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15ENG2.5

Second Semester B.Arch. Degree Examination, June/July 2019 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. Find center of gravity of plane figure by method of moments. (08 Marks)
- b. Locate the centroid for the composite section shown in Fig. Q1(b) about the given axis a – a and b – b. (12 Marks)

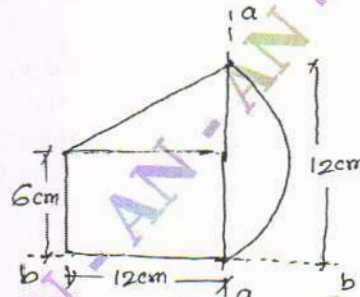


Fig. Q1(b)

OR

- 2 a. State and prove parallel axis theorem. (08 Marks)
- b. Determine moment of inertia of the section about the horizontal and vertical axis passing through the centre of gravity of the section shown Fig. Q2(b). (12 Marks)

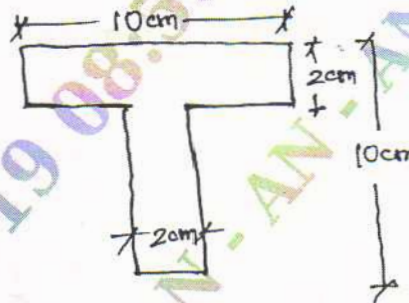


Fig. Q2(b)

Module-2

- 3 a. Define (i) Bending moment (ii) Shear force. Explain sign conventions. (06 Marks)
- b. Draw bending moment diagram and shear force diagram for the given beam shown in Fig. Q3(b). (14 Marks)

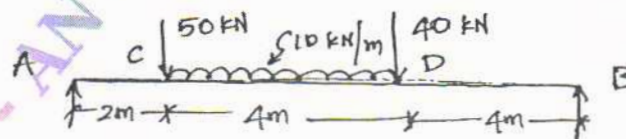


Fig. Q3(b)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

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

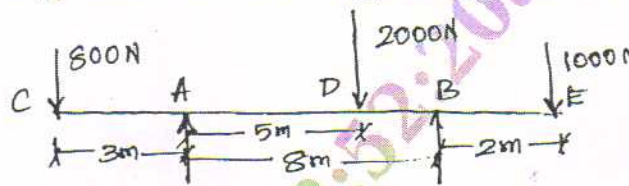


Fig.Q4

Module-3

- 5 a. Define (i) Section modulus (ii) Moment of Inertia (iii) radius of Gyration. (06 Marks)
 b. A cantilever is 3m long with 150×230 mm rectangular cross section carries a concentrated load of 40 kN.
 (i) What maximum bending stress developed at the base of the cantilever? (07 Marks)
 (ii) For the same span and loading condition what stress would develop in a beam with a circular cross section having a diameter 400 mm. (07 Marks)

OR

- 6 a. A timber beam spans 4 m carries a udl load of 4 kN/m run. 100×200 mm timber section is used if the modulus of elasticity in the timber is $E = 0.125 \times 10^5$ N/mm². Find the maximum deflection in the timber beam. (10 Marks)
 b. Determine the deflection for a cantilever beam at free end with concentrated load W at free end $W = 30$ kN, $L = 3$ m, $E = 2 \times 10^5$ N/mm², $I = 2 \times 10^8$ mm². (10 Marks)

Module-4

- 7 a. For different end conditions obtain Euler's expression for buckling load of columns. (08 Marks)
 b. Determine the section of a cast iron hollow cylindrical column 3m long with both ends firmly built in. It carries an axial load of 800 kN. The ratio of internal to external diameter is 5/8, use factor of safety as 4. (12 Marks)

OR

- 8 a. Define (i) Effective length of column (ii) Crippling load (iii) Slenderness ratio. (06 Marks)
 b. Calculate the critical load of a strut which is made of a bar circular in section and 5 m long which is pin-jointed at both ends. The same bar when used a simply supported beam gives a mid span deflection of 10 mm with a load of 10 N at the centre. (14 Marks)

Module-5

- 9 a. Define short column and long column as per IS456-2000. (04 Marks)
 b. Design a square column to carry a working load of 980 kN. The grade of concrete and steel are M₂₀ and Fe415 respectively. (16 Marks)

OR

- 10 a. Determine the load carrying capacity of a column 400×400 mm reinforced with 6 rods of 20 mm ϕ . The grade of concrete and steel are M₂₀ and Fe415 respectively. (10 Marks)
 b. Determine the steel required to carry a load of 1200 kN on Rectangular column 400×400 . The grade of concrete and steel are M₂₀ and Fe415 respectively. (10 Marks)
