B. Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the End of Second Year)

CIVIL ENGINEERING

Paper - IV : Strengths of Materials - II

Time : 3 Hours　　　　　　　　　　　　　　　　**Maximum Marks : 75**

Answer Question No.1 compulsory　　　　*(1 × 15 = 15)*

Answer one question from each unit　　　*(4 × 15 = 60)*

Assume suitable data

1)　a)　Define principle stress?

　　b)　Define the term longitudinal stress?

　　c)　Write the basic differential equation of the elastic curve?

　　d)　What are the effects of eccentric loads on short column?

　　e)　Define maximum strain energy theorem?

　　f)　What is the importance of Mohr's stress circle?

　　g)　What is Shear Strain energy?

　　h)　What is buckling load?

　　i)　Define long Column?

　　j)　Write any two assumption's made in Euler's theory?

　　k)　What is middle third rule?

　　l)　Define the term factor of safty?

　　m)　Define modules of Resilience?

n)   What is kernel of section?

o)   What are the classification of columns?

UNIT - I

2)   A point with in a loaded beam is under bending stress of 30 MPa (tensile) and shear stress of 25 MPa. Find out principal planes passing through the points and principle stress by using Mohr's circle method?   **(15)**

OR

3)   A simply supported beam of span 4 m carrying a concentrated load of 30 KN at mid span. Find the strain energy stored in the beam due to horizontal shear. The beam is 7.5 cm wide and 10 cm deep. Take $E = 300$ GN/m^2 and Poisson's ratio = 0.32?

UNIT - II

4)   The line of thrust in a compression testing specimen is 32 mm diameter is parallel to axis of specimen, but is displaced from it. Calculate the distance of the line of thrust from the axis when the maximum stress is 15% greater than the mean stress on normal section?   **(15)**

OR

5)   A thin cylindrical boiler is of internal diameter 2.5m, thickness of metal 12mm and the permissible tensile stress of plate is 80 N/mm^2. The efficiency of longitudinal Joint and circumferential joint are 75% and 45% respectively. Calculate, the permissible stream pressure and longitudinal and circumferential stresses in the solid plate?

UNIT - III

6)   A steel tube has a mean dia of 120 mm and a thickness of 3 mm. Calculate the torque which can be transmitted by the tube with a factor of safety "ψ" if the criterion of failure is   **(15)**

a)   Maximum shear stress and

b)   Maximum strain energy theory

Take $E = 2.1 \times 10^5$ N/mm^2 and r = 0.30?

OR

7)   A hollow circular C.I column 6 m long and having both ends rigidly fixed has a support on axial load of 1000 KN. The ratio of inner radius to outer radius is 3:4, crushing stress at failure for C.I may be taken as 200 KN/mm^2. If the work load is not exceeding 1/5th of buckling load and 1/3rd of the crushing load. Find minimum external diameter of column? Take $E = 2 \times 10^5$ N/mm^2, $\alpha = 1/1600$.

UNIT - IV

8) Derive an expression to find out the equation for slope & deflection of a cantilever beam of length 'I' and uniform EI with the uniformly distributed load 'W' per unit run over whole length. Hence evaluate its maximum slope and deflection? **(15)**

OR

9) A cantilever of 3 m span carries a uniformly distributed load of intensity 20 KN/m over the entire span together with a point load of 30 KN at free end. Find, maximum slope and maximum deflection. Take EI = 6×10^{12} N/mm^2?

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