Register Number.....

B.TECH. DEGREE EXAMINATIONS: OCTOBER/ NOVEMBER - 2008

Third Semester

TEXTILE TECHNOLOGY

U07TT301: Mechanics Of Solids

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions: -

Part A (20 × 1 = 20 Marks)

1. The internal resistance which the body offers to meet the load (or) external force is called

   A. Stress B. Strain C. Pressure D. None of the above

2. The ratio between Compressive stress and compressive strain (or tensile stress and tensile strain is termed as

   A. Modulus of Elasticity

   B. Modulus of rigidity

   C. Bulk Modulus of Elasticity

   D. None of the above

3. Relation between E, K & C is given by E = ?

   A. $\frac{9KC}{3K+C}$ B. $\frac{3K+C}{6KC}$ C. $\frac{6KC}{K+3C}$ D. $\frac{3KC}{3K+C}$

4. The unit of stress in S.I unit is

   A. MN/mm^2 B. kN/mm^2 C. N/mm^2 D. All the above

5. A _____ load is one which is considered to act at a point

   A. Point B. Uniformly distributed load C. Trapezoidal

   D. Uniformly varying load

6. In a cantilever of length L carrying a load whose intensity varies uniformly from Zero at the free end to W per unit run at the fixed end, The Max B.M is

   A. $\frac{WL}{3}$ B. $\frac{WL^2}{3}$ C. $\frac{WL^2}{6}$ D. $\frac{WL^2}{24}$

7. $WL^2/8$ the max BM for

   A. A point load at the center

   B. A U.D.L over the entire beam

   C. A load zero at free end and w per unit run at fixed end

   D. None of the above

8. A cantilever is a beam whose
   A. One end fixed and the other end free
   B. Both ends are fixed
   C. Both ends are Simply Supported
   D. Both ends are free

9. The Slope and deflection at a section in a loaded beam is found by
   A. Double Integration method
   B. Moment Area Method
   C. Macaulay's Method
   D. Any of the above

10. The deflection at the free end of a cantilever of length L carrying a point load W at its free end is given by

A. $\frac{WL}{2EI}$ B. $\frac{WL^2}{2EI}$ C. $\frac{WL^3}{2EI}$ D. $\frac{WL^3}{3EI}$

11. A simply supported beam of span L is carrying a point load W at the mid span . What is the deflection at the centre of the beam

A. $\frac{WL^2}{48\ EI}$ B. $\frac{WL^3}{48\ EI}$ C. $\frac{5WL^3}{384\ EI}$ D. $\frac{11WL^3}{120\ EI}$

12. In case of a rectangular beam section

A. $\tau_{max} = \frac{1}{2}\ \tau_{mean}$ B. $\tau_{max} = \tau_{mean}$ C. $\tau_{max} = \frac{3}{2}\ \tau_{mean}$ D. $\tau_{max} = \frac{5}{2}\ \tau_{mean}$

13. Power transmitted by the shaft in kW

A. $P = \frac{2\Pi NT}{60\times1000}$ B. $\frac{4\Pi NT}{60\times1000}$ C. $\frac{2\Pi NT}{40\times1000}$ D. $\frac{\Pi NT}{40\times1000}$

14. Torsion equation is given by =

A. $\frac{T}{Ip} = \frac{\tau}{Ip} = \frac{C\theta}{l}$ B. $\frac{T}{Ip} = \frac{\tau}{R} = \frac{C\theta}{l}$ C. $\frac{T}{Ip} = \frac{\sigma}{R} = \frac{C\theta}{l}$

D. $\frac{T}{Ip} = \frac{\tau}{R} = \frac{E\theta}{l}$

15. If a close-coiled helical spring is subjected to load W and deflection produced is δ , then the stiffness of the spring is given by

A. $\frac{W}{\delta}$ B. $W.\delta$ C. $\frac{\delta}{W}$ D. $2W\delta$

16. Two springs of stiffness k1 and k2 respectively connected in series, the stiffness of the composite spring (k) will be given by

