S. B. Roll. No……

STRENGTH OF MATERIALS
4th Exam/Mech./Auto/2093/Jun'2022
(For 2018 Batch Onwards)

Duration: 3Hrs. **M.Marks:75**

SECTION-A

Q1. Give answer in one line. **15x1=15**

a. What is the property by virtue of which it can be drawn into wires?
b. What is the SI unit of bulk modulus?
c. What is Poisson's ratio?
d. What do you mean by dead load?
e. What is the property due to which a material can absorb large amount of energy?
f. Write down the formula for polar moment of inertia of the cross-section of shaft of diameter d.
g. What will be moment of inertia of a triangle of base b and height with respect to a centroidal axis parallel to its base?
h. What is the value of bending moment at a point, where shear force is zero?
i. What is point of contraflexure?
j. Write down the bending equation.
k. What is the value of bending stress at neutral axis?
l. What is the value of effective length of a column with both ends fixed?
m. If diameter of shaft is doubled, then how many times its power transmitting capacity is increased?
n. What is the angle of helix in practical closed spring?
o. If two springs of stiffness k1 and K2 respectively are connected in series, then what will be the stiffness of the composite spring?

SECTION-B

Q2. Attempt any six questions. **6x5=30**

i. Define crippling load, slenderness ratio and equivalent length of a column.
ii. Explain ductility, brittleness and toughness of material with suitable examples.
iii. Define beam. Explain the types of beams.
iv. Find the shear stress in a rivet of 20 mm diameter connecting two overlapping plates subjected to a tensile load of 10 KN.
v. Draw shear force diagram and bending moment diagram for a simply supported beam carrying uniformly distributed load on its entire span.
vi. A solid shaft is required to transmit 150 KW at 300 Hz. If the shear stress is not to exceed 70 MPa, calculate the diameter of shaft.
vii. A close coiled helical spring is to carry a load of 100 N and the mean coil diameter is to be 8 times that of the wire diameter. Calculate the wire diameter if the maximum stress is to be 75 N/mm^2.
viii. Calculate resilience and the modulus of resilience of a bar 150 mm long, 40 mm wide and 20 mm thick subjected to tensile load of 40 KN applied gradually. Take $E=2*10^5 N/mm^2$.

SECTION-C

Q3. Attempt any three questions. **3x10=30**

a. Fig.1 shows a brass bar of cross-sectional area 800 mm^2, subjected to axial forces. Find the total elongation of the bar. Take $E=1.05*10^5 N/mm^2$.
b. Find the moment of inertia of a T-section 150*150*10 mm about X-X and Y-Y axis passing through the center of gravity of the section.

S. B. Roll. No.....

c. A simply supported beam of 40 mm width and 60 mm depth in section and 4 m length, carries a point load of 30 KN at center. Calculate the maximum bending stress induced in the beam. Also calculate the modulus of section of the beam.
d. A bar of 60 mm diameter and 4 m length is elongated by 6 mm under a pull of 60 KN. Calculate the buckling load if both ends are fixed.

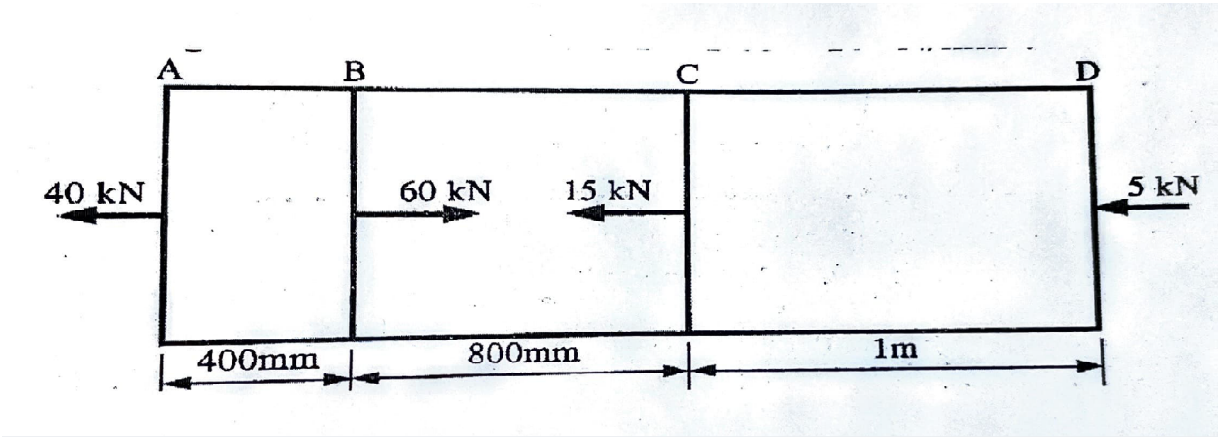

Fig.1