

**3E1621**

Roll No.

Total No. of Pages : **3****3E1621****B. Tech. (Sem. III) (Main/Back) Examination, December 2017**  
**Civil Engg.****3CE1A Strength of Materials - I****Time : 3 Hours****Maximum Marks : 80****Min. Passing Marks : 26**

*Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

*Use of following supporting material is permitted during examination. (Mentioned in form No. 205)*

1. NIL2. NIL**UNIT - I**

**1** A bar of steel is 7 m long. First 2 m of it is 250 mm in diameter, next 3 m of it 200 mm in diameter and remaining 2 m of it 150 mm in diameter. Find change in length if applied tensile load is 100 kN and  $E = 0.21 \text{ MN/mm}^2$ .

**16****OR**

**1** Derive relation between Young's modulus of elasticity and Shear modulus of elasticity.

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## UNIT - II

2. At a point in web of girder, bending stress is 60 MPa tensile and shearing stress at same point is 30 MPa. Calculate principal stresses and maximum shear stress.

OR

2. Determine moment of inertia about centre of gravity XX for section shown below.

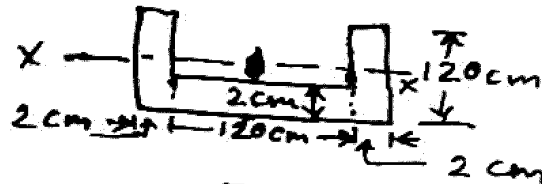


Fig. 1

## UNIT - III

3. A hollow cast iron column, hinged at both ends is 4 m long. Its external diameter is 200 mm and internal diameter is 150 mm. Find maximum load it can carry if factor of safety is 4. Use Rankine's formula. Take  $\sigma_y = 550 \text{ N/mm}^2$  and  $a = 1/1600$ .

OR

3. Calculate minimum wall thickness of a thin cylinder 1 m in diameter, if it is to withstand internal pressure of  $2 \text{ N/mm}^2$  and longitudinal stress is not to exceed  $30 \text{ N/mm}^2$  and also hoop stress not to exceed  $40 \text{ N/mm}^2$ .

## UNIT - IV

4. Draw shear force and bending moment diagrams for beam shown below.

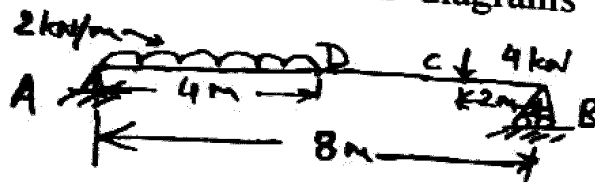


Fig. 2

OR

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- 4 Draw SFD and BMD for beam shown below.

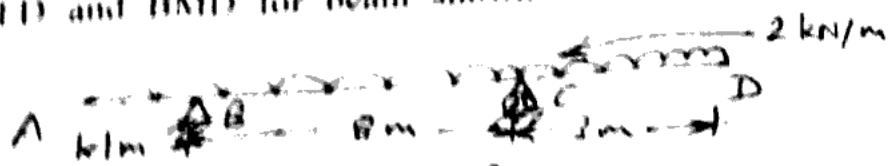


Fig. 3

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UNIT - V

- 5 An R.S.J. 55 cm deep and 19 cm wide having flange and web thicknesses of 1.5 cm and 0.99 cm respectively is used as beam. Calculate moment of resistance at section where max. Stress is  $100 \text{ N/mm}^2$ .

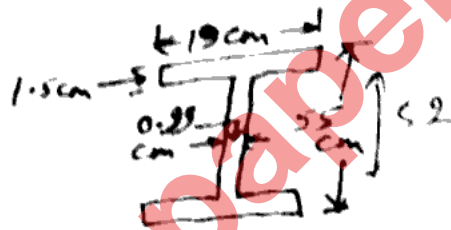


Fig. 4

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OR

- 5 For same section as fig. 4, if it is subjected to shear force of 100 kN, show variation of shear stress.

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