B. Tech. Sem - III (Chemical Engg.) 2014 COURSE) (CBCS) :
SUMMER - 2019
SUBJECT: STRENGTH OF MATERIAL

Day: Saturday
Date: 11/05/2019

S-2019-2546

Time: 02.30 PM TO 05.30 PM
Max. Marks: 60

N.B:

1) All questions are **COMUPLSORY.**
2) Figures to the right indicate **FULL** marks.
3) Assume suitable data if necessary.

Q.1 **a)** Define: **(04)**

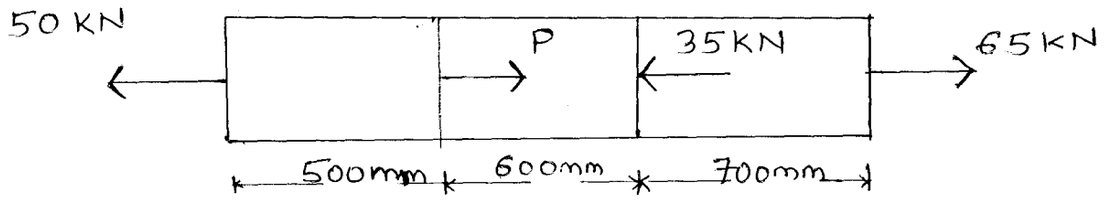
i) Modulus of rigidity
ii) Volumetric strain
iii) Poisson's ratio
iv) Shear strain

b) A square steel rod 20mm × 20mm in section is to carry an axial load (compressive) of 100KN. Calculate the shortening in a length of 50mm. $E = 2.14 \times 10^8$ KN/m^2. **(06)**

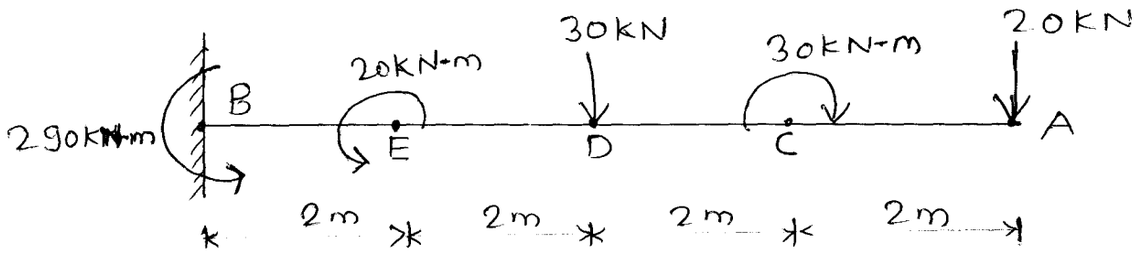
OR

Q.1 **a)** Prove relation between E and K. **(06)**

b) A circular bar having 200mm^2 area is subjected to the axial load as shown in Fig. Find the value of P and the total elongation. Take E = 200KN/mm^2 **(04)**

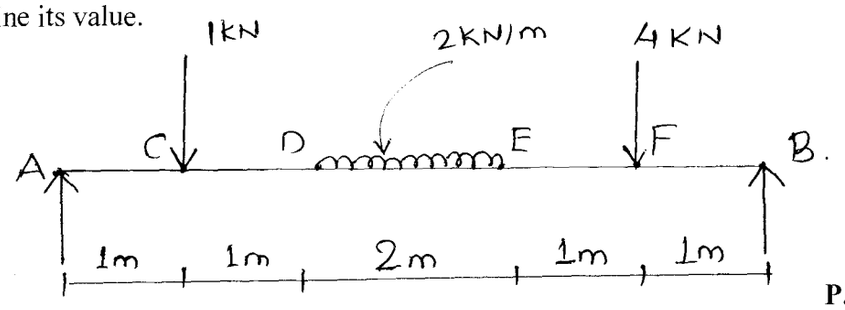


Q.2 Find the reaction at the fixed end of the cantilever loaded as shown in fig. Draw also the S.F. and B.M. diagram. **(10)**



OR

b) Draw the Shear force and Bonding diagrams for the beam shown loaded in fig. Clearly mark the position of the maximum bonding moment and determine its value. **(10)**



P.T.O.

Q.3 A steel girder uniform section, 14m long is simply supported at it's ends. It carries concentrated loads of 90 KN and 60KN at two points 3m and 4.5m from the two ends respectively. Calculate. **(10)**

i) The deflation of the girder at the points under the two loads.

ii) The maximum deflection

Take $I = 64\times10^{-4}m^4$ and $E = 210\times 10^{-6}$ KN/m^2.

OR

Q.3 A symmetrical section 200mm deep has a moment of Inertia $2.26\times10^{-5}m^4$ about it's neutral axis. Determine the longest span over which, when simply supported the beam would carry a u.d.l. OF 4KN/m, on without the stress due to bending exceeding 125×10^6 N/m^2 **(10)**

Q.4 Draw shear stress distribution on a T-section 150×15 mm deep (web) and 200×20 mm wide. The section is symmetric about vertical axis. The Shear force applied is 110KN. **(10)**

OR

Q.4 Compare the weights of equal lengths of hollow and solid shaft to resist same tensional moment for same maximum shear stress. Assume internal diameter 0.8 times the external diagram of hollow shaft. **(10)**

Q.5 Derive an expression for crippling load when both the ends of the column are hinged. **(10)**

OR

Q.5 Compare the crippling load given by Euler's and Rankine's formula for a tabular steel strut 2.3 long having external diagram 38mm and internal diagram 33mm, strut is fixed at one end and hinged at the other end. **(10)**

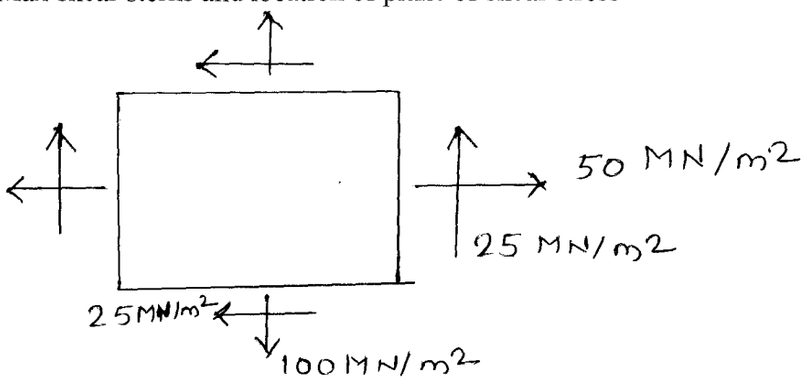
Take 6_c = 335 Mpa, and E = 205Gpa α = 1/7500.

Q.6 A point in a material is subjected to a stress as shown in fig. **(10)**

Calculate:

i) Principal stresses

ii) Max shear sterns and location of plane of shear stress



OR

Q.6 A cylinder 500mm internal diameter and 20mm wall thickness with closed ends is subjected to an internal pressure of 0.60 Mpa, bending moment 6400 Nm and Torque 16000Nm. Determine tensile stress and shearing stress in the wall of the cylinder. **(10)**

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