Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY
Winter Examination-2018

Subject Name: Automotive CAD

Subject Code: 4TE06ACA1 **Branch: B.Tech (Automobile)**

Semester: 6 **Date: 19/10/2018** **Time: 02:30 To 05:30** **Marks: 70**

Instructions:
(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Attempt the following questions:**

a) An accurate and efficient raster line-generating algorithm is 01
(A) DDA algorithm (B) Mid-point algorithm
(C) Parallel line algorithm (D) Bresenham's line algorithm

b) (2, 4) is a point on a circle that has center at the origin. Which of the following points are also on circle? 01
(A) (2, -4) (B) (-2, 4)
(C) (-4, -2) (D) All of above

c) The two-dimensional translation equation in the matrix form is 01
(A) P'=P+T (B) P'=P-T (C) P'=P*T (D) P'=P/T

d) 1-D spar element has _____ node. 01
(A) 1 (B) 2 (C) 3 (D) 4

e) Triangular (quadratic) element has _____ node. 01
(A) 3 (B) 6 (C) 9 (D) 12

f) Finite element analysis for lathe bed can be carried through..... 01
(A) structural analysis (B) thermal analysis
(C) fluid analysis (D) none of these

g) The number of pixels stored in the frame buffer of a graphics system is known as 01
(A) Resolution (B) Depth (C) Resalution (D) None of the above

h) Expansion of line DDA algorithm is 01
(A) Digital difference analyzer (B) Direct differential analyzer
(C) Digital differential analyzer (D) Data differential analyzer

i) The two-dimensional scaling equation in the matrix form is 01
(A) P'=P+T (B) P'=S*P (C) P'=P*R (D) P'=R+S

j) On raster system, lines are plotted with 01
(A) Lines (B) Dots (C) Pixels (D) None of the mentioned

k) The Cartesian slope-intercept equation for a straight line is 01
(A) y = m.x + b (B) y = b.x + m (C) y = x.x + m (D) y = b + m.m

l) A common device for drawing, painting, or interactively selecting coordinate positions on an object is a 01
(A) Image scanner (B) Digitizers (C) Data glove (D) Touch panels

m) The process of dividing the body into finite number of the elements is known as 01

(A) Meshing (B) Discreization (C) Element connectivity (D) none of this

n) The transformation in which an object is moved from one position to another in circular path around a specified pivot point is called 01

(A) Rotation (B) Shearing (C) Translation (D) Scaling

Attempt any four questions from Q-2 to Q-8

Q-2 **Attempt all questions**

a) List various approaches used for creating solid models. Discuss about Constructive solid modelling (C-Rep) and Boundary representation (B-Rep) approaches. **07**

b) Explain the various steps required to solve mechanical problem using finite element analysis. **07**

Q-3 **Attempt all questions**

a) Explain translation and scaling with reference to Geometrical Transformations with suitable examples. **07**

b) Write the reasons for implementing CAD in the field of Automobile Engineering. Also give the limitations. **07**

Q-4 **Attempt all questions**

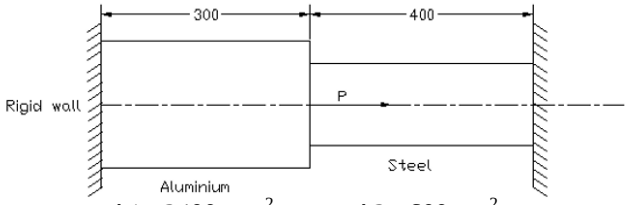
a) Differentiate clearly between conventional design and computer aided design process. **07**

b) State the characteristics of B spline curve. Compare it with Bezier curves. **07**

Q-5 **Attempt all questions**

a) Consider the bar shown in Figure 1. An axial load P = 20000 N is applied as shown. Using the finite element method find the following: **07**

1. The nodal displacements
2. Stress in each material
3. Reaction forces.



$A1 = 2400\ mm^2$ $A2 = 600mm^2$

$E1 = 70 \times 10^3\ N/mm^2$ $E2 = 200 \times 10^3\ N/mm^2$

Figure: 1

b) What is design optimization? Explain its application and advantages in engineering design. **07**

Q-6 **Attempt all questions**

a) Write a note on wire frame model. **04**

b) Write a note on Constructive Solid Geometry (CSG). **05**

c) Write the step by step design procedure in conventional and CAD environment. **05**

Q-7 **Attempt all questions**

a) Generate a straight line connecting two points (1, 2) and (8, 6) using DDA algorithm. **07**

	b)	What is element connectivity in context to establish local-global relationship?	**04**
	c)	Write merits, demerits and applications of FEM.	**03**
Q-8		**Attempt all questions**	
	a)	Prepare a C program for the design of Shaft subjected to Bending & Twisting Moment.	**07**
	b)	Explain following with respect to design optimization (1) Design vector (2) Objective function (3) Constraint.	**07**