

Roll No. .

Total No. of Questions : 10] [Total No. of Printed Pages : 4

**B.E. IIIrd Semester (CGPA)  
Examination, 2017**

**EFS-321**

**CIVIL ENGG.  
(Mechanics of Material)  
Paper : CE-302**

**Time : 3 Hours] [Maximum Marks : 60**

**Note :-** Attempt all questions. All questions carry equal marks.

1. Define the following terms (any four) :

- (i) Stress
- (ii) Strain
- (iii) Hook's law
- (iv) Poisson's ratio
- (v) Elastic constants
- (vi) Mohr's circle

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Or

2. A tapering bar 80 cm long has a diameter of 0.4 cm at the top and 20 mm at the bottom. It is clamped at the top and carries an axial pull of 50 kN at its lower end.

Calculate the elongation of the bar. Take  $E = 2.1 \times 10^5$  mPa. 12

3. Define beam and its type with neat sketch. Also give one application of each beam. 12

Or

4. Write theory of simple bending and derive bending equation with suitable assumptions. 12

5. (a) What is equivalent length of a column ?  
(b) Prove that the crippling stress by Euler's formula

$$\text{is given by : } f_c = \frac{\pi^2 EI}{(L/k)^2} . \quad 3,9$$

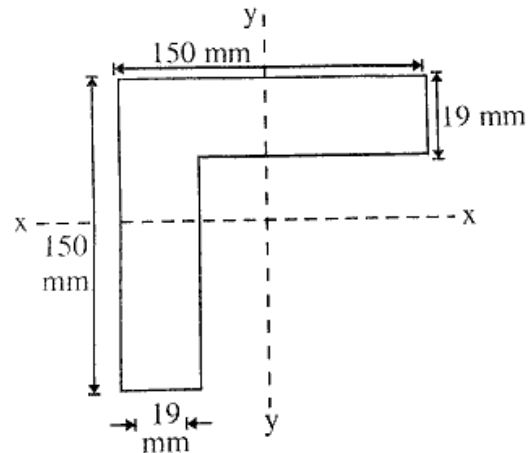
Or

6. A hollow cast iron column 200 mm outside diam. and 150 mm inside diam. 18 metre long has both ends fixed. It is subjected to an axial compressive load. Taking factor of safety as 6,  $f_c = 560$  mm<sup>2</sup>,  $a = 1/1600$ . Determine the safe rankine load. 12

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( 2 )

7. (a) What do you mean by shear centre ?  
(b) An equal angle section of size  $150 \times 150 \times 19$  mm is used as a beam with the load applied in the plane Y-Y parallel to the vertical leg as shown in fig. if the permissible stress is  $14 \text{ kN/cm}^2$ , calculate the bending moment, which the section can carry safely. Take  $I_{XX} = I_{YY} = 1170 \text{ cm}^4$  and  $I_{XY} = 690 \text{ cm}^4$ .



3,9

Or

8. (a) What do you mean by torsional rigidity of the shaft ?  
(b) A solid circular shaft is to transmit  $375 \text{ kW}$  at  $150 \text{ RPM}$ . Find the diameter of the shaft, if the shear stress is not to exceed  $65 \text{ MPa}$ .

4,8

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9. Write short notes on :

- (a) Bending stress  
(b) Bending moment  
(c) Hardness  
(d) Torsion

12

Or

10. (a) Describe combine effect of Bending moment and Twisting moment.  
(b) What do you mean by non-destructive testing ?

8,4

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