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## Second Semester B.Arch. Degree Examination, Aug./Sept.2020 Building Structures – II

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing one full question from each module.*

### Module-1

- 1 a. Explain: i) Hooke's law    ii) Factor of safety    iii) Poisson's ratio. (06 Marks)
- b. Write a short note on Temperature stress. (04 Marks)
- c. A reinforced concrete column of size 230mm × 400mm has 8 steel bars of 12mm diameter as shown in Fig.Q.1(c). If the column is subjected to an axial compression of 600kN, find the stress developed in steel and concrete. (Take modular ratio =  $\frac{E_s}{E_c} = 18.67$ ) (10 Marks)

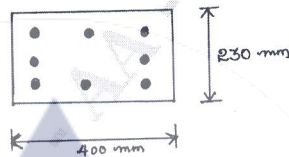


Fig.Q.1(c)

OR

- 2 a. Explain stress-strain diagram of a mild steel and brittle material subjected to tensile test. (10 Marks)
- b. A bar of length 1000mm and diameter 30mm is centrally boxed for 400mm, the bore diameter being 10mm as shown in Fig.Q.2(b). Under a load of 25kN, if the extension of bar is 0.185mm, what is the modulus of elasticity of the bar? (10 Marks)

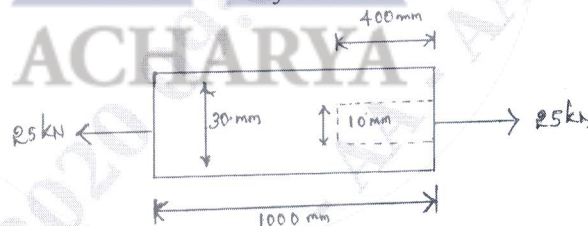


Fig.Q.2(b)

### Module-2

- 3 a. Explain Bending moment diagram and shear force diagram. (06 Marks)
- b. Write a note on sign convention in S.F.D and B.M.D. (04 Marks)
- c. Draw and derive S.F.D and B.M.D for following beam as shown in Fig.Q.3(c). (10 Marks)

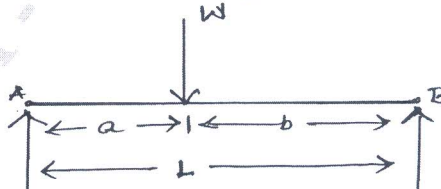


Fig.Q.3(c)

OR

- 4 a. Write the expression on relationship between rate of loading, shear force and bending moment. (08 Marks)
- b. Draw S.F.D and B.M.D for the following beam as shown in Fig.Q.4(b). (12 Marks)

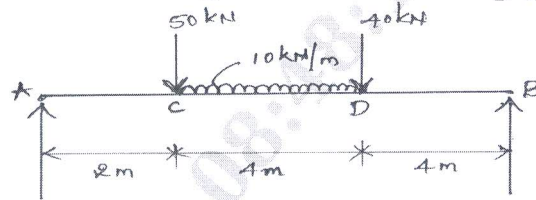


Fig.Q.4(b)

Module-3

- 5 a. Define:
- Section modulus
  - Shear stress in beam
  - Pure bending.
- b. Write all the assumptions made in bending theory. (04 Marks)
- c. Rolled steel joist of I section has dimension as shown in Fig.Q.5(c). This beam of I-section carries udl of 40kN/m run on a span of 10m. Calculate the maximum compressive stress produced due to bending. (10 Marks)

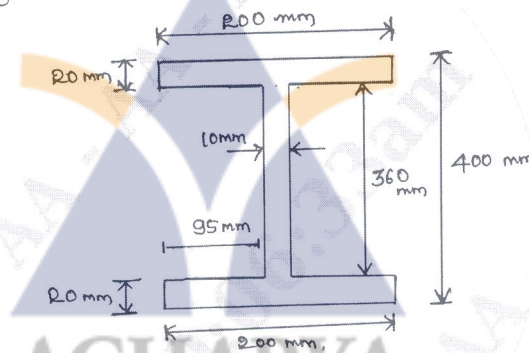


Fig.Q.5(c)

OR

- 6 a. Explain theory of simple bending. (06 Marks)
- b. An I-section as shown in Fig.Q.6(b) is simply supported over a span of 12m. If the maximum permissible bending stress is  $80\text{N/mm}^2$ , what concentrated load be carried at a distance of 4m from one support. (14 Marks)

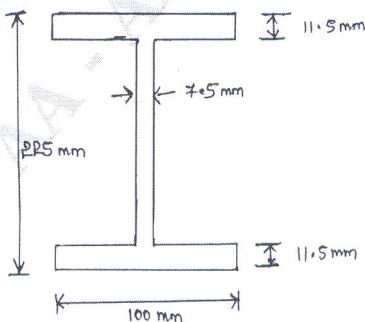


Fig.Q.6(b)

**Module-4**

- 7 a. Explain long column and short column. (06 Marks)
- b. Write the expressions for crippling load
- One end fixed and other free
  - Both ends fixed
  - One end fixed and other pin jointed
  - Both ends hinged.
- (04 Marks)
- c. A rectangular column of timber section  $15\text{cm} \times 20\text{cm}$  is  $6\text{m}$  long and both ends are being fixed. If  $E = 17.5\text{kN/mm}^2$ . Determine safe load for column (factor of safety is 3). (10 Marks)

**OR**

- 8 a. Write the assumptions and limitation of Euler's theory for critical load on long column. (08 Marks)
- b. A solid round bar  $3\text{m}$  long and  $5\text{cm}$  in diameter is used as a strut with both ends hinged. Determine the crippling load. Take  $E = 2 \times 10^5\text{N/mm}^2$ . (12 Marks)

**Module-5**

- 9 a. Write the expression for the relationship between radius of curvature, slope and deflection. (06 Marks)
- b. A simply supported beam of span ' $L$ ' is subjected to equal loads ' $W/2$ ', at each of  $1/3^{\text{rd}}$  span points. Find the expression for the deflection under the load and at mid span by help of macaulay method. (14 Marks)

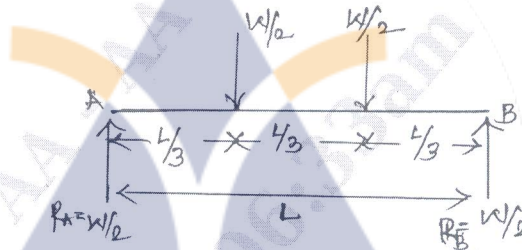


Fig.Q.9(b)

**ACHARYA****OR**

- 10 a. Explain double integration method and macaulay method to find deflection of beam. (10 Marks)
- b. Derive an expression for maximum deflection for cantilever beam subjected to concentrated load at free end. (10 Marks)

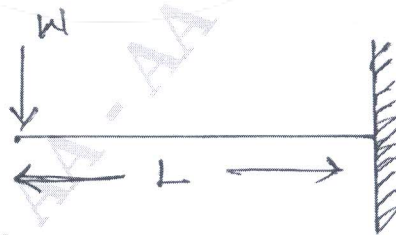


Fig.Q.10(b)

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