A. $k = k1 + k2$ B. $k = k1 \times k2$ C. $k = \frac{k1k2}{k1+k2}$ D. $k = \frac{k1+k2}{k1k2}$

17. When the strut is vertical i.e. inclined at 90° to the horizontal is known as

A. Column B. Pillar C. Stanchion D. None of the above

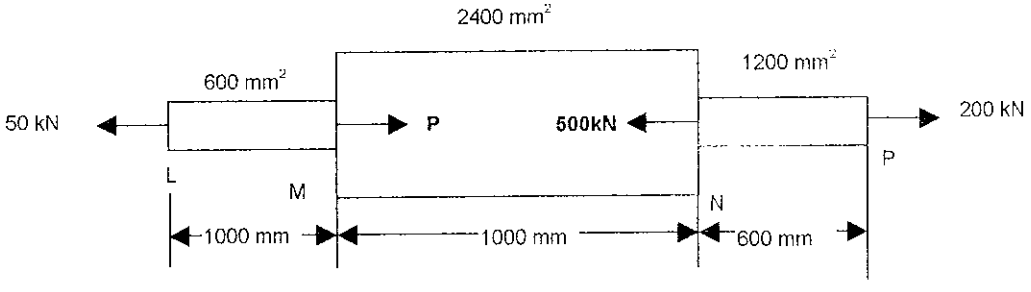
18. Euler's formula is applicable to
A. Short Column B. medium column C. long columns D. None of the above

19. Vessels used for strong fluid under pressure are called as
A. Cylinders B. Spheres C. Shells D. None of the above

20. Which of the following are usually considered as thin cylinders
A. Boilers B. Tanks C. Steam pipes D. all the above

PART B (5 X 16 = 80 Marks)

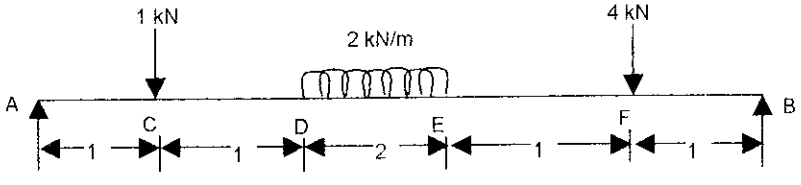
21(a) A member LMNP is subjected to point loads as shown in Fig calculate (i) Force P necessary for equilibrium (ii) Total elongation of the bar Take E= 210 GN/m^2



(OR)

21 (b) A bar of 30 mm diameter is subjected to a pull of 60 kN . The measured extension is 0.009 mm and the change in diameter is 0.0039 mm. calculate the Poisson's ration and the values of the three moduli.

22 (a) Draw shear force and Bending moment diagrams for the beam shown in fig below



All spans are in mts

(OR)

22 (b) A timber beam of rectangular section is to support a load of 20kN uniformly distribute over a span of 3.6 mts when beam is simply supported . If the depth of the section is to twice the breadth, and the stress in timber is not to exceed 7 N/mm^2 . find the dimensio of the cross section.

23 (a) A simply supported beam of length 5 m carries a point load of 5 kN a distance of 3 from left end. If $E = 2 \times 10^5$ N/m^2 and $I = 10^8$ mm^4 , determine the slope at the le support and deflection under the point load using conjugate beam method.

(OR)

23 (b) Derive the shear stress distribution for a rectangular section and find q_{max}

24 (a) Find the maximum torque that can be applied safely to a shaft of 300mm diameter. Th permissible angle of twist is 1.5 degree in a length of 7.5 m length and the shear stress i not to exceed 42 N/m^2 .Take C= 84.4 kN/m^2

(OR)

24 (b) Design a closely coiled helical spring of stiffness 20kg/cm deflection. The maximum shear stress in the spring material is not to exceed 800kg/ cm^2 under a load of 50kg . th diameter of the coil is to be 10 times the diameter of the wire. Take C as 0.84×10^6 kg/cm^2

25 (a) (i)Find the Euler's crippling load for a hollow cylindrical steel column of 38 mm externa diameter and 2.5 mm thick. Take length of the column as 2.3m and hinged at it both ends Take E = 205 kN/m^2.
(ii)Give the assumptions in Euler's Column Theory

(OR)

25 (b) A cylindrical thin drum 80cm in diameter and 3 m long has a shell thickness of 1 cm . If the drum is subjected to an internal pressure of 2.5 N/ mm^2 , determine change in diameter, change in length and change in volume . Take $E = 2 \times 10^5$ N/m^2 Poisson's ratio = 0.25

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