Reg. No. : | | | | | | | | | | | |

P 1100

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007.

Fourth Semester

Civil Engineering

CE 236 — STRENGTH OF MATERIALS

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define strain energy and write its units in S I system.

2. State Castigliano's theorem for deflection.

3. Mention any two advantages and disadvantages of fixed beam.

4. Write down the three moment equation for continuous beam.

5 Draw the core of square section of side 300 mm.

6. Calculate the radius of gyration of solid circular section of diameter 200 mm.

7. What are the significance of principal stresess?

8. State the maximum principal stress theory of elastic failure.

9. Write the Winkler Bach formula for curved beams.

10. What are compound cylinders?

PART B — (5 × 16 = 80 marks)

11. (a) A cantilever beam of span 3 m carries a UDL of 5 kN/m for the entire span in addition to a concentrated load of 20 kN at the free end. Using energy principle, calculate the deflection under the concentrated load. Assume EI = 2×10^4 kN/m mm^2.

Or

(b) Compute the vertical deflection at joint B of the stress shown in figure Q 11 b. Use unit load method. Assume AE = 10^2 kN for each member.

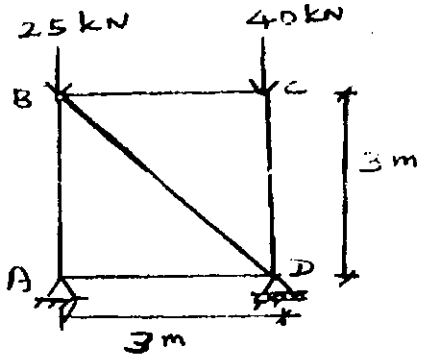

Fig. Q 11.b

12. (a) Calculate the moment and reaction developed at fixed supports of the fixed beam shown in figure Q 12 a.

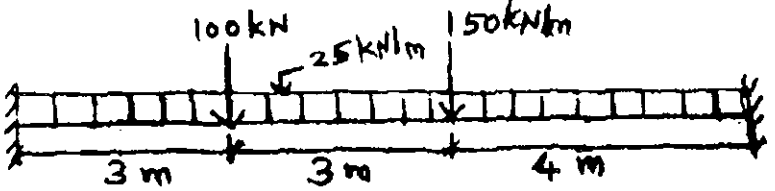

Fig. Q 12.a

Or

(b) Compute the moment and reaction developed at each support of the continuous beam show in figure Q 12 b.

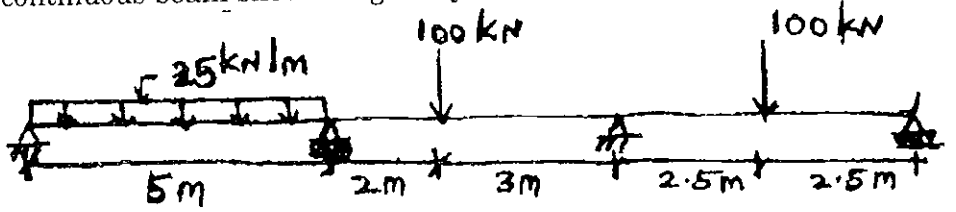

Fig. Q 12 b

13. (a) A rectangular pier of 1.5 m × 1 m is subjected to a compressive load of 450 kN shown in figure Q 13.a. Find the stresses on all the 4 corners of the pier and locate the neutral axis.

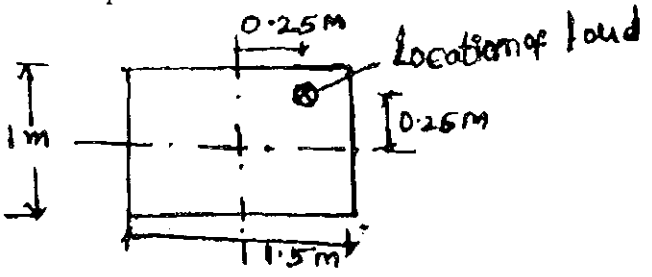

Fig. 13 a

Or

(b) A solid round bar 4 m long and 60 mm in diameter is used as a strut. Determine the Euler's crippling load under the following end conditions:

(i) both ends hinged

(ii) one end fixed and the other end free

(iii) both ends are fixed and

(iv) one end is fixed and the other end is hinged.

Assume the modulus of elasticity of the material of the bar as 200 kN/ mm^2 .

14. (a) The state of stress (N/mm^2) . at a point is given by

40 20 30

20 60 10

30 10 50

Determine the principal stresses and the orientation of any one of the principal plane.

Or

(b) At a point in a strained material, the major principal stress is $200N/mm^2$ tensile and the minor principal stress. If the yield stress of the material is 250 N/mm^2 , Find the value of the minor principal stress at which yielding commence, according to (i) maximum principal stress theory (ii) maximum shear stress theory and (iii) total strain energy theory. Assume Poison's ratio as 0.28.

15. (a) A thick cylinder of 150 mm outer radius and 100 mm inner radius is subjected to an internal pressure of 60 N/mm^2 . Calculate the maximum and minimum intensities of circumferential stresses across the section. Also sketch the circumferential stress distribution and radial stress distribution across the section.

Or

(b) Write brief technical note on :

(i) Computation of bending stress in unsymmetrical sections.

(ii) Significance of shear centre.

(iii) Location of neutral axis in curved beams.

(iv) Residual stresses.
