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2017

STRUCTURE - III

Paper : ENG-3·5

Full Marks : 100

Time : Three hours

***The figures in the margin indicate
full marks for the questions.***

*Answer **any five** questions.*

1. What is Macaulay's method for finding the slope and deflection of a simply supported beam having concentrated load at the centre of the beam ?   20

2. (A) Write the assumptions for shear stress in a circular shaft subjected to torsion.   5

   (B) A circular shaft of diameter 60*mm* is running at 150*rpm*. If the shear stress is not to exceed 50*μPa*, find the power which can be transmitted by the shaft.   15

Contd.

3. Derive the following expression

$$T = \frac{\mu}{16}\tau D^3$$

where, T = Torque transmitted by a solid circular shaft of diameter D

τ = Maximum shear stress.   20

4. A hollow shaft of external diameter $120\,mm$ transmits $300\,kW$ power at $200\,rpm$. Determine the maximum internal diameter if the maximum shear in the shaft is not to exceed $60\,N/mm^2$.   20

5. A simply supported beam of $2m$ carries an udl of $20\,kN/m$ throughout the whole span. Determine the maximum slope and deflection of the beam. Take flexural rigidity of the beam as $500 \times 10^9\,Nmm^2$.   20

6. (a) Tabulate the relationship between the different end conditions of a column with the equivalent length.   10

   (b) Determine the buckling load for a street of rectangular flat section having size $100 \times 200\,mm^2$. The street is $4m$ long and hinged at both the ends.

   Take $E = 200\,GN/mm^2$.   10

7. Write short notes on :   4×5=20

   (a) Buckling and Critical Buckling load

   (b) Slenderness ratio

   (c) Shear stress and Normal stress

   (d) Assumptions used in Euler's column theory.

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