Reg. No. : | | | | | | | | | | |

Question Paper Code: 44705

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Fourth Semester

Mechanical Engineering

14UME405 - STRENGTH OF MATERIALS

(Regulation 2014)

Duration: 1.15 hrs Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. The ratio between the change in volume and original volume of the body is called _____ strain

   (a) tensile (b) compressive (c) shear (d) volumetric

2. When a bar is subjected to change of temperature and its deformation is prevented, which of the following stresses is induced?

   (a) thermal (b) shear (c) tensile (d) compressive

3. Which of the following are the statically determinate beams?

   (a) Cantilever (b) SSB
   (c) Overhanging beams (d) All of the above

4. In a cantilever with uniformly distributed load the shearing force varies following a

   (a) Linear law (b) Parabolic law (c) Either (a) or (b) (d) None of these

5. When a solid shaft is subjected to torsion, the shear stress induced in the shaft at its center is

   (a) Zero (b) minimum (c) maximum (d) average

6. The ratio of strength of solid to hollow shafts, both having outside diameter D and hollow having inside diameter D/2, in torsion, is

(a) 1/16 (b) 1/4 (c) 1/2 (d) 15/16

7. The amount of deflection of a beam subjected to some type of loading depends upon

(a) cross-section (b) bending moment
(c) either (a) or (b) (d) both (a) and (b)

8. The slope and defelction at a section in a loaded beam can be found out by which of the following methods

(a) Double integration method (b) Moment area method
(c) Macaulay's method (d) any of the above

9. Pressure Vessels are made up of

(a) non ferrous materials (b) sheet metal
(c) cast iron (d) All of the above

10. The extremeties of any diameter on Mohr's circle represent

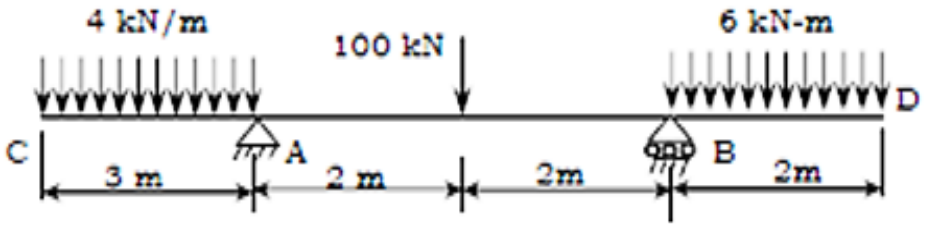
(a) Normal stresses on plane at 45^o (b) principle stresses
(c) normal and shear stresses on plane (d) Shear stresses on plane at 45^o

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. The ultimate stress for a hollow steel column which carries an axial load of 2Mn is 500 N/mm^2. If the external diameter of the column is 250mm, determine the internal diameter .Take the factor of safety as 4.0. (8)

12. A simply supported beam of span 8 *m* long is subjected to two concentrated loads of 24*kN* and 48*kN* at 2*m* and 6*m* from left support respectively. In addition it carries a UDL of 36*kN/m* over the entire span. Draw the shear force and bending moment diagrams. Mark the salient points. (8)



13. It is required to design a closed coiled helical spring which shall deflect 1mm under an axial load of 100 N at a shear stress of 90 Mpa. The spring is to be made of round wire having shear modulus of 0.8 x 10^5 Mpa. The mean diameter of the coil is 10 times that of the coil wire. Find the diameter and length of the wire. (8)

14. Derive the equation of the deflection curve for a cantilever beam AB supporting a load P at the free end (figure 2). Also, determine the deflection B and angle of rotation Bat the free end. (8)

Figure 2

15 A cylindrical steel pressure vessel 400 mm in diameter with a wall thickness of 20 mm, is subjected to an internal pressure of 4.5 MN/m^2. (a) Calculate the tangential and longitudinal stresses in the steel. (b) To what value may the internal pressure be increased if the stress in the steel is limited to 120 MN/m^2? (c) If the internal pressure were increased until the vessel burst, sketch the type of fracture that would occur. (8)