

(155)

SEI - CIVIL Sem-III (Choice Based) 7/12/17

SOM

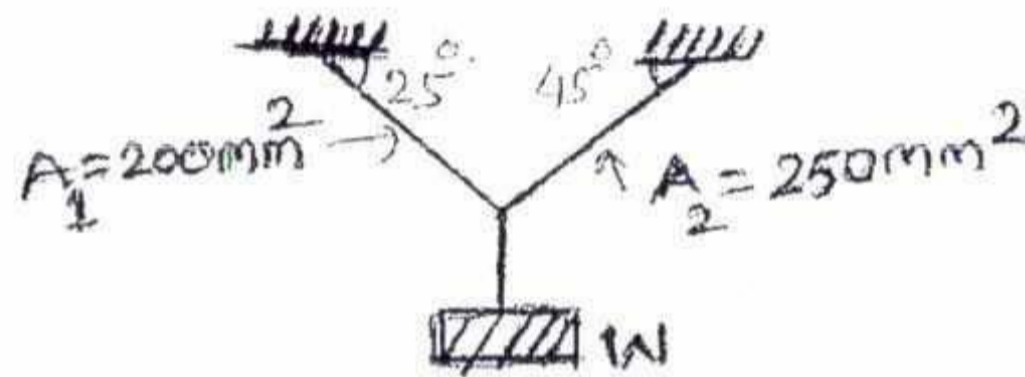
Q.P.Code: 27315

[Time: 3 Hours]

[Marks: 80]

- 1) Question no.1 is compulsory
- 2) Attempt any three question from remaining five
- 3) Assume any suitable data if required

Q1 a) Determine the maximum weight W that can be supported by two wires as shown in fig. if the stress in each wire is not to exceed 120 N/mm^2 (20)



b) A cantilever beam of solid circular section and 3m long carries a concentrated load of 25kN at its free end. If the max bending stress in tension and compression are not to exceed 100 N/mm^2 and 60 N/mm^2 calculate the diameter of the beam required.

c) A 230mm x 350 mm simply supported beam carries a UDL of 20kN/m over a span of 8M. Determine the maximum shear stress at a section 2m from the support.

d) A rectangular column of 230mm x 350mm and 4M long used as a column. If one end is hinged and other is fixed, find the safe load the column can carry if FOS=2.5. use Euler's formula.

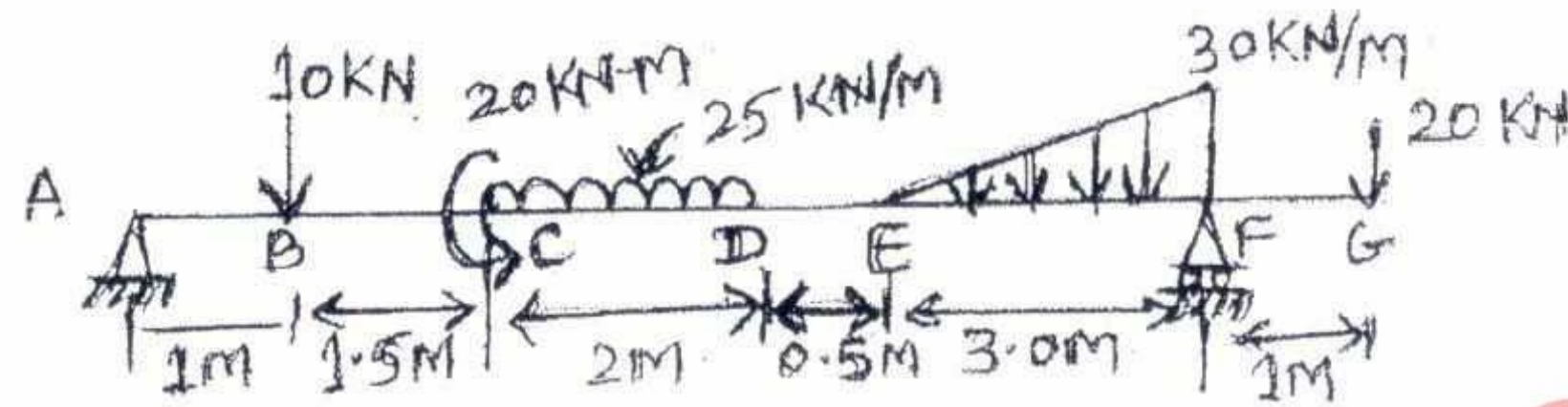
e) Derive the expression for strain energy due to gradually applied axial load.

