C16-**M-302**

6243

BOARD DIPLOMA EXAMINATIONS

SEPTEMBER/OCTOBER - 2020

DME – THIRD SEMESTER

STRENGTH OF MATERIALS

Time:3 hours Max. Marks: 80

PART – A 3 X 10 = 30

Instructions: *1. Answer **all** questions.*
*2. Each question carries **Three** Marks.*
3. Answer should be brief and straight to the point and should not exceed Five simple sentences.

1. List out the three elastic constants and write down the relation between them.
2. List out the mechanical properties of material. Define ductility and brittle ness.
3. Define the following terms.
   a) Resilience b) Proof resilience c) Modulus of resilience.
4. Derive an expression for longitudinal stress in thin cylinder subjected to internal pressure.
5. What are the different types of loads acting on a beam?
6. Define the following terms.
   (a) Neutral layer (b) Neutral axis (c) Radius of curvature.
7. Write an expression with usual notations for slope and deflection of cantilever beam carrying a point load at its free end.
8. List the assumptions in theory of simple torsion.

[cont..,

9. A shaft of 75 mm dia transmits power of 75 kw at 150 rpm. Find the maximum shear induced in the shaft.

10. List out various types of springs.

PART – B **5 X 10 = 50**

Instructions: *1. Answer any **Five** questions*
*2. Each question carries **TEN** Marks.*
3. Answer should be comprehensive and Criteria forValuation is the content but not the length of the answer.

11. A rod of length 250 mm is made with steel of diameter 20 mm for a length 100mm and remaining with copper of diameter 30 mm. A tensile force P is applied to the bar so that the maximum stress induced in the material is 50 N/mm^2. Determine the following.

    a) Magnitude of tensile force b) Stress in copper rod

    c) Stress in steel. Take E for steel $=2X10^5$ N/mm^2

    E for copper $=1X10^5$ N/mm^2.

12. The following data refers to a tensile test

    Diameter of steel bar =30 mm.

    Gauge length =200 mm.

    Extension at a load of 100 kN =0.139 mm.

    Load at Elastic limit= 230 kN

    Calculate i) Resilience ii) Proof Resilience iii) Modulus of Resilience

13. A shell 3.25 m long and 1 m diameter is subjected to an internal pressure of 1.2 N/mm^2. If the thickness of the shell is 10mm. Find the circumferential and longitudinal stresses. Find also the maximum shear stress and changes in dimension of the shell. Take E=200kN/mm^2 and poisson's ratio=0.3.

[Cont..,

14. A beam of length 1.2 m is simply supported at its ends and carries two point loads of 3.5 KN at distance of 0.4 m and 0.8 m from the left end support respectively. Draw shear force and Bending moment diagram.

15. a) A cantilever 3m long of rectangular section carries a U.D.L of 20 kN/m over its entire length. If the maximum stress induced is not to exceed 125 N/mm^2. Find the dimensions of the beam. Take depth of section is twice the width.

    b) A rectangular beam having cross section 60 mm x 40 mm is of 2 m long and simply supported at the ends. It carries a load of 1 kN at the mid span. Determine the maximum bending stress induced in the beam.

16. a) A beam of uniform rectangular cross section 175 mm and 250 mm deep is simply supported at ends. It carries uniformly distributed total load of 30 kN over the entire span of 4metres. Find (a) The slope at the supports and (b) Maximum deflection. Take $E=1.2X10^4$ N/mm^2.

    b)A simply supported beam of length 1.5m is subjected to a central point load of 10 kN. Find the deflection of the beam, if $E=200$ GN/m^2, Take I for the beam as $12.1X10^6$ mm^4.

17. A solid steel shaft 2m long has a diameter of 60 mm and rotates at 3.5 rev/s. Determine the toque, the power transmitted, and the angle of twist when the maximum shear stress in the shaft is 70 N/mm^2. Take $G=80$ GN/m^2

18. A closely coiled helical spring of steel wire 5 mm in diameter having 12 complete coils of 50 mm mean diameter is subjected to an axial load of 100 N. Find the deflection of the spring and the maximum shearing stress in the material. Take 80 $GN/m^{2.}$