

Enrollment No: _____

Exam Seat No: _____

C. U. SHAH UNIVERSITY

Winter Examination-2019

Subject Name : Computer Aided Design and Engineering

Subject Code : 4TE06CDE1

Branch: B.Tech. (Mechanical)

Semester: 6

Date: 09/09/2019

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:

- | | |
|-------------------------------------------------------------------------|---|
| a) Write the name of any four softwares which are used for 3D modeling. | 1 |
| b) What is mesh convergence? | 1 |
| c) Define the local coordinate system. | 1 |
| d) Write the matrix of 3D rotation with respect to z axis. | 1 |
| e) What is element connectivity? | 1 |
| f) Define element and node. | 1 |
| g) Write the full name of DDA and its application. | 1 |
| h) List the hardware used in CAD. | 1 |
| i) Write any two objectives of optimization. | 1 |
| j) Write the full form of STL data exchange standard. | 1 |
| k) What do you mean Aspect Ratio? | 1 |
| l) What is the primary output device in a graphics system? | 1 |
| m) How many numbers of nodes are in Triangular (quadratic) element? | 1 |
| n) How many numbers of nodes are in 1D spar element? | 1 |

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

Q-2 Attempt all questions

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|------------------------------------------------------------------------------------------|---|
| a) Enlist the various methods of geometric modeling. Discuss any one modeling in detail. | 7 |
| b) Differentiate clearly between conventional design and computer aided machine design. | 7 |

Q-3 Attempt all questions

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|--------------------------------------------------------------------|---|
| a) Compare IGES and PDES. | 7 |
| b) Explain DDA algorithm for line generation with its limitations. | 7 |

Q-4 Attempt all questions

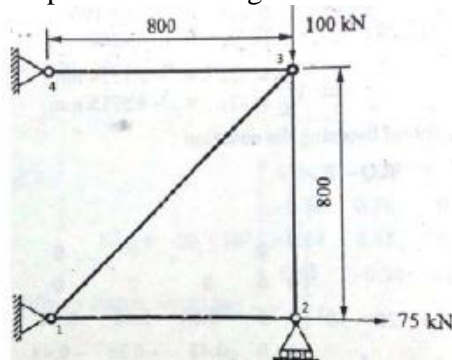
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|---------------------------------------------------------------------------------------------------------------------------|---|
| a) Using Bresenham's line algorithm, find the pixel positions along the line path between end points (20,10) and (30,18). | 7 |
| b) Prepare an algorithm and write a C++ program for the design of cotter joint. | 7 |



- Q-5 Attempt all questions**
- a) Discuss the need for CAD/CAM data exchange. 7
- b) The composite transformation of the graphics elements consists of the following operations. 7
- (i) The rotation through 120° about Z- axis.
- (ii) The translation through 10 and -20 units along X and Y directions respectively.
- (iii) The rotation through 30° about X- axis.
- Write the homogenous transformation matrices for the above operation and develop the composite transformation matrix, if operation is done as per above sequence.
- Will the sequence operation affect the end results?

- Q-6 Attempt all questions**
- a) Explain the concepts of FEM. Discuss the different steps involved in FEA in detailed. 7
- b) With reference to finite element analysis, discuss the treatment of boundary condition using elimination approach. 7

- Q-7 Attempt all questions**
- a) A four bar truss is as shown in Figure. Assuming that for each element, the cross-sectional area is 400 mm^2 and modulus of elasticity is 200 GPa, determine the nodal displacements. Length of each element is in mm. 7



- b) Discuss classification of optimization problem using suitable examples. 7
- Q-8 Attempt all questions**
- a) Reflect the diamond shape polygon whose vertices are A (-1, 0), B (0, -2), C (1, 0) and D (0, 2) about the line $y = x + 2$. 7
- b) Explain relative advantages and disadvantages of CSG approach and B-rep approach. 7

