1312

Code : 15CE31T

Register Number | | | | | | | | | | |

III Semester Diploma Examination, Oct./Nov.-2019

ENGINEERING MECHANICS AND STRENGTH OF MATERIALS

Time : 3 Hours] **[Max. Marks : 100**

Note : (i) Answer any **six** questions from PART – **A**.

(ii) Answer any **seven** full questions from PART – **B**.

PART – A

1. Define the term "Force" and its various characteristics. **5**

2. Define the following : **5**
   (i) Hooks law
   (ii) Resilience
   (iii) Factor of safety
   (iv) Modulus of elasticity
   (v) Ductility

3. With a neat sketch, explain stress, strain curve for a mild steel specimen. **5**

4. Distinguish between centroid and centre of gravity. **5**

5. Name the types of beams, loading and supports with sketches. **5**

6. What are the assumptions in theory of simple bending ? **5**

7. Define : 5

(i) Neutral axis

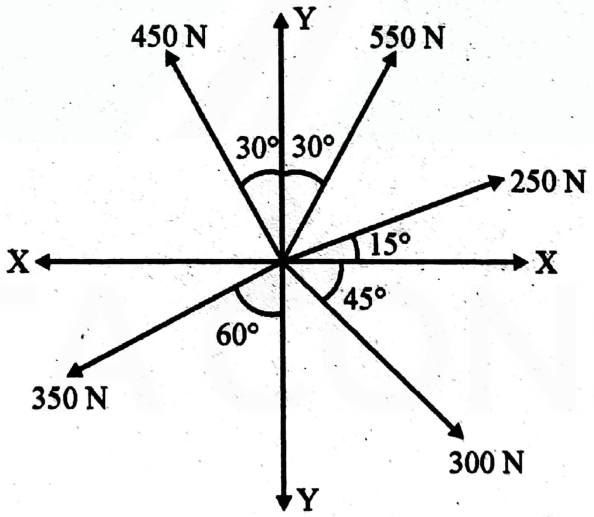
(ii) Bending stress

8. A cantilever beam of span '*l*' carries udl of 'w'/unit length over entire span. Determine maximum slope and deflection using moment area method. 5

9. What is effective length of column ? Tabulate the effective length and crippling load of column for various end conditions. 5

PART – B

10. Find the magnitude and direction of the Coplanner concurrent force systems shown in fig. 10



11. A bar of 20 mm diameter is subjected to on axial pull of 25 kN. After loading the diameter of the bar was measured and found to be 19.985 mm. Calculate the Poissions ratio and Young's modulus of the material. Take shear modulus of the material as 4.5×10^4 N/mm^2. 10

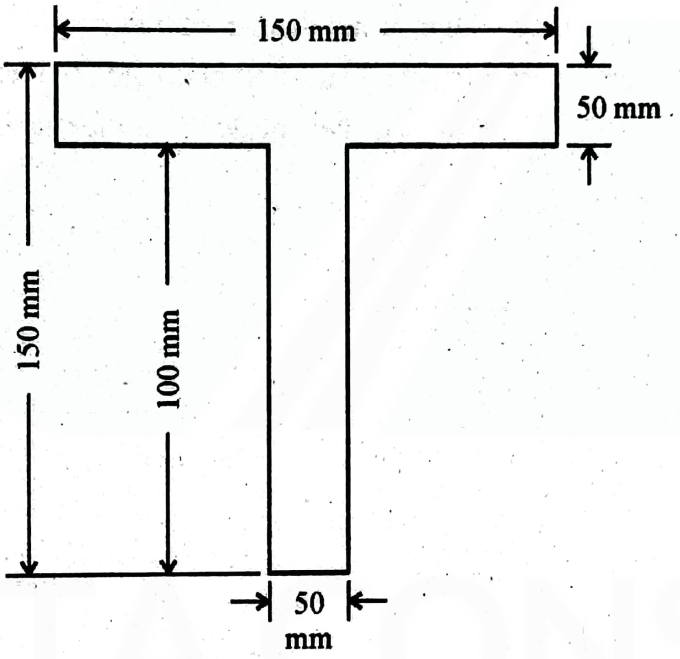
A reinforced concrete column is 300 mm × 300 mm in section. The column is provided with 8 bars of 20 mm diameter. The column carries a load of 360 kN, find the stress in concrete and steel bars. Find the load shared by each material. **10**

Take : $E_s = 2.0 \times 10^5$ N/mm^2

$E_c = 0.14 \times 10^5$ N/mm^2

13. Calculate M.I of an unequal section about the centroidal X-X axis. ISA 150 × 100 × 10 mm. **10**

14. Find the centre of gravity and moment of Inertia of a T-section about horizontal axis as shown in Fig. **10**



15. A cantilever beam 8 m long carries point loads of 10 kN, 5 kN and 3 kN at 2 m, 4 m, 8 m from the fixed end. Draw the shear force and bending moment diagrams indicating the values at salient points. **10**

16. A beam of length 10 m is simply supported at the ends and carries point loads of 5 kN each at a distance of 3 mt and 7 mt from left support and also a uniformly distributed load of 2 kN/m between the point loads. Draw SFD and BMD for the beam. **10**

[Turn over

313

17. A simply supported beam has a span of 6 mt. carrying a udl of 5 kN/m over entire span, if the maximum bending stress not exceed 10 kN/mm^2. Calculate the width and depth of beam. Take depth of beam is twice of its width. 10

18. (a) Define : 5

(i) Slope

(ii) Deflection

(b) A simply supported beam of span 4 m is carrying a uniformly distributed load of 2 kN/m over the entire span. Find the maximum slope and maximum deflection of the beam. Take EI for the beam as 80×10^9 N-mm^2. 5

19. A hollow alloy tube of 5 m long with external diameter 50 mm and thickness 5 mm was found to extend 5 mm under a tensile load of 50 kN. Find the buckling load for the tube with both ends hinged. Also find the safe load on tube taking a factor of safety as 4. 10