# C.U.SHAH UNIVERSITY Summer Examination-2018

#### Subject Name : Automotive CAD

Subject Code : 4TE06ACA1			Branch : B.Tech (Automobile)	
Semester : 6		Date : 23/04/2018	Time : 02:30 To 05:30	Marks :70
Instruct	ions:			
(1)	Use of Programmable calculator & any other electronic instrument is prohibited.			
(2)	Instructions written on main answer book are strictly to be obeyed.			
(3)	(3) Draw neat diagrams and figures (if necessary) at right places.			
(4)	Assume su	uitable data if needed		

- a) Enlist the geometric modeling facility available in CAD software.
- **b**) Write down the matrix of 3D mirror with respect to xy plane.
- c) Enlist the technical specification of CAD workstation.
- d) What do you mean by parametric representation?
- e) Define the synthetic curves.
- f) Describe tabulated surfaces in brief.
- g) Write the demerits of Cubic spline.
- **h**) What is mesh convergence ?
- i) Explain any two properties of stiffness matrix.
- j) Explain the characteristics of shape function.
- **k**) Draw and name any one element associated with 1D problem.
- I) Write the element equation for 1D heat conduction problem.
- m) Write any two objectives of optimization.
- **n**) Write the name of any two softwares which are used for 3D modeling and two softwares used for FEA.

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

#### Q-2 Attempt all questions

- a) Differentiate clearly between conventional design and computer aided design 07 process.
- b) Write down the reasons for implementing CAD in the field of Automobile 07 Engineering. Also give the limitations.

#### Q-3 Attempt all questions

- a) Define scan conversion. Scan convert a circle whose centre is (10, 20) and the radius is 10 units using Bresenham's circle algorithm.
- b) Explain DDA algorithm for line generation. Using the same find the pixel positions along the line path between end points (10, 5) and (15, 9). Write down its

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limitations.

## Q-4 Attempt all questions

- a) Show that the transformation matrix for a reflection about the line Y = -X is equivalent to a reflection relative to the Y axis followed by a counterclockwise rotation of 90°.
- b) Write short note on Importance of Homogeneous coordinate system in the form of matrix transformation.

## Q-5 Attempt all questions

- a) State the characteristics of B spline curve. Compare it with Bezier curves. 07
- b) Explain with neat sketch the major surface entities provided by CAD system. 07

## Q-6 Attempt all questions

- a) Explain basic steps involved in Finite Element Method and illustrate them with example. Give your comments on "FEM is an approximate method".
- b) Consider the bar shown in Figure 1. An axial load  $P = 200 \times 103 \text{ N}$  is applied as **07** shown. Determine the following
  - 1. The nodal displacements
  - 2. Stress in each material
  - 3. Reaction forces.



## Q-7 Attempt all questions

a) Determine the nodal deflection, stresses in members and the reactions at supports 07 of the three bar truss shown in Figure 2.
Area of each member = 800 mm<sup>2</sup>
E = 200 GPa



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Figure 2

b) Prepare an algorithm and write a C++ program for the design of Helical 07 Compression Spring.

## Q-8 Attempt all questions

- a) Explain Johnson's method of optimum design stating basic steps and classification. 07
- b) Explain relative advantages and disadvantages of CSG approach and B-rep 07 approach.



