Hall Ticket Number:

Code No. : 22011

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (Civil Engg.) II Year II-Semester Main & Backlog Examinations, May-2017

Strength of Materials-II

Time: 3 hours Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

1. Derive an expression for the slope and deflection of a simply supported beam of span 'L' subjected to uniformly distributed load 'w' per meter over its entire length.
2. Explain Macaulay's method and its applications.
3. State the differences between actual beam and conjugate beam.
4. State the differences between fixed beam and continuous beam.
5. How Clapeyron's theorem of three moments is applied to continuous beam with (i) simply supported ends (ii) fixed end supports?
6. How to determine the shear centre for channel section and I-Section?
7. Define the terms (i) Polar Modulus (ii) Strength of shaft.
8. Define helical springs. Name the two important types of helical springs.
9. Define Castigliano's theorem and its applications to beams.
10. Define Slenderness ratio. State the limitations of Euler's formula.

Part-B (5 × 10 = 50 Marks)
(All bits carry equal marks)

11. a) Determine slope and deflection of a simply supported beam of length 'L' carrying a point load 'W' at the centre by using Mohr's theorem.

b) A beam of length 10 m is simply supported at its ends carries two point loads of 2 kN and 5kN at a distance of 4 m and 6 m from left end respectively. Determine (i) deflection under each load (ii) maximum deflection. E= 2×10^5 N/mm^2 and I = 0.5×10^9 mm^4.

12. a) A simply supported beam of span 8 m carries a uniformly distributed load of 1kN per meter length. The beam is propped at the middle of the span. Find the amount by which the prop should yield, in order to make all the three reactions equal. E = 2×10^5 N/mm^2 and I = 8×10^8 mm^4.

b) A fixed beam of length 12 m carries point loads of 30 kN and 15 kN at distance of 4 m and 8 m from left end. Determine the fixed end moments and the reactions at the supports. Draw B.M and S.F diagrams.

13. a) A continuous beam consists of three successive spans of 6 m, 8 m and 4 m and carries uniform loads of 4 kN/m, 2 kN/m, and 6 kN/m respectively on the spans. Determine the bending moments and reactions at the supports.

b) Determine the position of shear centre for a channel section as shown in Fig.1.

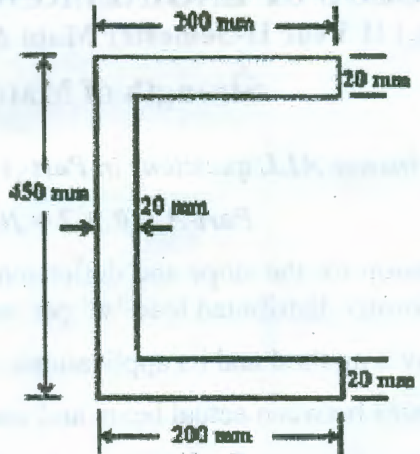

Fig. 1

14. a) A hollow shaft is 1.5m long and has external diameter 75 mm. It has 30 mm internal diameter. If the maximum shear stress in it is not to exceed 100 N/mm^2, determine the maximum power transmitted by it at speed of 400 rpm.

b) A closely coiled helical spring of mean diameter 300 mm is made of 40 mm diameter rod and has 16 turns. Compute the axial deformation of the spring when subjected to an axial load of 4 kN. Take $C = 0.8 \times 10^5 N/mm^2$.

15. a) Derive expression for strain energy stored in a body when the load 'P' is applied gradually.

b) A hollow mild steel tube 5 m long 50 mm internal diameter and 6 mm thick is used as a strut with both ends fixed. Find the crippling load and safe load by taking factor of safety as 2.5 and E = 200 GPa.

16. a) A beam of span 10 m and of uniform flexural rigidity EI = 50 $MN\text{-}m^2$, is simply supported at its ends. It carries a uniformly distributed load of 20 kN/ m run over the entire span. It is also subjected to a clockwise moment of 150 kNm at a distance of 4 m from the left support. Calculate the slope of the beam at the point of application of the moment.

b) A fixed beam AB of length 8 m carries a uniformly distributed load of 4 kN/m over the left half of the span together with a point load of 5 kN at a distance of 4.5 m from left end. Determine the fixed end moments and the support reactions.

17. Write short notes on any two of the following:

a) Computation of deflection of beams using double integration method using an example.

b) Strength and stiffness of a circular shaft.

c) Secant formula for columns.

******