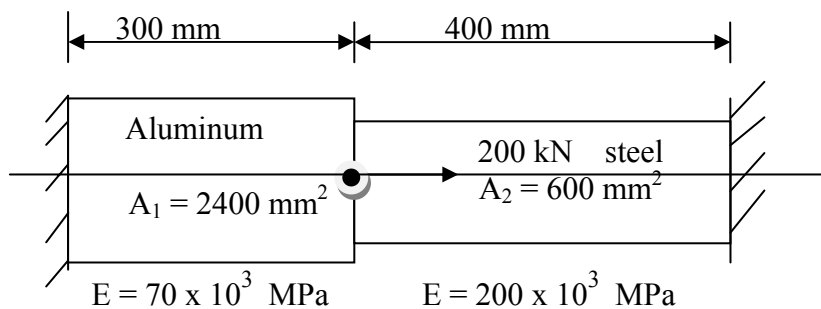


GUJARAT TECHNOLOGICAL UNIVERSITY**B. E. - SEMESTER – VI • EXAMINATION – WINTER 2012****Subject code: 161903****Date: 04/01/2013****Subject Name: Computer Aided Design****Time: 02.30 pm - 05.00 pm****Total Marks: 70****Instructions:**

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 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. **07**
- (b)** Figure -1 shows the compound section fixed at both ends. Estimate the 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. **07**

Figure -1 Q-1 (b)

- Q.2 (a)** What do you mean by optimum design? Explain objectives of optimum design. Distinguish clearly between optimum design and engineering design problem solution. **07**
- (b)** Derive a final preliminary design equation (final PDE) for designing a shaft of diameter 'd' for optimum power transmission considering the effect of torque gradient 'K' of the shaft, stress concentration factor 'K_T' and maximum shear stress criterion of failure for shaft material. The following limitations are given for optimum power transmission capacity: **07**
- Torque gradient / stiffness, ($K = M_T / \theta$) $K \geq K_{min}$
- Diameter, $d \leq d_{max}$
- Length, $L_{min} \leq L \leq L_{max}$
- Maximum shear stress, $\tau \leq S_y / 2$ (FOS)
- (Where, FOS means factor of safety)

OR

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

given data:

Force to be transmitted = F

Diameter, $d \leq d_{\max}$

Length of rod, $L_{\min} \leq L \leq L_{\max}$

Maximum shear stress, $S_{s \max} \leq S_y / 2$ (FOS)

Density of material = ρ

- Q.3 (a)** What is a geometric transformations? Define and explain the following With respect to 2-D transformations (any three) : **07**
(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 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 $S_x = 0.5$ and $S_y = 0.6$ **05**
- (b)** Explain 3-D geometric transformations (any three) in detail. **09**
- Q.4 (a)** What is geometric modeling? Explain its importance in CAD / CAM applications. States the different types of geometric modeling in mechanical engineering field. **07**
- (b)** Explain B-rep and C-rep approach of solid modeling in detail. **07**
- OR**
- Q.4 (a)** Write about graphics standards. (explanation 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 suitable examples of FEA in engineering. **07**
- (b)** Describe a standard graphics workstation in detail along with neat sketch. **07**
