B.TECH 3RD SEM.

STRUCTURAL ANALYSIS -1

PAPER: CE -201 –F

DEC - 2010

SECTION - A

Q.NO. 1 (a).

State "Hook's law and it's applications". 05

Q.NO. 1 (b). A load of 400KN is applied on a short concrete column 250mm×250mm and the column is reinforced with steel bars of total area 2512 mm^2 . if the modulus of elasticity for steel is 18 time, that of concrete, . Find the stresses in concrete and steel. 15

Q.NO. 2(a)

Derive the expression for normal stress and tangential stress on a oblique section of a body subjected to direct stresses in two mutually perpendicular direction. 10

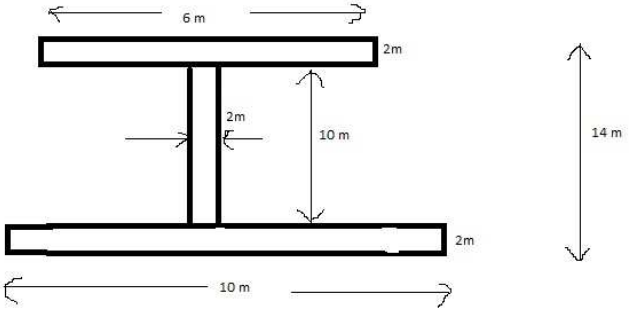
Q.NO. 2(b)

At a point in a strained material, is subjected to two mutually perpendicular tensile stresses of 20 kN/cm^2 and 10 kN/cm^2 . Determine the intensities of normal stress and resultant stress on a plane, inclined at 50° to horizontal axis i.e. axis of minor principal stress. 10

SECTION –B

Q.NO. 3

A I-section is as shown in fig. . It is subjected to a bending moment of 5000 N-m at its neutral axis . Find the maximum stress induced in the beam.



20

Q.NO. 4(a)

Drive a torsion equation for a circular shaft. 10

Q.NO. 4(b)

A wooden beam 15cm wide and 20cm deep is reinforced at the bottom by a steel plate 15cm wide and 1.2 cm thick . if the allowable stresses in wood and steel are 1 kN/cm^2 and 13 kN/cm^2 respectively. Find the safe Bending Moment that the section may carry. (Take $E_s = 15\ E_w$) 10

SECTION-C

Q.NO. 5(a)

What are the different end conditions for column? What will be the effective length according to these conditions?
2.5+2.5=5

Q.NO. 5(b)

A strut 3.0m long is 60mm in diameter. Find the safe compressive load for the member using Euler's formula if

(i) Both ends hinged or pinned.
(ii) Both ends fixed

Take E =2×10^5 N/mm^2 and the factor of safety =3.5 15

Q NO. 6 (a)

State the assumptions of Euler's column theory. 5

Q NO. 6 (b) A column of circular section made of cast iron 200mm external diameter and 20mm thick is used as a column. The length of a column is 4m. Both ends of the column are fixed. The column carries a load of 180kN at an eccentricity of 250mm from the axis of the column. Find the stresses developed in the extreme fibers. Take E =94000 N/mm^2. 15

SECTION -D

Q.NO. 7

A beam 6m long simply supported at the ends and carries a uniformly distributed load of 15 k N/m and three concentrated loads 10kN, 20kN and 30kN acting at 1.5m from left support , centre point and 1.5m from right support respectively. Draw the SFD and BMD and determine the max. B.M. 20

Q.NO. 8

A simply supported beam AB, of span 10m is subjected to a point load of magnitude 50 kN at its centre Find out the maximum slope and deflection by moment area method. Take I =160×10^3 cm^4 and E = 2×10^{5}N/mm^2. 20