C14-M-**305**

4253

BOARD DIPLOMA EXAMINATION,(C-14)

JUNE-2019

DME - THIRD SEMESTER EXAMINATION

STRENGTH OF MATERIALS

Time: 3Hrs Max.Marks: 80

PART - A

10x3=30M

Intstructions: 1) Answer **all** the questions. and Each question carries **three** marks.
2) Answer should be brife & straight to the point and shall not exceed five simple sentences.

1) Briefly explain about composite bar .

2) A brass specimen has modulus of elasticity of $1.2x10^5$ N/mm^2 and shear modulus is $0.5x10^5$ N/mm^2. Compute the poisson's ratio.

3) Derive an expression for strain energy of a uniform bar.

4) Define the following terms:

a) Shear force diagram and b) Point of contra flexure.

5) A cantilever beam 3 m long carrying a UDL of 2 KN/m over the entire beam. Draw the shear force and bending moment diagrams.

6) A steel strip of thickness 4 mm is coiled on a drum of 1.4 m diameter. Calculate the maximum stress produced by the coiling.Take E = 2.0 x 10^5 N/mm^2.

7) A cantilever of 5 m. long carried a UDL of 8.4 KN/m over the entire length.Calculate the deflection at free end.Assume E= 2.0 $x10^5$N/mm^2. and I = 0.8 x 10^8 mm^4.

8) Write the advantages of using hollow shafts over solid shafts.

9) A closed coiled helicaql spring is made up of 10 mm diameter steel wire has 15 coils of 100 mm mean diameter. Calculate the stiffness of the spring if $G = 8.16 \times 10^4$ N/mm^2.

10) A boiler shell of 1260 mm diameter and 15 mm thick plate having the efficiency of longitudinal joint is 70%. Determine the minimum tensile stress induced in the shaft, when the internal pressure of 2 N/mm^2.

PART - B

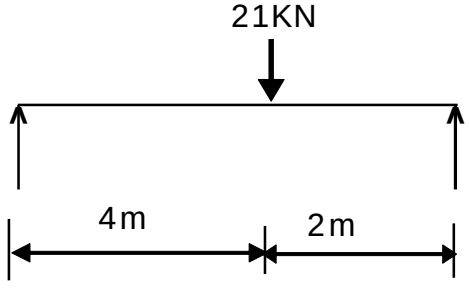
5x10=50M

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

11) A composite bar is made up of two different materials of 1 m long is of 50 mm diameter aluminum over a portion of 0.6 m long and 25 mm diameter of steel bar over the remainder. The bars are stress free at a temperature of 30^0 C. What will be the stresses in the two bars when the temperature is 21^0 C if the supports are unyielding.
Assume $\alpha_a = 22.5 \times 10^{-6} / {}^0C$ and $\alpha_s = 12 \times 10^{-6} / {}^0C$
$E_a = 0.7 \times 10^5$ N/mm^2 and $E_s = 2.0 \times 10^5$ N/mm^2.

12) A bar 3 m long and 50 mm diamter hangs vertically has a collar securely attachwed at the lower end. Find the maximum stress induced. When : a) A weight of 250 N falls from 120 mm on to the collar and
b) A weight of 2500 N falls from 10 mm on to the collar.
Take $E = 2.0 \times 10^5$ N/mm^2.

13) a) A bar of 25 mm diameter and 210 mm is subjected to an axial pull of 50 KN. Calculate the change in volume if $E = 2.13 \times 10^5$ N/mm^2. and $1/m = 0.336$
b) Draw the shear force and bending moment diagrams for a beam shown in the figure:



14) A freely supported beam of span 4m has exteneded 1m on right hand support. It is loaded with two point loads of 2 KN and 4 KN at a distance of 3m and 5m from its left end respectively. And also a UDL of 2 KN/m is spread over 3m from left end. Draw shear force and bending moment diagrams.

15) Derive the expression for the bending equation.

16) A wagon weighing 30 KN. Moving at 7.2 KMPH. How many springs each of 18 coils will be required in a buffer stop the energy of motion during a compression of 250mm. The mean diameter is 25 mm.
Take $G = 0.9 \times 10^5$ N/mm^2.

17) a) A solid shaft of diameter 10 mm is subjected to a torque of 15 N-m. Calculate the angle of twist over a length of 250 mm.
Take $G = 0.8 \times 10^5$ N/mm^2.

b) A simply supported beam with a central point load on a span of 4 m and the maximum bending stress is 8 N/mm^2. What is the maximum deflection when the moment of resistance is 18 KN-m.
Assume $I = 3.4 \times 10^8$ mm^4 and $E = 0.1 \times 10^5$ N/mm^2.

18) A cylindrical bolier shell is to withstand an internal pressure of 1 N/mm^2. The plate is 10 mm thick , the longitudinal efficiency of the joiont is 90% while the circumferential one is 50%. Design the boiler shell diameter. If the ultimate stress is 350 N/mm^2 and factor of safety is 4.

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