B. TECH. SEM - III (CHEMICAL ENGG.) 2014 COURSE)
(CBCS) : WINTER - 2017
SUBJECT: STRENGTH OF MATERIALS

Day: **Monday** Time: **10.00 AM TO 01.00 PM**
Date: **15/01/2018** **W-2017-2017** Max. Marks: 60

N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Draw neat labelled diagrams **WHEREVER** necessary.
4) Assume suitable data if necessary.

Q.1 **a)** State factor of safety and it's values for steel, concrete and timber. Define Hooke's law with it's equation. **(05)**

b) A circular rod and diameter 20 mm and 500 mm long is subjected to a tensile force 45 kN. The modulus of elasticity for steel may be taken as 200 KN/mm^2 find stress, strain and elongation of the bar due to applied load. **(05)**

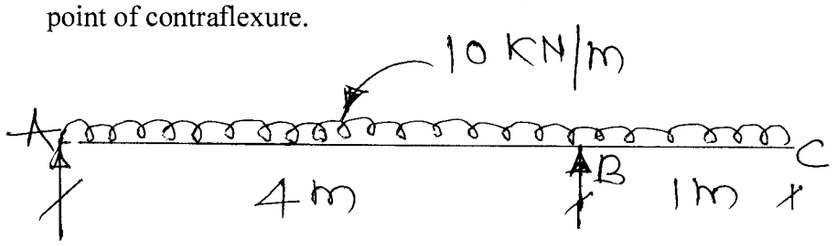
OR

Q.1 **a)** Draw stress strain diagram for ductile materials. Indicate salient points on it. **(05)**

b) Show that elongation of circular rod tapering uniformly from diameter 'd_1' to diameter 'd_2'is given by **(05)**

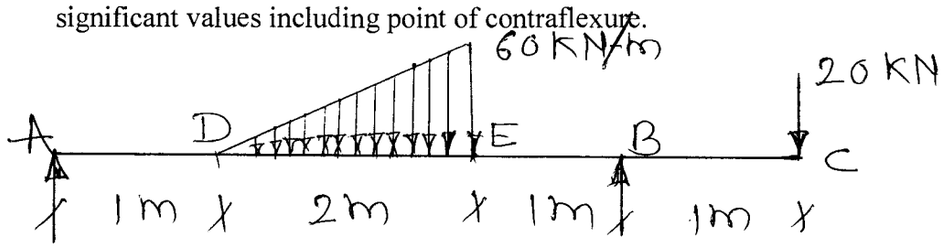
$$\delta_L = \frac{4PL}{\pi d_1 d_2 E}$$ where L = length of rod.

Q.2 Draw S.F.D. and B.M.D. as shown in fig. with Maximum B.M. and indicate point of contraflexure. **(10)**



OR

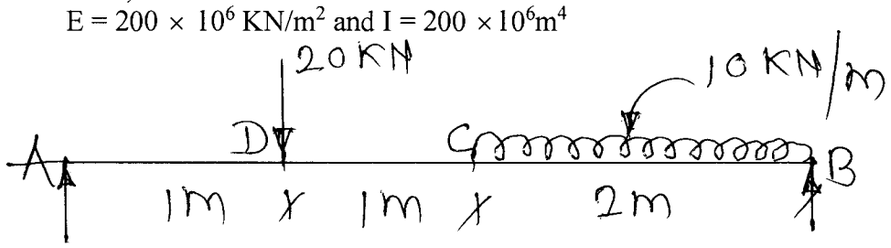
Q.2 Draw the SFD and BMD for the over hanging beam shown in fig. indicate all significant values including point of contraflexure. **(10)**



Q.3 A beam AB and 4m span is simply supported at the ends and is loaded as shown in fig. Determine: **(10)**

i) Deflection at C
ii) Maximum deflection.

