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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. II Year II Semester Supplementary Examinations Dec 2019

STRENGTH OF MATERIALS -II

(Civil Engineering)

Time: 3 hours Max.Marks:60

(Answer all Five Units 5 X 12 = 60 Marks)

UNIT-I

Q.1 a. Explain maximum shear stress theory and maximum strain energy theory. **8M**

b. The Principal stresses in a cast-iron body are 40Mpa tensile and 90Mpa compressive, third principal stress being zero. Determine the factor of safety based on elastic limit, if the criterion of failure is principal stress theory? The elastic limit in simple tension is 80Mpa and in simple compression is 450Mpa. **4M**

OR

Q.2 A point in a strained material is subjected to normal tensile stresses of 100Mpa and 200Mpa, and a shear stress of 300Mpa. Find out the stresses acting on a plane making an angle of 45^0 with the axis of the first normal stress? Also find the principal stresses? **12M**

UNIT-II

Q.3 a. A pipe of 120cm diameter is to carry water under a pressure of $20Kg/cm^2$. If the longitudinal and circumferential stresses are not to exceed $300Kg/cm^2$ and $400Kg/cm^2$ respectively, determine the suitable thickness of the pipe when the efficiencies of longitudinal and circumferential joints are 60% and 70% respectively? **4M**

b. A cylindrical shell is 3m long, 1.5m internal diameter and 20mm metal thickness. Calculate the intensity of maximum shear stress induced and also the change in dimensions of the shell if it is subjected to an internal pressure of $2N/mm^2$? Take $E= 2X10^5 N/mm^2$ and $\frac{1}{m} = 0.30$. **8M**

OR

Q.4 Stating the assumptions, derive the Lame's equations to find out the stresses in a thick cylindrical shell. **12M**

UNIT-IIII

Q.5 a. Derive an expression for deflection of a close coiled helical spring subjected to an axial load of 'W'. **6M**

b. An open coiled helical spring is subjected to an axial load of 50KN. Find the deflection of the spring and maximum shear stress in the spring wire? The spring particulars are as follows. (i) No. of coils = 4, (ii) mean radius of coil = 30mm (iii) diameter of the spring wire = 5mm (iv) Modulus of rigidity = $0.8x10^5Mpa$ (v) angle of helix = 10^0 (vi) $E = 2X10^5N/mm^2$. **6M**

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OR

Q.6 A masonry dam of rectangular section 20m high and 10m wide has water up to a height of 16m on its one side. Find: **12M**

i) Pressure force due to water on one meter length of dam

ii) Position of centre of pressure

iii) The position at which the resultant cuts the base and

iv) Maximum and minimum stress intensities at the base of the dam. The density of masonry is 19.62KN/m^3 and of water is 9.81KN/m^3.

UNIT-IV

Q.7 a. What are the assumptions made in the Euler's theory? **4M**

b. A Column having a T-section with a flange 120mm x 16mm and web 150mm x 16mm is 3m long. Assuming the column to be hinged at both ends, find the crippling load by using Euler's formula? E= 2x10^5 N/mm^2. **8M**

OR

Q.8 a. What is slenderness ratio? Explain briefly. **4M**

b. A hollow cylindrical CI column of 150mm external diameter and 15mm thickness, 3m long and is hinged at one end and fixed at the other end. Find (i) The ratio of the Euler's and Rankine's load? Take E = 0.8X10^5Nmm^2 , fc = 550 N/mm^2 and $\alpha = \frac{1}{1600}$ **8M**

UNIT-V

Q.9 A 125mm x 75mm x 10 mm unequal angle bars is placed with the longer leg vertical and used as a joist freely supported at the ends. It is subjected to a bending moment of 3KNm acting in the vertical plane through the centroid of the section. Find the maximum bending stress induced in the section? **12M**

OR

Q.10 A beam of circular section of diameter 20mm has its centre line curved to a radius of 50mm. Find the intensity of maximum stresses cri the beam, when subjected to a moment of 5KN-m? **12M**