Total No. of Printed Pages:05

SUBJECT CODE NO:- H-323
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (Civil)
Strength of Materials
(REVISED)

[Time: Three Hours] **[Max.Marks: 80]**

Please check whether you have got the right question paper.

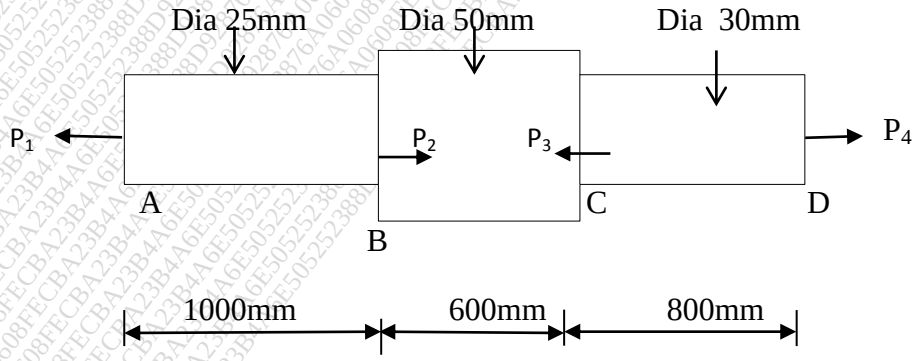
N.B
1) Question No. 1 and 6 are compulsory. Attempt any two questions from remaining for each Section.
2) Figures to the right indicate full marks.
3) Assume suitable data, if necessary.

Section A

Q.1 Answer the following. (any five) 10

a) Define Elasticity.
b) State Hooke's law.
c) Explain Poission's ratio.
d) Explain point of contraflexure.
e) Define stress and types of stresses.
f) Write flexure formula.
g) Define modular ratio.
h) Define volumatric strain.

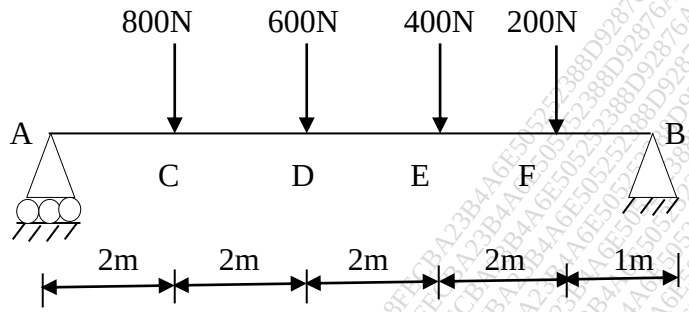
Q.2 a) A member ABCD is subjected to point loads P_1, P_2, P_3 and P_4 as shown in fig. Calculate the force P_2 necessary for equilibrium if $P_1 = 10kN, P_3 = 40kN$ and $P_4 = 16\ kN$. Take $E = 2.05 * 10^5 N/mm^2$. Determine total elongation of the member. 07



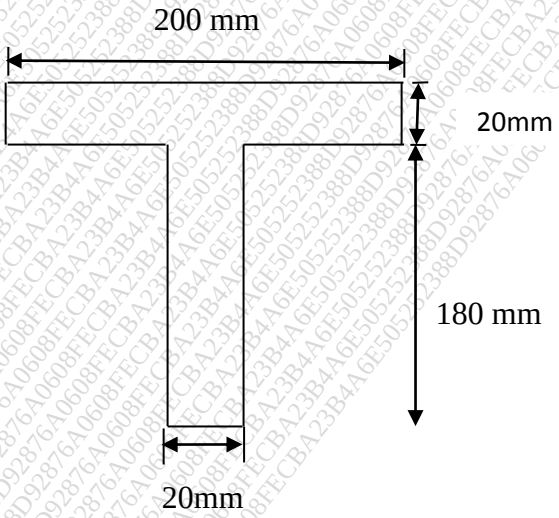
b) A load of 400 kN is applied on a short column $300mm \times 300mm$. The column is reinforced by steel bars of 25 mm diameter and 4 NOS. if the modulus of elasticity for steel is 15 times that of concrete, find the stresses in concrete and steel. 08

Q.3 a) Define types of beam. 03

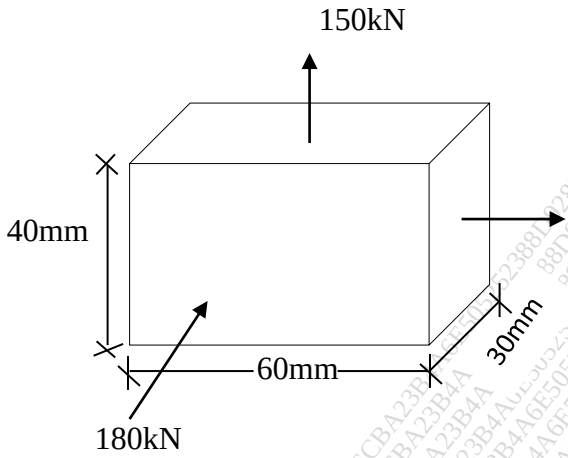
b) Draw shear force and bending moment diagram for simply supported beam shown in fig. 12



