4253

BOARD DIPLOMA EXAMINATION, (C-14)

MARCH/APRIL—2021

DME - THIRD SEMESTER EXAMINATION

STRENGTH OF MATERIAL

Time : 3 hours]   [*Total Marks* : 80

PART—A

4×5=20

Instructions :   (1) Answer *any* **five** questions.

(2) Each question carries **four** marks.

(3) Answers should be brief and straight to the point and shall not exceed five simple sentences.

1. List three elastic constants.

2. Define Lateral strain and linear strain.

3. State the difference between sudden load and impact load.

4. Draw the shear force diagram for cantilever beam subjected to a point load at its free end.

5. List any three types of loads on beams.

6. Define the terms *(a)* Neutral layer and *(b)* Neutral axis.

7. State the bending moment equation and write the units of each term.

8. State the torsion equation and write the units of each term involved in it.

9. Define the terms spring index and stiffness related to coil springs.

10. Define hoop stress and longitudinal stress in thin cylindrical shells.

PART—B

15×4=60

Instructions : (1) Answer *any* **four** questions.

(2) Each question carries **fifteen** marks.

(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

11. A bar of 30 mm diameter is subjected to a pull of 60 kN. The measured extension over gauge length of 200 mm is 0.1 mm and change in diameter is 0.004 mm. Calculate Young's modulus and Poisson's ratio.

12. *(a)* Write briefly about any four mechanical properties of engineering materials.

(b) A cantilever beam 4 m long carries a uniformly distributed load of 3 kN/m over the entire span. Draw SF diagram.

13. Derive the expression for strain energy in a body.

14. A simply supported beam of length 5 m carries a UDL of 2 kN/m over entire span. Draw shear force and bending moment diagrams.

15. A square beam bends under the action of loads. The maximum stress induced is 140 N/mm^2 and bending moment is 3800Nm. Find the dimensions of the cross-section on the beam.

16. *(a)* State the assumptions made in theory of simple bending.
(b) State the assumptions made in torsion equation.

17. A closed coil helical spring is to carry a load of 140 N and the mean coil diameter is to be ten times the wire diameter. Calculate the diameters of both coil and wire, if the maximum shear stress is to be 80 N/mm^2.

18. Derive an expression for longitudinal stress when a seamed type thin cylinder is subjected to an internal pressure.

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