R16

Code No: 134CD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, May - 2019

STRENGTH OF MATERIALS – II

(Common to CE, CEE)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b as sub questions.

PART – A **(25 Marks)**

1.a) A close coiled helical spring of mean diameter 140mm is made of 12mm diameter wire. Find the direct axial load the spring can carry, if the maximum stress is not to exceed $100N/mm^2$. [2]

b) What are assumptions made in the derivation of shear stress produced in a circular shaft subjected to torsion? [3]

c) Define the terms, strut and column, and distinguish between slender and stocky struts. [2]

d) What would be the nature of failure in case of
i) Long columns ii) Medium size columns iii) short columns. [3]

e) What do you mean by direct stress and bending stress? [2]

f) What do you mean by the following terms:
i) Middle third rule for rectangular sections
ii) Middle quarter rule for circular sections. [3]

g) How hoop stress in thick cylinders can be effectively reduced? [2]

h) How you go about the design of thin cylindrical shells? [3]

i) Label the shear centre equation for unsymmetrical 'I' section. [2]

j) A rectangular section of breadth 4cm and depth 6cm.What is the product of inertia about the co-ordinate axis passing at one corner of the section and parallel to the sides? [3]

PART – B **(50 Marks)**

2. Develop the torsion equation from fundamentals, with usual notations $\frac{T}{J}=\frac{q}{r}=\frac{C\theta}{L}$. [10]

OR

3. A closely coiled helical spring of round steel wire 8mm in diameter having 10complete turns with a mean diameter of 10cm is subjected to an axial load of 250N. Determine
a) the deflection of the spring
b) maximum shear stress in the wire
c) stiffness of the spring.
Take $N=8\times10^4$ N/mm^2(modulus of rigidity). [10]

4. Find an expression for crippling load for a long column when one end of the column is fixed and other end is hinged. [10]

OR

5. Find the Maximum bending moment in a strut subjected point load W at mid point and axial thrust P shown in Figure1. [10]

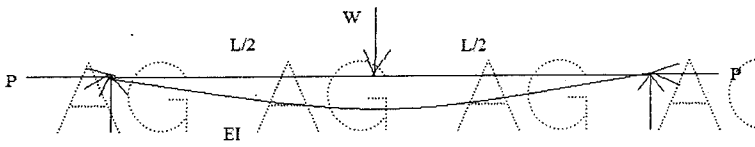

Figure: 1

6. A column is rectangular in cross-section of 300mm×400mm in dimensions. The column carries an eccentric point load of 360 KN on one diagonal at a distance of quarter diagonal length from a corner. Determine the stresses at all four corners. Draw the stress distribution diagrams for any two adjacent sides. [10]

OR

7. A curved beam, semi circular in plan and supported on three equally spaced supports. The beam carries a uniformly distributed load of w/unit circular length. Determine and sketch the bending moment and twisting moments. [10]

8. A cylindrical shell is 3.0m long, 0.75m internal diameter and 12.5 mm thickness. Determine the change in diameter of the shell if it is subjected to an internal pressure of 1.5 N/mm^2. Also calculate the maximum shear stress induced in the shell. Given that E=200GPa and poissions ratio=0.25. [10]

OR

9. A compound cylinder is made by shrinking a cylinder of 200 mm external diameter and 160mm internal diameter over another cylinder of 160 mm external diameter and 120 mm internal diameter. The radial pressure at the junction after shrinking on is 8 N/mm^2. Estimate the final stresses setup across the section when the compound cylinder is subjected to an internal fluid pressure of 60N/mm^2. [10]

10.a) Explain the stresses induced due to unsymmetrical bending.

b) Develop the equation of Shear centre for channel section. [4+6]

OR

11.a) Determine the principal moments of inertia for an un-equal angle section 200mm×150mm×10mm.

b) A rectangular-section beam 80 mm × 50 mm is arranged as a cantilever 1.3 m long and loaded at its free end with a load of 5 kN inclined at an angle of 30° to the vertical as shown in Figure 2. Determine the position and magnitude of the greatest tensile stress in the section. Take E = 210 GN/m^2. [4+6]

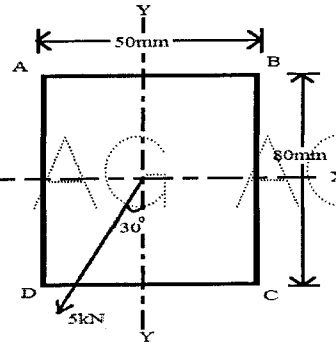

Figure: 2

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