SE - Sem - II - Old - Civil

SOM

3/12/15

QP Code : 1136

(Old Course)

(3 Hours) Total Marks : 100

N.B. 1) Question number 1 is compulsory. Attempt any four out of remaining six questions.

2) Figures to right indicate full marks.

3) Assume suitable data if needed but justify the same.

Q.1. Attempt any four of the following.

a) Explain briefly point of contraflexure and Bulk modulus. 5

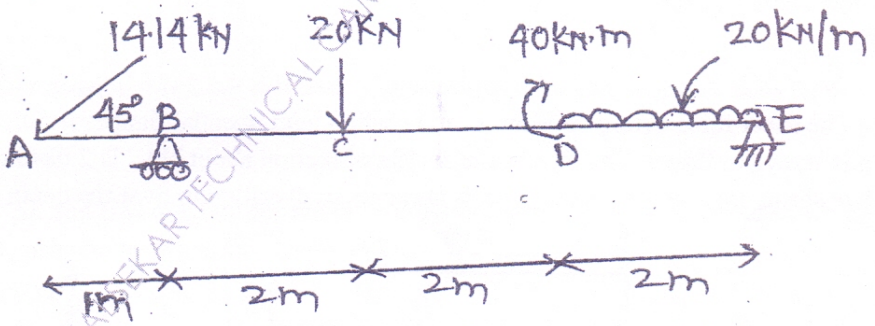
b) Explain merits of welded joints over riveted joint 5

c) State assumption made in theory of simple bending 5

d) Define shear force, bending moment, shear force diagram, bending moment diagram. 5

e) Explain Principal plane and principal stresses

Q.2.(a) Draw shear force & bending moment diagram for beam as shown in figure.. 10



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QP-Con. 9639-15.

Q.2.(b) A steel tube of 30mm external diameter and 20 mm internal diameter encloses a copper rod of 15 mm diameter to which it is rigidly joined at each end. If at a temperature of 10^0 c there is no longitudinal stress , calculate stresses in the rod and tube when temperature is raised to 200^0 C. Take E for steel and copper as $2.1x10^5$ N/mm^2 &$1x10^5$ N/mm^2.The value of coefficient of linear expansion for steel and copper is given as $11x10^{-6}$ per ^{0} C and $18x10^{-6}$ per ^{0} C.

10

Q.3.(a) A timber beam 150 mm wide and 200 mm deep is to be reinforced by bolting on two steel flitches each 150 mm by 12.5 mm in section. Find the moment of resistance when:

(a) Flitches are attached symmetrically at top and bottom

(b) The flitches are attached symmetrically at the sides.

Allowable stresses in timber are 6 N/mm^2.What is maximum stress in steel in each case?

Take $E_s = 20E_w$

12

Q.3.(b)A beam of triangular section having base width 20 cm and height 30 cm is subjected to SF of 3 KN. Find the value of maximum shear stress and sketch shear stress distribution along with depth of beam

8

Q.4.(a) The shear force acting on beam at an I section with unequal flanges is 50KN . The section is shown in figure. The moment of inertia of section about NA is $2.0849x10^4$ mm^4. Calculate shear stress at NA and also draw shear stress distribution over the depth of section.

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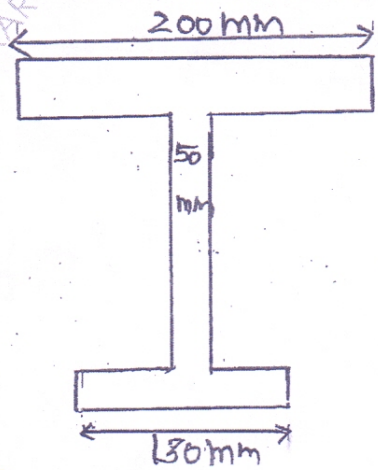

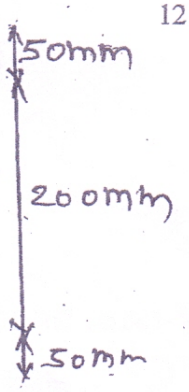

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Q.4.(b)Define section modulus and determine section modulus for rectangular section.

4

Q.4.(c)Derive the relationship among modulus of elasticity, modulus of rigidity and bulk modulus

4

Q.5. (a) A hollow rectangular masonry pier is 1.2 m x 8 m overall, the wall thickness being 0.15m. A vertical load of 100 KN is transmitted in vertical plane bisecting 1.2m side at an eccentricity of 0.1m from geometric axis of section. Calculate maximum and minimum stress intensities of section.

10

Q.5.(b) The stresses at a point in bar are 200N/mm^2(tensile) and 100N/mm^2(comp).Determine the resultant stress in magnitude and direction on a plane inclined at 60^0 to axis of major stress. Also determine the maximum intensity of shear stress in the material at the point.

10

Q.6.(a) Explain tensional rigidity and derive expression for power transmitted by shaft.

5

(b) Draw SF and BM diagram for simply supported beam carrying uniformly varying load from zero at each end to w per unit length at centre.

5

(c) A single riveted double cover butt joint in a structure is used for connecting two plate 12 mm thick. The diameter of rivet is 20 mm .The permissible stresses are 150N/mm^2 in tension and 100N/mm^2 in shear and 300 N/mm^2 in bending. Calculate necessary pitch and efficiency of joint.

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Q.7.(a) Find the maximum shear stress induced in a solid circular shaft of diameter 15 cm when the shaft transmit 150KW power at 180 r.p.m

12

Q.7.(b) The cylindrical shell 900 mm long ,150mm internal diameter, having a thickness of metal 8 mm is filled with fluid at atmospheric pressure. If an additional 20000 mm^3 of fluid is pumped into cylinder find:

(i) Pressure exerted by fluid on cylinder

(ii) The hoop stress.

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