LIB
13/11/13 AN

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

Question Paper Code : 33226

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Fourth Semester

Civil Engineering

CE 1252/CE 1255/070100035 – STRENGTH OF MATERIALS

(Regulation 2004/2007)

(Common to B.E. (Part – Time) Third Semester, Regulation 2005)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define strain energy.

2. State Castigliano's second theorem.

3. What is meant by an indeterminate beam?

4. State Clayperon's theorem of three moments.

5. What are compound cylinders?

6. State middle third rule.

7. Define residual stresses.

8. Give the spherical components of stress tensor.

9. Define stress concentration.

10. Write the Winkler Bach formula.

PART B — (5 × 16 = 80 marks)

11. (a) A beam 4 cm wide, 8cm deep is freely supported over a span of 2 m. A weight of 5 kg is dropped on to the middle of the beam from a height of 4 cm. Calculate the maximum instantaneous stress and deflection. $E = 2 \times 10^6 kg / cm^2$.

Or

(b) A cantilever of length L and uniform section carries a point load W at the free end. Find the strain energy stored in the beam and hence calculate the deflection at the free end.

12. (a) A fixed beam of span 5m carries a uniformly distributed load of 2 t/m. Find the fixed end moments and the maximum sagging bending moment.

Or

(b) A continuous beam covers three consecutive spans of 6,8 and 10 meters. The first span carries a UDL of 6 t/m, the second a UDL of 5t/m, and the third a UDL of 4 t/m. Draw the B.M and S.F. diagrams using clayperon's theorem of three moments.

13. (a) A thick cylinder of internal diameter 10 cm, external diameter 20 cm, is subjected to an internal pressure of 100 kg/cm^2. Draw diagrams showing the distribution of radial pressure and hoop stress in the wall of the cylinder.

Or

(b) The Euler's crippling load for a strut, 75 cm long, 0.75 cm diameter, is 10 kg. Estimate the critical load of a column of the same material, 15 cm diameter, 6meters long, and fixed in a similar manner.

14. (a) Find the strain energy stored in a steel bar 250 mm long and of cross section25 mm $\times$ 6 mm, when it is subjected simultaneously to an axial pull of 20 kN and a compressive stress of 80 N/mm^2 on its narrow edge. For steel, E=2.04 $\times$ 10^{5}N/mm^2 and 1/m = 0.28.

Or

(b) Explain the following

(i) Maximum shear stress theory

(ii) Maximum strain energy theory

15. (a) Determine the principal moments of inertia for an unequal angle section 60 mm $\times$ 40 mm $\times$ 6 mm.

Or

(b) Explain the graphical method of locating principal stresses.