Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY
Summer Examination-2016

Subject Name: Automotive CAD

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

Semester: 6 **Date: 06/05/2016** **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:** **(14)**

a) A circle, if scaled only in one direction becomes a ……..
a) Hyperbola b) Ellipse c) Parabola d) Remains a circle

b) Which of the following is not a rigid body transformation?
a) Translation b) Rotation c) Shearing d) Reflection

c) The object refers to the 3D representation through linear, circular or some other representation are called
a) Quadric surface b) Sweep representation c) Torus d) None of these

d) On raster system, lines are plotted with ……..
a) Lines b) Dots c) Pixels d) None

e) Which algorithm is a faster method for calculating pixel positions?
a) Bresenham's line algorithm b) Parallel line algorithm
c) Mid-point algorithm d) DDA line algorithm

f) The number of lines required to represent a cub in a wireframe model is ……
a) 8 b) 6 c) 12 d) 16

g) In the following geometric primitives, which is not a solid entity of CSG modeling?
a) Box b) Cone c) Cylinder d) Circle

h) The software that provides users with various functions to perform geometric modelling and construction. Editing and manipulation of existing geometry. drafting and documentation is known as:
a) Operating system b) Application software
c) Graphics software d) Programming language

i) The widely employed computer architecture for CAD/CAM applications is.
a) Mainframe-based system b) Minicomputer-based system
c) Microcomputer-based system d) Workstation-based system

j) The shape functions of a two-node bar element are
a) Linear b) Quadratic c) Constant d) Non of the above

k) The process of dividing the body into finite number of the elements is known as
a) Meshing b) Discreization c) Element connectivity d) none of this

l) The quality of an image depends on
a) No. of pixel used by image b) No. of line used by image
c) No. of resolution used by image d) None

m) In computer aided drafting practice, an arc is defined by
a) Two end points only b) Center and radius
c) Radius and one end point d) Two end points and center

n) The transformation in which an object is moved from one position to another in circular path around a specified pivot point is called
a) Rotation b) Shearing c) Translation d) Scaling

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

Q-2 **Attempt all questions**

a) Differentiate clearly between conventional and computer aided machine designs **(07)**

b) Explain Bresenham's algorithm for generation of line. **(07)**

Q-3 **Attempt all questions**

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

b) A Triangle PQR with Vertices P (2, 5) Q (6, 7) and R (2, 7) is to be reflected about line Y = 0.5 X + 3. Determine the Concatenated Transformation matrix. **(07)**

Q-4 **Attempt all questions**

a) Explain following entities used in Surface Modeling. **(04)**
(1) Ruled Surface. (2) Tabulated Surface.

b) Write a short note on Wire Frame Modeling. **(05)**

c) Explain characteristics of Bezier Curve. **(05)**

Q-5 **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) The Coordinates of four data points P_0, P_1, P_2, and P_3 are: (2,2,0) , (2,3,0), (3,3,0) and (3,2,0) respectively. Find the equation of the Bezier curve and determine the coordinates of points on curve for u=0, 0.25, 0.5, 0.75 and 1.0. **(07)**

Q-6 **Attempt all questions**

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

b) Fig. 1 shows three springs, having stiffnesses 10, 20, and 40 N/mm, connected in parallel. One end of the assembly is fixed, and a force of 700 N is applied at the other end. Using the finite element method, determine the deflection of individual **(07)**

spring.

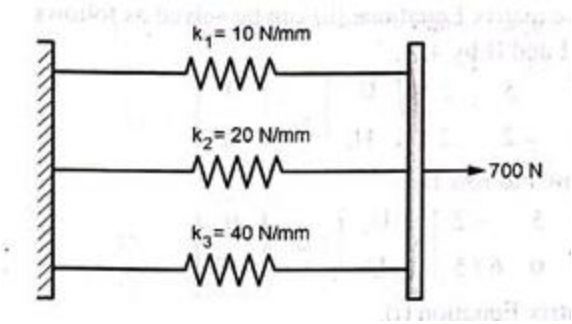

Fig. 1

Q-7 **Attempt all questions**

a) A stepped steel bar (E = 200 X 10^3 N/mm^2) is subjected to an axial load of 300KN, as shown in Fig.2. Using the finite element method, determine: (i) The nodal displacement (ii) The stresses in each elements and (iii) The reaction forces at the supports. Use minimum number of elements. **(09)**

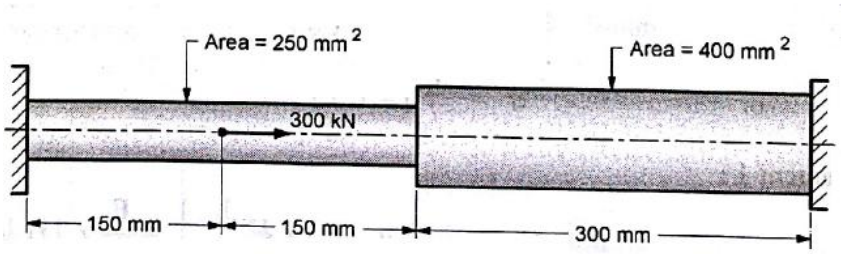

Fig. 2

b) Prepare a C program for design of Helical Spring. **(05)**

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 **(07)**
(1) Design vector (2) Objective function (3) Constraint