Total No. of Questions – [08] Total No. of Printed Pages 03

G.R. No.	

Paper code – U218-114 (BE-FS)

May 2019-ENDSEM EXAM (BACKLOG)

S. Y. B. TECH. (Civil Engineering) (SEMESTER-I)

COURSE NAME: Strength of Materials

COURSE CODE: CVUA21174 (2017 PATTERN)

Time: [**2 Hours**] [Max. : **50**]

Instructions to candidates:

1) **Answer Q.1, Q.2, Q.3, Q.4, Q.5 OR Q.6, Q.7 OR Q.8**
2) **Figures to the right indicate full .**
3) **Use of scientific calculator is allowed**
4) **Assume suitable data wherever required and state them clearly**

Q.1) a) Draw neat Shear Force Diagram (SFD) for the beam shown below. [6]

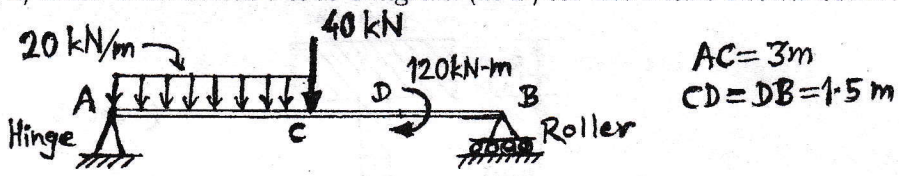

Fig. 1

OR

b) Draw neat Bending Moment Diagram (BMD) for the cantilever beam shown below. [6]

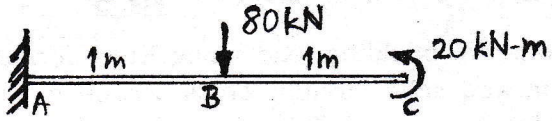

Fig. 2

Q.2) a) A steel wire and a copper wire of identical length (l) before loading are subjected to identical axial pulls (P). If copper wire has 1.6 mm diameter, determine diameter of steel wire such that both wires have identical elongation (δl). Given: Young's Moduli for copper and steel as 100 GPa and 206 GPa respectively. [6]

OR

b) Determine elongation of steel rod AC as shown below. Given E = 200 GPa. [6]

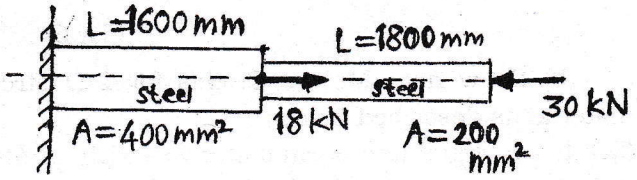

Fig. 3

1 of 3

Q.3) a) Compute maximum bending stresses for a beam subjected to a maximum bending moment of 9 kN.m. Cross section of the beam is hollow rectangular as shown below. Draw neat bending stress distribution diagram for the section. [6]

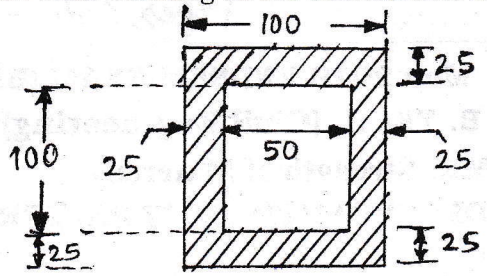

Fig. 4

OR

b) Calculate shearing stresses at all salient points and draw neat shear stress distribution diagram for the cross section of the beam shown in Fig. 5 if the section is subjected to a maximum shearing force of magnitude 15 kN. [6]

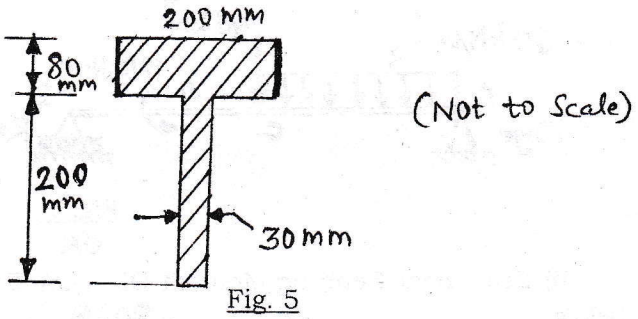

Fig. 5

Q.4) a) Compute buckling load using Euler formula for a column having actual length 2 m and solid circular cross section of 700 mm diameter. Assume that column is lower end fixed while upper end is free and E = 200 GPa. [4]

OR

b) Briefly explain with sketch kern or core of a rectangular section. [4]

Q. 5) a) If 2-D stresses at a point in a strained material are as shown in Fig. 6: compute principal stresses and locate the principal planes. [6]

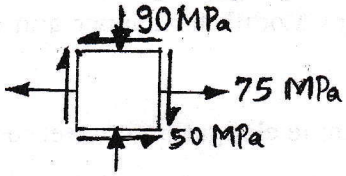

Fig. 6

b) Draw neat Mohr's Circles for 2-D stresses act at a point in a strained material as described below:

(i)Only two equal like normal stresses without any shear stress.

(ii)Only shearing stresses act without any normal stresses. [4]

c) State the method (Steps) of drawing a Mohr's Circle. [4]

OR

Q.6) a) If at a point in a strained material, 2-D stress condition is shown in Fig.7; find (i)Principal Stresses and (ii)maximum in-plane shearing stresses. [6]

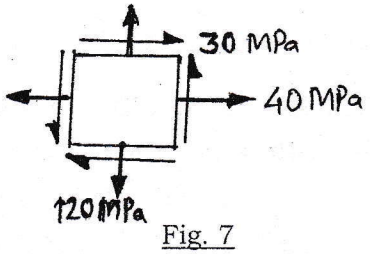

Fig. 7

b)Explain with sketch 'Mohr's Circle'. [4]

c)Define 'Principal Stresses' and 'Principal Planes'. Explain briefly with a suitable sketch. [4]

Q.7) a) A cantilever beam of length 'L' has uniform flexural rigidity 'EI'. It carries load 'W' at the free end. With the help of neat sketch, obtain equations for the slope and deflection at the free end in terms of 'W', 'L' and 'EI'. [6]

b) Briefly explain conjugate beam method for determining slope and deflection of beams. [4]

c) State Castigliano's first theorem and clearly explain its use. [4]

OR

Q.8) a) Obtain slope and deflection (in terms of 'EI') at the free end of a cantilever carrying a couple as shown in Fig. 8. [6]

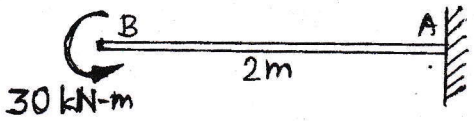

Fig. 8

b) Explain Moment Area Method for finding slope & deflection of beams. [4]

c) Write the equations for maximum slope and deflection at the center of a beam of length 'L' simply supported at the ends if:

(i)The beam carries point load 'W' at the center.

(ii)The beam carries a U.D.L. '*w*' over entire span. [4]

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