Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII EXAMINATION – SUMMER 2016

Subject Code:180205 Date:16/05/2016

Subject Name:Automotive CAD (Department Elective-II)

Time:10:30 AM to 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)** Write C- Programme for designing of a helical spring. **07**

(b) Explain in detail the various capabilities, limitation and application of any 3 –D CAD package software and also write steps for building up a computerized geometric solid model of rectangular nut of M8. **07**

Q.2 **(a)** Explain Bresenharm's algorithm for representation of line with suitable example. **07**

(b) Apply Gauss elimination method to solve the equation. **07**
X-3Y+4Z = 2, 2X+3Y+Z=3, -X+2y+3Z=5

OR

(b) Write short note on (1) GKS (2) IGES (III) Communication Standards. **07**

Q.3 **(a)** Explain types of mesh generation in finite element analysis. **04**

(b) As shown in fig.1 A load P= 200KN is applied as shown. Determine the nodal displacements, element stresses and support reactions. Use elimination approach for boundary conditions. Take E= 2 X 10^5 N/mm^2. **10**

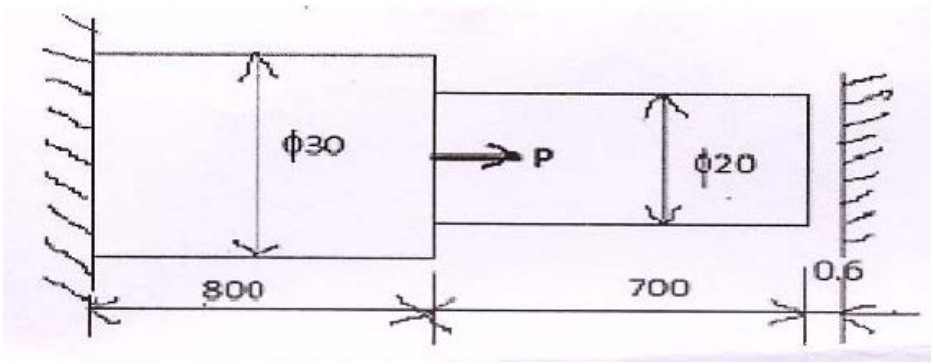

Figure 1.

OR

Q.3 **(a)** With the help of sketches, explain various types of elements used in finite element analysis and their applications. **04**

(b) An axial load P= 300 X 10^5 N is applied at 20 ^{0} C to the rod as shown in figure 2. the temperature is then raised to 60^0 C .Determine the nodal displacement and element stresses. **10**

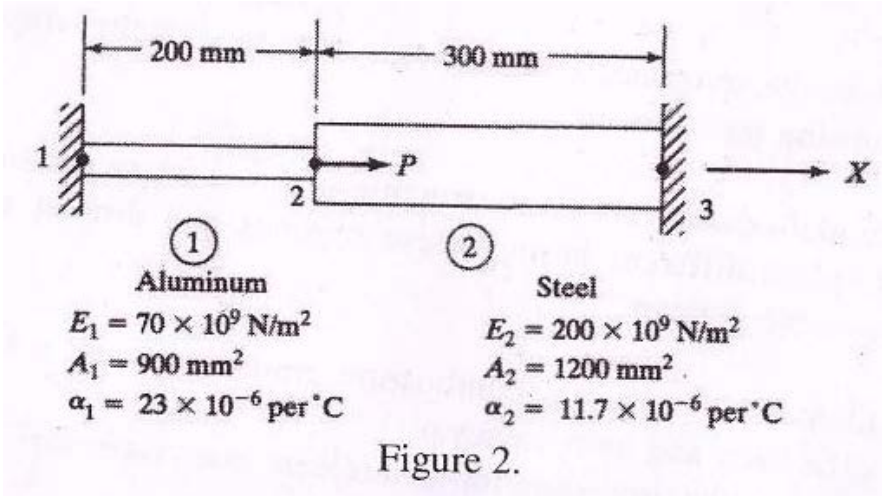

Figure 2.

Q.4 **(a)** Consider a triangle ABC having co-ordinates A(5,5) B(8,5) and C(5,12). Determine the new vertex position if it is mirrored about a line X = 0.5Y -2. **07**

(b) Reflect the diamond shaped polygon whose vertices are A (-1,0) B(0,-2) C(1,0) and D(0,2) about line X= 2. **07**

OR

Q.4 **(a)** Prove that three dimensional rotations are non commutative when more than one rotation is to be made. **07**

(b) A mirror is placed vertically such that it passes through the point (10,0) and (0,10) . Find the reflected view of triangle ABC with co-ordinates A(5,50) B(20,40) and C(10,70). **07**

Q.5 **(a)** Develop C-Programme to implement a Newton rapson method to find a root of equation $X^3 - 4X - 9 = 0$. **07**

(b) Explain in detail the raster scan and vector scan techniques of displaying graphics. **04**

(c) What is homogeneous co –ordinate system? Explain its importance in CAD. **03**

OR

Q.5 **(a)** Prepare a C- Program to design a clutch for a vehicle transmitting power P with speed N rpm of the prime mover. Calculate the axial force required for engagement of clutch. **07**

(b) What is optimization? Give classification of optimization.

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