1509 **Code : 15ME31T**

Register Number | | | | | | | | | | |

III Semester Diploma Examination, April/May-2019

STRENGTH OF MATERIALS

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

Instructions : Answer any **6** questions from Part-**A** and any **7** questions from Part-**B**.

PART – A

1. Explain hoop stress and Longitudinal stress in thin cylindrical shells. **5**

2. Explain thermal stresses and Bulk modulus. **5**

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

4. Define Centre of gravity. Locate the CG for rectangle, cone and trapezium with the help of plane figures. **5**

5. Define the following : Shear force and Point of contraflexure in beams. **5**

6. Explain Sagging and Hogging bending Moment. **5**

7. Explain moment of resistance and radius of curvature in a beam. **5**

8. Write the bending equation with all notations and state any 4 assumptions made in theory of simple bending. **5**

9. Compare the strength of hollow and solid shaft. **5**

PART – B

10. (a) Define : Poisson's ratio and Modulus of rigidity. 4

(b) A bar of steel 4m long, 30 mm wide and 20 mm thickness is subjected to an axial load of 30 kN in the direction of its length. Find the changes in length, thickness and volume if young's modulus is 200 kN/mm^2. 6

11. A mild steel bar of 15 mm diameter was subjected to tensile test. The test bar was found to yield at a load of 90 kN and it attains maximum load of 180 kN and ultimately fails at a load of 67.5 kN. Determine the following tensile stress at the yield point, ultimate stress and stress at the breaking point, if the diameter of the neck is 7.5 mm. 10

12. Find the centroid of I-section. Top flange 100 × 20 mm. Web 20 × 100 mm and Bottom flange 200 × 20 mm 10

13. Find the moment of Inertia of an L-section of dimensions 100 × 80 × 20 mm through CG and parallel to shorter leg. 10

14. A cantilever beam of Length 4m subjected to a point load of 3 kN, 5 kN, 8 kN and 10 kN at a distance of 1 m, 1.5 m, 3 m and 3.5 m from the free end. Draw SFD and BMD. 10

15. A Simply supported beam 6 m long is carrying a uniformly distributed load of 2 kN/m over a length of 3m from the right support. Draw SFD & BMD for the beam. Also, calculate the maximum bending moment on the beam. 10

16. A rectangular beam 300 mm deep is simply supported over a span of 4m. What uniformly distributed load the beam may carry, if the bending stress is not to exceed 120 MPa. Take I = 80 × 10^6 mm^4. 10

17. A Cast Iron pipe of external diameter 60 mm and 10 mm thickness and 5 m long is supported at its ends. The pipe carries a point load of 100 N at its centre. Calculate the maximum bending stress induced in the pipe. 10

18. (a) Define : (i) Resilience, (ii) Proof resilience, (iii) modulus of resilience 3

(b) An axial pull of 20kN is suddenly applied on a steel rod 2.5 m long and 1000 mm^2 in cross-section. Calculate the strain energy which can be absorbed in the rod. Take E = 200 GPa. 7

19. (a) List the assumptions made in theory of Torsion. 3

(b) A solid circular shaft is required to transmit 1 MW at 240 rpm. The permissible shear stress in the shaft is 60 N/mm^2. The angle of twist is not to exceed 1° in a length of 2.5 m. The value of rigidity modulus is 80 kN/mm^2. Find the diameter of shaft. 7