C14-M-**305**

4253

BOARD DIPLOMA EXAMINATION, (C-14)

MARCH /APRIL-2019

DME - THIRD SEMESTER EXAMINATION

STRENGTH OF MATERIALS

Time: 3 hours Max. Marks: 80

PART-A **10x3=30M**

Instructions: 1) Answer **all** questions.
2) Each question carries **three** marks.
3) Answers should be brief and straight to the point and shall not exceed five simple Sentences.

1) Define (a)Young's modulus (b) Bulk modulus and (c) Modulus of rigidity. 1+1+1=3M

2) Young's modulus of material is $2.1x10^5$ N/mm^2 and modulus of rigidity is $0.84x10^5$ N/mm^2. Find the poisson's ratio.

3) Define the following terms (i) Resilience (ii) Strain energy.1½+1½=3M

4) Draw the shear force and bending moment diagrams for simply supported beam with uniformly distributed load over the entire span.

5) Define the terms a) Reactions b) Point of contraflexure.

6) A steel wire of 8 mm diameter is bent into a circular shape of 9 m radius.Determine the maximum stress induced in the wire. Take E = $2x10^5$N/mm^2.

7) Write simple bending equation and mention the units of terms involved.

8) Find the power transmitted by a circular shaft of 60 mm diameter at 150 rpm considering the maximum shear stress in the shaft is not to exceed 65 N/mm^2.

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9) List out any three applications of springs.

10) A thin cylindrical pressure vessel of 600 mm diameter is subjected to an internal pressure of 2 N/mm^2. The longitudinal stress for the material is 15 N/mm^2. Calculate the thickness of the vessel.

PART-B **5x10=50M**

Instructions: 1) Answer any **five** questions.
2) Each question carries **ten** marks.
3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11) A copper bar 40 mm diameter is rigidly attached at both ends to the inside steel tube of 50mm external diameter and 5mm thick. Find the stresses in each metal of composite section length of1 meter, when it is subjected to an axial load of 200 KN.
Take E_s = $2x10^5$and E_c =$1x10^5$ N/mm^2.

12) A weight of 3 KN falls through a height of 15 mm on a collar rigidly attached to the lower end of a vertical bar, 3 m long and area of cross section 800 mm^2, find the (a) maximum value of instantaneous stress (b) maximum instantaneous elongation and(c) maximum resilience. Assume modulus of elasticity of mild steel, E=$2x10^5$ N/mm^2.

13) (a) Draw a stress-strain diagram for M.S specimen and discuss the significance of salient points on it. 5M
(b) A simply supported beam 9 m long is carrying a U.D.L of 10 KN/m over a length of 6 m from left end. Draw the S.F and B.M diagrams for the beam and also calculate the maximum B.M on the section.5M

14) A contilever beam of 5 m long is subjected to a U.D.L of 10 KN/m over a length of 2 m commencing at 2.5 m from the fixed end. In addition it also carries point loads of 35 KN and 40 KN at its free end and at 1m from the fixed end respectively. Draw the loaded diagram, shear force diagram and bending moment diagrams.

15) A simply supported beam of rectangular section 200 mm wide and 300 mm deep carries a uniformly distributed load of 9 KN/m over the entire span of 5 m. Find (i) The slope at the supports and (ii) Maximum deflection. Take E = $1x10^4$ N/mm^2.

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16) Derive torsion equation and state the assumptions in deriving it.

17) (a) A closed coiled helical spring of 150 mm mean diameter is made up of 8mm diameter wire is subjected to a load of 250 N. Determine the shear stress induced in the wire and energy stored, if the spring is wound for 20 turns. Take G= 0.8×10^5 N/mm^2.5M

(b) Find the maximum stress induced in a rectangular beam of width 60 mm and depth 160 mm, when a bending moment of 600 Nm is applied. 5M

18) A thin cylindrical shell having 1.5 m diameter and 5 m length is subjected to a hoop stress of 45 N/mm^2. Calculate longitudinalstrain. Assume poisson's ratio as 0.32 and young's modulus as 2.1×10^5 N/mm^2.

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