E = 200 × 10^6 KN/m^2 and I = 200 ×10^{6}m^4

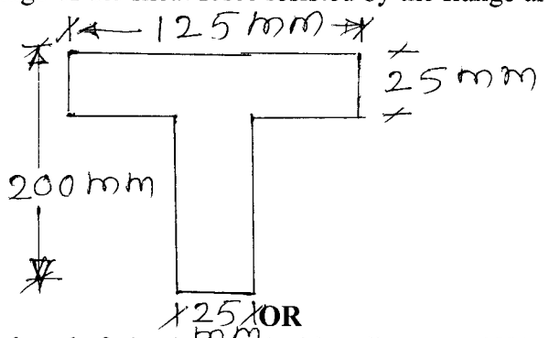


OR

P. T. O.

Q.3 The cross section of a cantilever bracket of C.I. is I section having dimensions- **(10)**
Top flange – 120 × 20 mm.
Web = 160 ×10 mm
Bottom flange - 40×20mm
If in bending the tensile stress is not to exceed 90 MPa and the compressive stress is not to exceed 143MPa, determine the moment of resistance of the section. If the length of the bracket is 1.2 m. find the max value of a vertical point load that it can support at its free end. Neglect the self-weight.

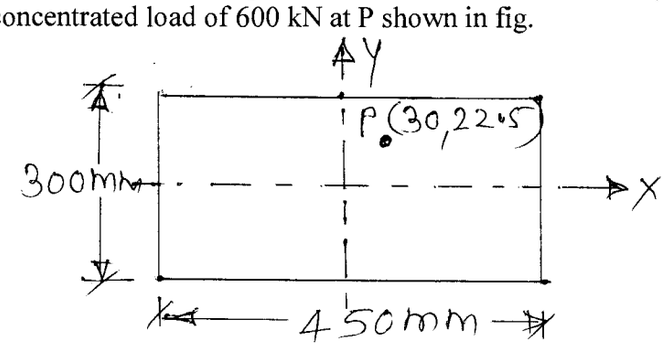
Q.4 A simply supported beam has a cross-section of a 'T' as dimensioned in fig. **(10)**
find the percentage of the shear force resisted by the flange and the Web.



OR

Q.4 A hollow circular shaft having an insider diameter 60% and it's outside **(10)**
diameter is to replace a solid circular shaft, transmitting the same power at the same speed. Find percentage saving in the material per unit run, if material used is the same.

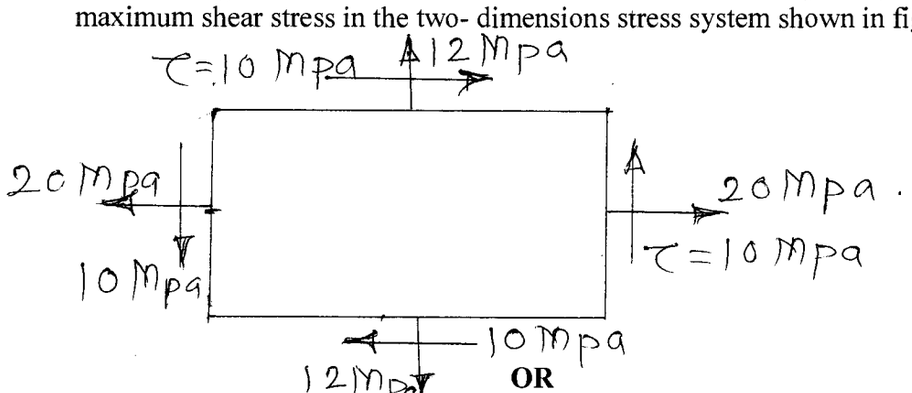
Q.5 Find the stresses developed at the four corners of a masonry pillar subjected to **(10)**
a concentrated load of 600 kN at P shown in fig.



OR

Q.5 A mild steel T- section having flange width 150 mm and depth of section as **(10)**
150 mm has uniform 10 mm thickness and flange and web. It is used as strut
5 m long with ends fixed. Determine the Rankine's formula the safe load and it can carry with a factor of safety 3. f_c = 330MPa, $\alpha = \frac{1}{7500}$.

Q.6 Find the magnitude and direction of resultant stresses on the planes, carrying **(10)**
maximum shear stress in the two- dimensions stress system shown in fig.



OR

Q.6 Determine the magnitude and direction of resultant stresses on the planes **(10)**
shown in fig. for Q. no.6 above using graphical(Mohr's circle) method.

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