Q.2 a) An unknown weight falls through 15mm on a collar rigidly attached at the lower end of the bar 4m long and 800 mm^2 in area. If the maximum instantaneous elongation is 3 mm, find the corresponding stress and the value of unknown weight. Take $E = 210 \text{ kN/mm}^2$ (06)

B) A circular rod ABC is subjected to axial compressive load of 50kN. The part AB is hollow circular with outer diameter of 25mm and inner diameter of 10mm and length of 200mm. The part BC is solid circular with diameter of 25mm and length of 300mm. Calculate total decrease in length of the bar. Take $E = 210 \text{ kN/mm}^2$ (04)

c) Draw the shear force and bending moment diagram for the beam loaded as shown in fig. (10)

Turn Over



Q3 a) Explain with the help of neat sketch concept of equivalent section use in flitched beam (04)

b) A hollow circular column of 2.8m long is fixed at one end and free at other end, has to support a load of 500kN. The internal diameter is 0.8 times external diameter. Calculate the external diameter with FOS=4. Take $\sigma_c=330 \text{ N/mm}^2$ $\alpha=1/7500$ (08)

c) A inverted T beam having web 20mm x 100mm and flange 120mm x 20mm, has a span of 5m and is simply supported at ends. Find the maximum load the beam can carry if the compressive and tensile stress not to exceed 60 kN/mm^2 and 75 kN/mm^2 (08)

Q4 a) A flitched beam consist of wooden joist 150mm wide and 300mm deep strengthen by steel plate

Of 10 mm thick at bottom. Find the moment of resistance by using transformed area concept. permissible stress in wooden joist is 8 N/mm^2 . Take $E_s = 15E_w$ (08)

b) A beam of square section of size 200mm x 200mm is placed with one of it's diagonal horizontal and it carries a shear force of 80kN. Draw the shear stress distribution diagram. (08)

c) Derive the relation between SF, BM and rate of loading W (04)

q5 a) A cylindrical shell is 3m long and 1.2m in diameter and 12mm thick is subjected to internal pressure of 1.8 N/mm^2 calculate change in dimension of shell. Take $E=210 \text{ kN/mm}^2$ $\nu=0.3$ (08)

b) At a point in a strained material the stresses on two mutually perpendicular plane are 120 kN/mm^2 and 80 kN/mm^2 both are tensile. Find the normal, tangential and resultant stress at a plane inclined 30° to the major principal plane. (08)

c) determine the area of core section for rectangular section of size 230mm x 350mm. (04)

Q6 a) A hollow circular steel shaft of 5m length has to transmit 150KW power at 120rpm. If internal diameter is 0.6 times external diameter, total angle of twist not to exceed 3° and shear stress is limited to 50 N/mm^2 . Determine the diameter of shaft. Take $G=84 \text{ kN/mm}^2$ (08)

b) In the rectangular section 400mm wide and 300mm deep is subjected to compressive load of 80kN at an eccentricity of 40mm and 75 mm from centroidal xx and yy axis. Find stress at each corner. (06)

c) a rod of 300mm long and 20mm in diameter is heated through 100°C and at the same time pulled by force P. If the total elongation is 0.4mm. What is the magnitude of P Take $E=210 \text{ kN/mm}^2$ and $\alpha=12 \times 10^{-6}$

(06)

Subject: Correction : T0933 / T71 - Strength of Materials QP code: 27315

From: University of Mumbai (support@muapps.in)

To: controllerktc@yahoo.com;

Date: Thursday, 7 December 2017 4:55 PM



University of Mumbai

Correction : T0933 / T71 - Strength of Materials **QP code: 27315**

Question No. 1(d): Take value of $E=2 \times 10^5$ N/mm²

2×10^5

University of Mumbai

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