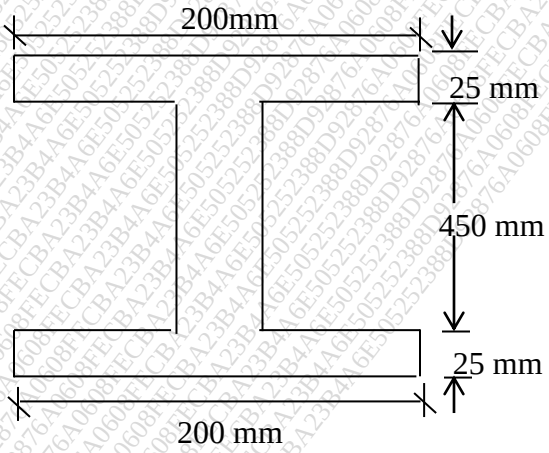
Q.4 'T' section with Flange $200mm \times 20mm$ and web $20mm \times 180mm$ is used as a cantilever beam of 2.5m span subjected to u.d.L of intensity 20KN/m over its full span. Determine the maximum stresses in the beam. 15



Q.5 a) Forces acting on piece of material as shown in fig. Find change in each dimensions and change in volume of material. Take E $= 2 * 10^5 N/mm^2$. $\mu = 0.25$ 08



b) A steel beam of I section as shown in fig. is subjected to a shear force of 400 kN. Determine shear stress distribution for the beam Section. 07



Section B

Q.6 Answer the following. (any five) 10

a) Define strain energy.
b) Explain core or Kernel of Section.
c) What are the assumptions in Euler's theory?
d) Define principle stresses and strain.
e) What are the assumptions in theory of torsion?
f) Define Limit of eccentricity.
g) Write torsional formula.
h) Enlist types of stresses in thin cylindrical shell.

Q.7 a) A shaft has to transmit 105 kw at 160 RPM. If the shear stress is not to exceed $65N/mm^2$ and the twist in a length of 3.50m must not exceeds 1°, find a suitable diameter. Take $C = 8 \times 10^4 N/mm^2$. 08

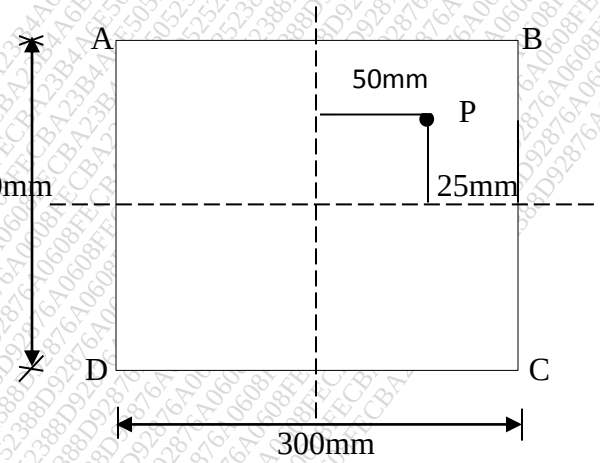
b) A bar 50mm diameter, 2m long is fixed at upper end and provided with a collar at lower end. A weight of 450 N is dropped on the collar from the height of 250mm. Take E=200GPa. 07

Find:- i) The instantaneous stress
ii) The instantaneous elongation
iii) The strain energy stored in bar.

Q.8 a) A cylindrical shell 3m long which is closed at the ends has an internal diameter of 1m and wall thickness of 15mm. Calculate the circumferential and longitudinal stresses induced and also change in dimensions of the shell, if it is subjected to an internal pressure 1.5 N/mm^2. Take $E = 2 * 10^5\ N/mm^2$ 08

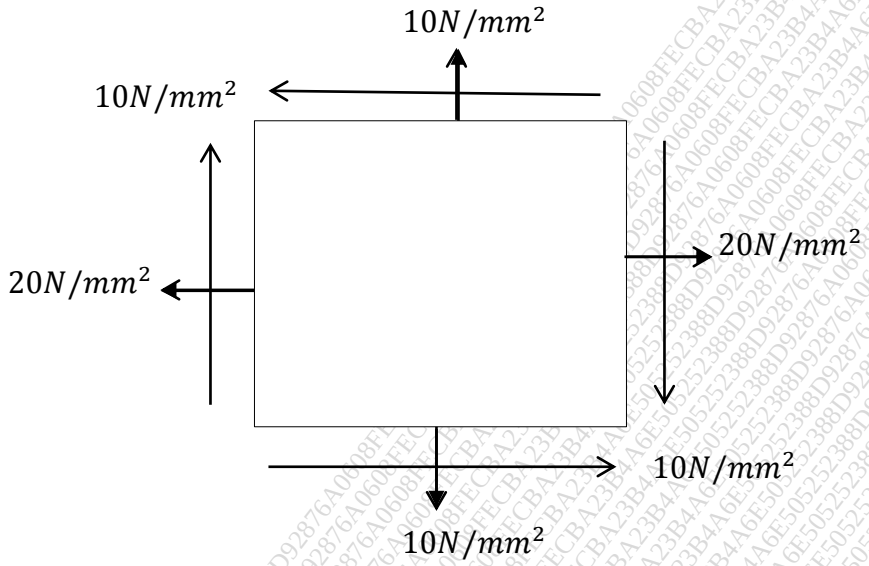
$\mu = 0.3$

b) A rectangular column $300mm \times 200mm$ is subjected to a compressive load of 450kN at point P as shown in figure. Find the intensities of stress at all the four corners of column. 07



Q.9 At a point in a strain material there are two mutually perpendicular stresses of $20N/mm^2$ and $10\ N/mm^2$ both tensile. They are accompanied by shear stress of $10\ N/mm^2$. Find 15

i) Principle stresses
j) Position of principle plane
k) Maximum shear stresses



Q.10 A T-Section Column of mild steel 3.5m long with both ends fixed is shown in fig. Find the safe axial load on the column. 15

Take $\sigma_e = 335\ N/mm^2$ and $\alpha = \frac{1}{7500}$ and factor of safety of 3.