Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE – SEMESTER–VIII • EXAMINATION – SUMMER • 2014**

**Subject Code: 180205 Date: 27-05-2014**

**Subject Name: Automotive CAD**

**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 different phases/steps involved in computer aided design process. **07**

**(b)** Discuss different reasons for implementing CAD system. Also list down benefits & limitations of CAD. **07**

**Q.2** **(a)** Solve the following system by Gauss elimination method: **07**
$2x + y + z = 10$; $3x + 2y + 3z = 18$; $x + 4y + 9z = 16$.

**(b)** Prepare a flow chart to implement Newton Raphson method to find roots of any given sets equations. **07**

**OR**

**(b)** Explain different graphic displaying techniques. **07**

**Q.3** **(a)** Write a short note on Bezier curves. Also discuss characteristics of Bezier curves. **07**

**(b)** A rectangle is formed by four points ABCD whose coordinates are : A(50,50), B(100,50), C(100,80), D(50,80). Calculate the new coordinates of the rectangle in reduced size using the scaling factors Sx=0.5 and Sy=0.6. Also plot the coordinates. **07**

**OR**

**Q.3** **(a)** Explain Wireframe modeling, Surface modeling, and Solid modeling with suitable sketches. **07**

**(b)** Prove that the multiplication of two successive translation matrices is commutative. **07**

**Q.4** **(a)** What are the different types of elements used in finite element analysis? Explain briefly with applications. **04**

**(b)** Consider a three spring system as shown in figure 1. **10**
Take $K_1$ = 40 N/mm, $K_2$ = 50 N/mm, and $K_3$ = 80 N/mm.
The loads applied are $P_1$ = 100 N, $P_2$ = 50 N.
Calculate the displacement at nodal points.

**OR**

**Q.4** **(a)** What is optimization? Explain different techniques used for analysis of optimization. **07**

**(b)** Prepare a C-program to design a coil spring for a suspension system. Assume suitable notations and material for the coil spring. **07**

**Q.5** **(a)** Explain how to model and apply boundary conditions for a hollow cylinder subjected to internal pressure, with one end closed. **04**

**(b)** Consider a bar as shown in figure 2. Determine the displacements and support reactions by penalty approach method. Take modulus of elasticity as $80 \times 10^3$ N/mm$^2$. **10**

**OR**

**Q.5** **(a)** List down various 3D CAD softwares used in solid modeling. Explain any one software with suitable automotive applications in detail. **07**

**(b)** Explain the basic principle of DDA algorithm for drawing a line. Also prepare a flow chart for line drawing using DDA algorithm. **07**

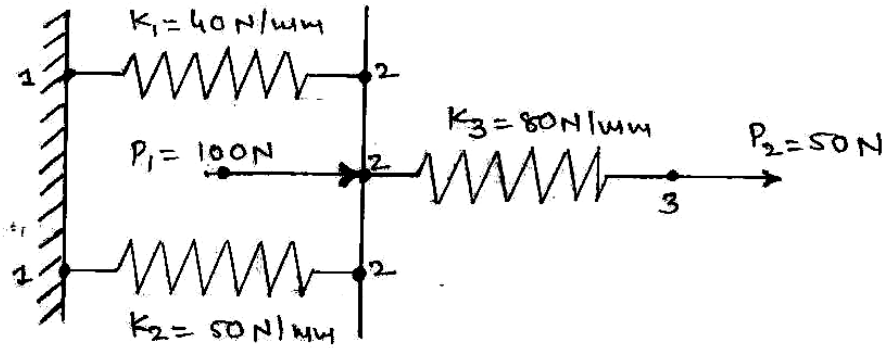


Figure : 1 [Q-4 (b)]

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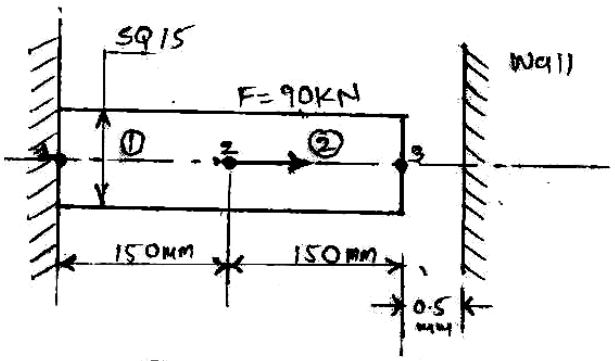


Figure : 2 [Q-5 (b)]

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