CBCS SCHEME

USN | | | | | | | | | | |

15ENG25

Second Semester B.Arch. Degree Examination, Dec.2023/Jan.2024
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. Define Centroid. State and prove parallel axis theorem of moment of inertia. **(08 Marks)**

b. Locate the centroid of the beam in Fig. Q1 (b). **(12 Marks)**

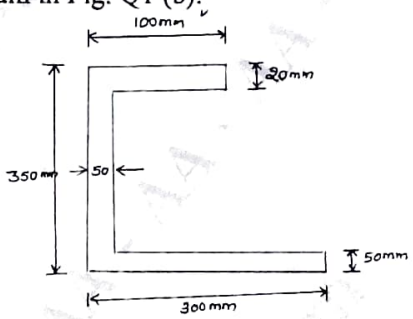

Fig. Q1(b)

OR

2 a. Explain in brief different types of supports with an example. **(06 Marks)**

b. Find the moment of inertia about centroidal axis in Fig. Q2 (b). **(14 Marks)**

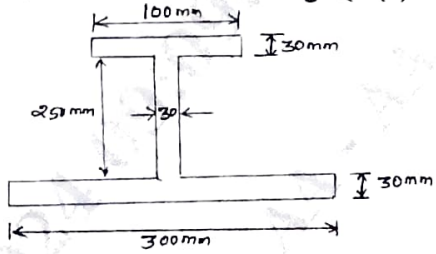

Fig. Q2(b)

MODULE - 2

3 a. Define i) Bending moment ii) Shear force and explain sign conventions. **(06 Marks)**

b. Draw shear force diagram (SFD) and bending moment diagram (BMD) for given beam in Fig.Q3(b). **(14 Marks)**

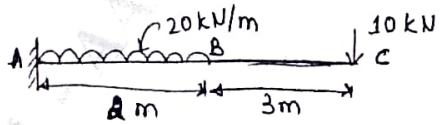

Fig. Q3(b)

OR

4 Draw shear force diagram and bending moment diagram for given beam Fig.Q4. **(20 Marks)**

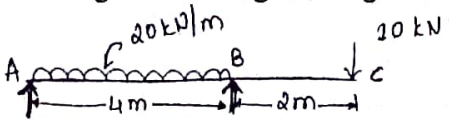

Fig. Q4

MODULE - 3

5 a. Define the following :
i) Neutral axis. ii) Bending stress. iii) Section modulus. **(06 Marks)**

b. A steel beam of hollow square section of outer side 100 mm and inner side 80 mm is used as beam for a span of 4 m. Find the uniformly distributed load on the beam that can carry if the bending stress is not to exceed 120 N/mm^2. **(14 Marks)**

OR

6 a. A Cantilever beam 4 m long carries a point load of 10 KN at free end. Determine the slope and deflection at free end. Take $E = 2 \times 10^5$ N/mm^2. $I = 4000 \times 10^4$ mm^4. **(10 Marks)**

b. A simply supported beam of span 4 m is carrying a uniformly distributed load of 5 kN/m throughout its span. The size of the beam is 100×200 mm. Find the maximum slope and deflection at mid span, if $E = 1 \times 10^4 N/mm^2$. **(10 Marks)**

MODULE - 4

7 a. Differentiate between short and long columns. **(04 Marks)**

b. A hollow mild steel tube 6 m long 40 mm internal diameter and 50 mm external diameter is used as a shunt with both ends hinged. Find the crippling load and safe load taking factor of safety as 3.0 and $E = 2 \times 10^5 N/mm^2$. **(16 Marks)**

OR

8 a. Define : i) Strut ii) Slenderness ratio iii) Buckling lond iv) Safe load. **(04 Marks)**

b. A solid rand bar 3 m long and 50 mm diameter is used as a strut. Determine the crippling load, when the given strut is used with the following conditions : $E = 2 \times 10^5 N/mm^2$.
i) Both ends hinged
ii) One end fixed and other is free
iii) Both ends are fixed.
iv) One end fixed and other is hinged. **(16 Marks)**

MODULE - 5

9 The cross sectional area of a square concrete column is 400 mm × 400 mm with 6 vertical , 12 mm ϕ bars. Determine the strength of column with respect to steel and concrete separately for the given stresses in steel and concrete. Stresses are :
i) 415 N/mm^2 (steel), 20 N/mm^2 (concrete)
ii) 500 N/mm^2 (steel), 25 N/mm^2 (concrete)
iii) 250 N/mm^2 (steel), 15 N/mm^2 (concrete). **(20 Marks)**

OR

10 A circular cross-section of 300 mm diameter size is reinforced with 6 bars of 16 mm diameter. Determine the strength of concrete and steel with following data :
i) $f_y = 250 N/mm^2$, fck = 15 N/mm^2
ii) $f_y = 415 N/mm^2$, fck = 20 N/mm^2
iii) $f_y = 500 N/mm^2$, fck = 25 N/mm^2

where fck = stress in concrete, f_y = stress in steel. **(20 Marks)**

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