- Q.3** (a) State the different CAD software commercial available and explain the features of CAD software in detail. (any two software.) **07**
- (b) Write a detailed note on B-rep and C-rep. **07**
- OR**
- Q.3** (a) Explain the CAD of helical compression spring using flow chart. **07**
- (b) Explain the feature based modeling with suitable examples in detail. **07**
- Q.4** (a) Write a detailed note on Bezier curves. **07**
- (b) A triangle ABC with vertices A(30,20), B(90,20) and C(30,80) is to be scaled by factor 0.5 about a point X(50,40). Determine (i) the composition matrix and (ii) the coordinates of the vertices for a scaled triangle. **07**
- OR**
- Q.4** (a) 1. Explain graphics standards in brief. **03**
2. Explain the following 2D geometric transformation with suitable examples: - translation and rotation. **04**

- (b) A rectangle ABCD has vertices A(1,1), B(2,1), C(2,3) and D(1,3). It has to be rotated by 30° CCW about point P (3,2). Determine (i) the composite transformations of matrix and (ii) the new coordinates of rectangle. **07**

Q.5 (a) What is conventional and optimum design? Explain it with suitable examples. State the application optimization in engineering. list the optimization software **07**

- (b) Derive the final preliminary design equation for helical compression for minimum weight from the following given data: **07**

Maximum load on spring = $P_{\max}$

Minimum load on spring = $P_{\min}$

Spring Wire Cross section = circular with diameter d

Mean spring coil diameter = D

Spring material density = ρ

Modulus of rigidity = G

Wahl's stress factor = K

For spring material, maximum stress $\tau_{\max} \leq [\tau]$

OR

Q.5 (a) Explain R.C.Johnson's optimization method with suitable examples. **07**

- (b) A manufacturing unit manufactures P and Q components using A, B and C machines. The machine time required for each component, the machining time available on different machine and the profit on each types of component are given table below. **07**

Type of machine	Machining time required for		Maximum machining time available per week, in minutes
	Component P in minutes	Component Q in minutes	
A	10	20	4000
B	25	10	5000
C	6	14	2100
Profit per unit	Rs 800	Rs 2000	

Find the numbers of component P and Q to be manufactured per week to maximize the profit.
