E-1137

B. E. 3rd Semester (Main & Re) Examination, December – 2019

STRENGTH OF MATERIAL

Branch : (ME)

Code : BNE-301

Time : Three Hours]   *[Maximum Marks : 60*

Note : Attempt *all* questions from *Section – A four* questions from *Section – B* and *three* questions from *Section – C.*

Section- A : Filling the blanks/MCQ/True, false. $1 \times 10 = 10$

Section- B : Short answer type questions. $5 \times 4 = 20$

Section- C : Long/ descriptive answer type questions. $10 \times 3 = 30$

SECTION – A

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. In thick cylinders the radial stress in the wall thickness is.

   (a) Zero   (b) Negligibly small

   (c) Not negligible   (d) All of them

3. Inc case of a laminated spring the load at which the plates become straight is called :

   (a) Working load   (b) Safe load

   (c) Proof load   (d) None of the above

4. The ratio of lateral strain to linear strain is known as ....

5. Elongation produced in a bar due to its self weight ....

                                                P. T. O.

6. For a column with one end fixed and the other end free the effective length is ....

7. The maximum possible value of poissons ratio is ....

8. The modulus of rigidity of rolled aluminium may be .... GN/m^2.

9. Euler's formula for long columns is $= \dfrac{\pi^2 EI}{le^2}$.   *(True/ False)*

10. A continuous beam is one which is supported on more than two supports. *(True/ False)*

SECTION – B

1. Calculate the bursting pressure for a cold drawn seamless steel tubing of 60mm inside diameter with 2mm wall thickness. The ultimate strength of steel is 380 MN/m^2.

2. Stress and elongation produced in a bar due to its self- weights.

3. Drive the relation between slope, deflection and radius curvature of beam.

4. What is column ? Classification of columns.

5. Describe shear centre for channel section.

6. Show that in a strained material subjected to two dimensional stress the sum of the normal components of stresses on any two mutually perpendicular planes is constant.

SECTION – C

1. Draw the Mohr's stress circle for direct stresses of 65 MN/m^2 (Tensile) and 35 MN/m^2 (Compressive) and estimate the magnitude and direction of the resultant of stresses on planes making angles of 20° and 50° with the plane of the first principal stress. Find also the normal and tangential stresses on these planes.

2. A beam with a span of 4.5 metres carries a point load of 30 KN at 3 metres from the left support. If for the section $Ixx = 54.97 \times 10^{-6} \, m^4$ and E = 200 GN/m^2, find.

   (i) The deflection under the load.

   (ii) The position and amount of maximum deflection.

3. Calculate the thickness of metal necessary for a cylindrical shell of internal diameter 160mm to withstand an internal pressure of 25 MN/m^2. If maximum permissible tensile stress is 125MN/m^2.

4. An open- coiled helical spring of wire diameter 12mm, mean coil radius 84mm, helix angle 20° carries an axial load of 480 N. Determine the shear stress and direct stress developed at inner radius of the coil.

5. Derivations of Euler's formula "When both ends of column are hinged or pinned.

———————