



C20-AA-404

7410

**BOARD DIPLOMA EXAMINATION, (C-20)**  
**OCTOBER/NOVEMBER—2023**  
**DAA – FOURTH SEMESTER EXAMINATION**

**THEORY OF STRUCTURES**

Time : 3 Hours ]

[ Total Marks : 80

---

**PART—A**

3×10=30

- Instructions :** (1) Answer **all** questions in **Part—A**.  
(2) Each question carries **three** marks.

1. Draw the SF and BM diagrams for a cantilever beam carrying UDL throughout the span.
2. List the different types of beams and sketch them.
3. Explain the term 'Point of Contraflexure'.
4. Define the following terms :
  - (a) Neutral axis
  - (b) Section modulus
5. Write the equation of simple bending with usual notations.
6. Draw the shear stress distribution curve for I section.
7. If for a rectangular beam of 100 mm wide and 200 mm deep the maximum stress induced is  $280 \text{ N/mm}^2$ . What is the maximum moment of resistance?
8. For a rectangular beam what is the relation between maximum shear stress and average shear stress?

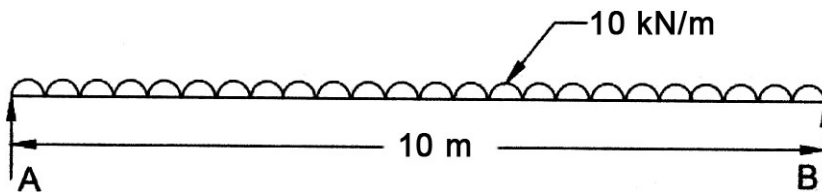
9. Define (a) crushing load and (b) crippling load.
10. State the different Euler's formulae for any three different end conditions of columns.

**PART—B**

8×5=40

**Instructions :** (1) Answer either (a) or (b) from each question from **Part—B**.  
 (2) Each question carries **eight** marks.

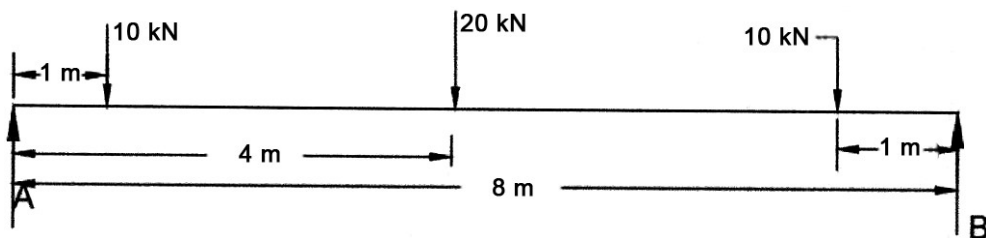
11. (a) Draw the SFD and BMD for the given beam.



(OR)

- (b) Draw the shear force diagram and bending moment diagram for the simply supported beam of 5 m length carrying two point loads of 20 N at 1/3 and 2/3 of the length.

12. (a) Find the end support reactions for the given beam.



(OR)

- (b) A simply supported beam 8 m long carries point loads of 10 kN, 8 kN, and 6 kN at distances of 2 m, 5 m and 6 m respectively from left support. Draw the SF and BM diagrams.

13. (a) A mild steel column 6 m long and 50 mm dia with both ends fixed. Determine the Euler's crippling load. Take  $E = 2 \times 10^5 \text{ N/mm}^2$ .

(OR)

(b) A hollow cast iron column whose external dia is 200 mm, thickness of 50 mm, 5 m long and is fixed at the both ends and subjected to an axial compressive load. Taking factor of safety as 6, determine the safe Rankine's buckling load. Given  $f_e = 550 \text{ N/mm}^2$ ,  $a = 1/1600$ .

14. (a) A rectangular beam of 300 mm deep is simply supported over a span of 4 m. What UDL/m the beam can carry, if the bending stress is not to exceed  $120 \text{ N/mm}^2$ ? Take  $I = 8 \times 10^7 \text{ mm}^4$ .

(OR)

(b) A timber joist of square section  $200 \text{ mm} \times 200 \text{ mm}$  is fixed as cantilever with a length of 4 m is subjected to uniformly distributed load of  $2 \text{ kN/m}$ . What is the maximum stress developed in the beam?

15. (a) A rectangular beam of  $250 \times 450 \text{ mm}$  is subjected to a maximum shear force of  $500 \text{ kN}$ . Calculate intensity of shear stress at a height of  $100 \text{ mm}$  above the base of the beam.

(OR)

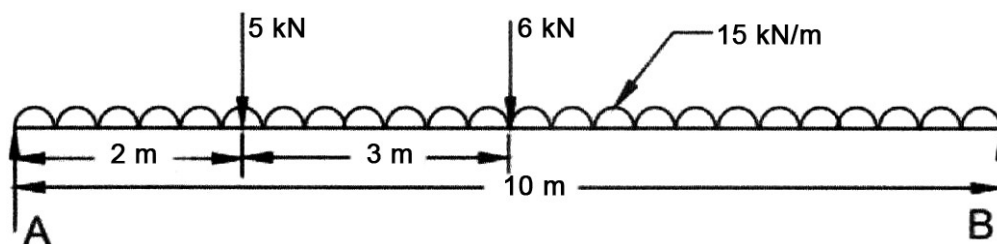
(b) An I section has flanges  $80 \times 15 \text{ mm}$  and web  $100 \times 20 \text{ mm}$ . This section is subjected to shear force of  $10 \text{ kN}$ . Find the values of maximum and average shear stresses induced in the section.

### PART—C

10×1=10

**Instructions :** (1) Question No.16 is compulsory.  
(2) The question carries **ten** marks.

16. Draw the shear force diagram and bending moment diagram of the given simply supported beam.



★★★