Seat No.:

Enrolment No.

## **GUJARAT TECHNOLOGICAL UNIVERSITY** B. E. - SEMESTER – VI • EXAMINATION – WINTER 2012

Subject code: 161903 Subject Name: Computer Aided Design Time: 02.30 pm - 05.00 pm Instructions: Date: 04/01/2013

**Total Marks: 70** 

- 1. Attempt any five questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- Q.1 (a) Define computer aided design. Compare computer aided design and 07 conventional design with a neat sketch/block diagram. State the different applications of CAD in an engineering field. Justify the need of CAD in engineering area.
  - (b) Figure -1 shows the compound section fixed at both ends. Estimate the 07 reaction forces at the supports and the stresses in each material when a force of 200 kN is applied at the change of cross section.



- Figure -1 Q-1 (b)
- Q.2 (a) What do you mean by optimum design? Explain objectives of optimum 07 design. Distinguish clearly between optimum design and engineering design problem solution.
  - (b) Derive a final preliminary design equation (final PDE) for designing a shaft 07 of diameter 'd' for optimum power transmission considering the effect of torque gradient 'K' of the shaft, stress concentration factor 'K<sub>T</sub> ' and maximum shear stress criterion of failure for shaft material. The following limitations are given for optimum power transmission capacity:

 $\begin{array}{ll} \mbox{Torque gradient / stiffness, ( } K = M_T / \theta \ ) & K \geq K_{min} \\ \mbox{Diameter, } d \ \leq \ d_{max} \\ \mbox{Length, } & L_{min} \ \leq \ L \ \leq \ L_{max} \\ \mbox{Maximum shear stress, } \tau \leq S_y / 2 \ (FOS) \\ \mbox{( Where, FOS means factor of safety)} \\ & \mbox{OR} \end{array}$ 

(b) Formulate a final preliminary design equation (final PDE) for designing a 07 tensile rod of circular cross-section for optimum weight considering the maximum shear stress criterion of failure for rod material from the following

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given data:

Force to be transmitted = F Diameter,  $d \le d_{max}$ Length of rod ,  $L_{min} \le L \le L_{max}$ Maximum shear stress,  $s_{s max} \le S_y / 2$  (FOS) Density of material =  $\rho$ 

- Q.3 (a) What is a geometric transformations? Define and explain the following With 07 respect to 2-D transformations (any three):
   (i) Translation (ii) rotation (iii) scaling (iv) reflection
  - (b) Explain Bresenham's algorithm for generation of line. 07

## OR

Q.3 (a) A rectangle formed by four points PQRS whose coordinates are 05 P(50,50),Q(100,50),R(100,80),S(50,80).Find the new coordinates of the rectangle in reduced size using scaling factors S<sub>X</sub> = 0.5 and S<sub>Y</sub> = 0.6

(b) Explain 3-D geometric transformations (any three) in detail. 09

Q.4 (a) What is geometric modeling? Explain its importance in CAD / CAM 07 applications. States the different types of geometric modeling in mechanical engineering field.
(b) Explain B-rep and C-rep approach of solid modeling in detail. 07

## OR

Q.4	(a) Write about graphics standards. ( explaination and its uses)	07
Q.4	(b) Explain solid modeling in detail.	07

Q.5(a) Explain 2-D and 3-D elements used in finite element analysis.07(b) Explain the Bezier curves.07

## OR

- Q.5 (a) Discuss the different steps used in finite element analysis in detail. State the 07 suitable examples of FEA in engineering.
  - (b) Describe a standard graphics workstation in detail along with neat sketch. 07

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