SOM

Duration: 40 Minutes **Maximum marks: 30**

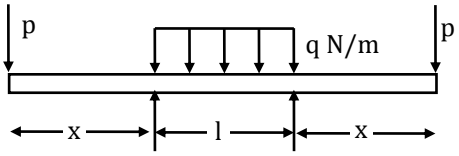
Q.1 - Q.10 Carry One Mark each.

1. A bar produces a lateral strain of magnitude 60×10^{-5} mm when subjected to a tensile stress of magnitude 300 MPa along the axial direction. What is the elastic modulus (GPa) of the material if the poisson's ratio is 0.3?

2. The modulus of rigidity of an elastic material is found to be 38.5% of the value of its young's modulus. The poisson's ratio μ of the material is

3. Two shafts, one solid and the other hollow, made of the same material, will have the same strength and stiffness, if both are of the same
   (A) Length as well as weight
   (B) Length as well as polar moment of inertia
   (C) Weight as well as polar moment of inertia
   (D) Length, weight as well as polar moment of inertia

4. If the beam shown in the figure is having zero bending moment at its mid point. The over long X should be



(A) $\frac{qL^2}{4P}$ (B) $\frac{qL^2}{6P}$
(C) $\frac{qL^2}{8p}$ (D) $\frac{qL^2}{12P}$

5. A 60mm long steel cylinder is made up of 4 mm thick plates. The inside diameter of the cylinder is 120 mm when it is subjected to an internal pressure of 5 MPa. The increase in its volume is found to be 500 mm^3. The value of poission ratio_____(Take E=210 GPa)

Q.6 - Q.10 Carry Two Mark each.

6. A beam of rectangular section (12 cm wide × 20 cm deep) is simply supported over a span of 12 m. It is acted upon by a concentrated load of 80 kN at the mid span. The maximum bending stress inducted is (MPa)

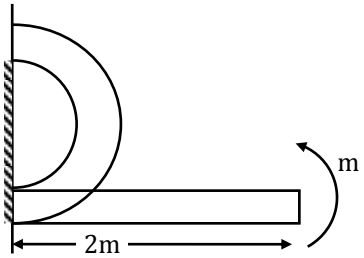
7. A uniform bar, simply supported at the ends carries a concentrated load P at mid span. If the same load be, alternatively, uniformly distributed over the full length of the bar the maximum deflection of the bar will decrease by_____

8. A simply supported rectangular beam has width of 130 mm and depth of 250 mm covering a span of 4 m. The load of 13 kN is dropped at the mid span of the beam from a height of 14 mm, the maximum instantaneous deflection induced in the beam is (E=200 GPa)

(A) 4.33 mm
(B) 3.95 mm
(C) 3.16 mm
(D) 2.74 mm

9. A hollow shaft of 60 mm outer diameter transmits 180 kw of power while rotating at a frequency of 25 hrtz. The thickness of the shaft must be in mm so that the shear stress does not exceed 60 MPa, is _____

10. A circular steel rod of diameter 20 mm and length 2m is bent into a semicircular ring by applying a couple m as shown in figure the value of M is [Take E=200 GPa]



(A) 1.5kNm
(B) 2kNm
(C) 2.5kNm
(D) 5kNm