C.U.SHAH UNIVERSITY
Summer Examination-2019

Subject Name: Automotive CAD
Subject Code: 4TE06ACA1   **Branch: B.Tech (Automobile)**
Semester: 6   Date: 16/04/2019   Time: 10:30 To 01:30   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)	List out input devices used in CAD workstation.	
(b)	What are the advantages of electrostatic plotters?	
(c)	What is computer Graphics?	
(d)	What is the significance of homogenous coordinates in geometric transformation?	
(e)	Define Clipping.	
(f)	Differentiate between analytic and synthetic curves.	
(g)	What is feature based modeling?	
(h)	Explain Revolve feature in solid modeling.	
(i)	What is the application of shape function?	
(j)	State any of the two properties of global stiffness matrix.	
(k)	Define Adequate Design.	
(l)	Define Optimum Design.	
(m)	Explain ruled surface in surface modeling.	
(n)	What are the commonly used primitives in solid modeling?	

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

Q-2	**Attempt all questions**	
(a)	Discuss the conventional product life cycle. How CAD/Cam accelerate the product development?	**07**
(b)	Explain Bresenham's algorithm for generation of line.	**07**
Q-3	**Attempt all questions**	
(a)	Explain Random and Raster scan display devices.	**07**
(b)	A triangle ABC with vertices A (30, 20), B (90, 20) and C (30, 80) is to be scaled by a factor of 0.5 about a point X (50, 40). Determine: (a). The composite transformation matrix, and (b). The coordinates of the vertices for a scaled triangle.	**07**
Q-4	**Attempt all questions**	
(a)	What do you understand by C-rep and B-rep approaches? Compare them.	**07**
(b)	The 1-D element has a length of 200 mm. The temperatures at nodes 1 and 2 are $100°$ and $40°$ C respectively. Evaluate the shape functions associated with nodes 1	**07**

and 2, if the temperature is to be estimated at point P within the element, situated at 150 mm from node 1. Also calculate temperature at point P.
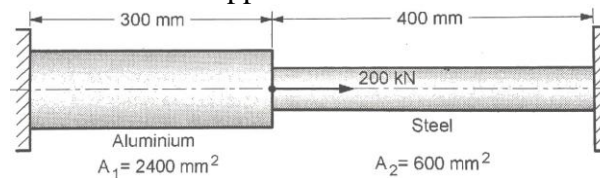
Q-5 **Attempt all questions**

(a) Explain the concepts of FEM. Discuss the different steps involved in FEA in detailed. **07**

(b) Plot the Bezier curve having end points P_0 (1, 3) and P_3 (7, 2). The other control points are P_1 (5, 6) and P_2 (6, 0). Plot for values for u = 0, 0.1, 0.2,….,1, if the characteristic polygon is drawn in the sequence P_0- P_1 -P_2 -P_3. **07**

Q-6 **Attempt all questions**

(a) With neat sketch, explain Hermite cubic spline curve. Obtain the parametric equation for Hermite cubic spline curve. **07**

(b) A stepped bimetallic bar made of aluminium (E = 70 x 10^3 N/mm^2) and steel (E= 200 x 10^3 N/mm^2) is subjected to an axial load of 200 kN, as shown in figure. Using the finite element method, determine: **07**

   i.   The nodal displacements
   ii. The stresses in each material and
   iii. The reaction forces at the supports.

Q-7 **Attempt all questions**

(a) State the applications of optimization in engineering. **05**

(b) The three- bar truss made of steel (E= 200 x 10^3 N/mm^2) is subjected to the horizontal forces of 30000 N and 20000 N and the vertical force of 10000 N as shown in the figure. The cross- sectional area is 300 mm^2 for each element. Using finite element method, determine: **09**

   i.   The nodal displacements
   ii. The stresses in each element, and
   iii. The reaction forces at the supports.
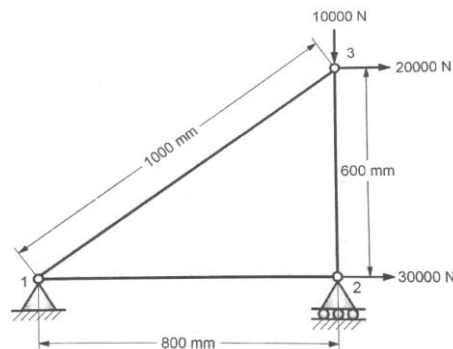
Q-8 **Attempt all questions**

(a) Explain the importance of wire frame modeling in CAD with advantages and limitations. **07**

(b) Prepare an algorithm and write a C program for the design of shaft. **07**