1619

Code : 15ME31T

Register Number

III Semester Diploma Examination, Oct./Nov.-2019

STRENGTH OF MATERIALS

Time : 3 Hours] **[Max. Marks : 100**

Note : (i) Answer any **six** questions from Part – A and any **seven** questions from Part – B.

(ii) Assume missing data.

PART – A

1. Define Poisson's ratio and modulus of rigidity. **5**

2. Explain Hoop's stress and Longitudinal stress in thin cylindrical shells. **5**

3. State parallel and perpendicular axis theorem. **5**

4. Locate C.G. for triangle, rectangle, circle, semicircle, square with the help of plain figure. **5**

5. Define shear force and bending moment in beams. **5**

6. Explain sagging and hogging bending moment. **5**

7. List the assumptions of theory of simple bending. **5**

8. Explain Modulus of section for rectangular and circular sections. **5**

9. Explain proof resilience and modulus of resilience. **5**

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PART – B

10. A rod of diameter 15 mm and 50 mm long is subjected to tensile load of 25 kN. The modules of elasticity for steel rod may be taken as 200 kN/mm^2. Find the stress, strain and elongation of the bar due to applied load. **10**

11. A bar of 30 mm diameter is subjected to an axial pull of 80 kN. The measured extension is 0.1 mm on a gauge length of 200 mm and the change in diameter is 0.04 mm. Calculate the Poisson's ratio and the values of Young's modulus, bulk modulus and modulus of rigidity. **10**

12. Find the C.G. of 'L' section of dimensions 100 × 80 × 20 mm. **10**

13. Find the moment of inertia [I_{XX}] of I section having top flange of 100 mm × 20 mm, web 120 × 20 mm and bottom flange 150 × 20 mm. **10**

14. A cantilever beam of length 3 m subjected to point load of 5 kN, 8 kN and 12 kN at a distance of 1 m, 1.5 m and 2.5 m from the free end. Draw SFD and BMD. **10**

15. A simply supported beam of length 8 m carries two point loads of 30 kN and 40 kN respectively at a distance of 1.5 m and 6.5 m from the left support. Also it carries a UDL of 10 kN/m between the points loads. Draw shear force and bending moment diagram. **10**

16. A steel plate is bent into an arc of a circle of radius 10 m. If the breadth of the plate is 150 mm and thickness 25 mm and E = 2 × 10^5 N/mm^2. Calculate the maximum stress induced in the plate and the bending moment which can produce this stress. **10**

17. A simply supported wooden beam of span 1.3 m is carrying a central point load of 40 kN. If the allowable bending stress in the timber is taken as 8 N/mm^2. Find the breadth and depth of the timber. Take b = 0.6 d. **10**

18. (a) List the assumptions made in theory of torsion. **5**

(b) Calculate the strain energy stored in a bar 2.5 m long, 50 mm wide and 40 mm thick when it is subjected to tensile load of 50 kN. Take Young's modulus is 2×10^5 N/mm^2. **5**

19. A solid circular shaft is required to transmit 100 kW at 180 rpm. The permissible shear stress in the shaft is 60 N/mm^2. Find the suitable diameter of the shaft. The angle of twist is not to exceed 1° in a length of 3 m. The value of rigidity modulus is 0.8×10^5 N/mm^2. **10**
