MODEL QUESTION PAPER

MFC2

I Semester M.TECH Examination, August 2011
APPLIED ELASTICITY & PLASTICITY

Time: 3 Hours   Max. Marks: 75

GROUP A : Answer any three questions.

Q.1   Explain Plain Stress.

Q.2   State and prove the Maxwell-Betti reciprocal theorem?

Q.3   Describe membrane analogy for the bending of thin plates. How this analogy can be used to determine the deflection of a plate.

Q.4   Discuss combined bending and stretching of rectangular plates.

Q.5   A circular disc of 8 cm diameter and 5mm thk is subjected to diametral compression. It the applied load is 800 N, determine the stress distribution in the disc at the centre.

GROUP B : Answer any three questions.

Q.6.   The State of stress at a point is given by

$$\begin{bmatrix} 20 & -6 & 10 \\ -6 & 10 & 8 \\ 10 & 8 & 7 \end{bmatrix} Mpa$$

Determine the principal stresses and principal directions.

Q.7   Explain geometry of shells of revolutions.

Q.8   A cantilever beam loaded at its free end has a stress function

$\phi = Axy + B \dfrac{xy^3}{6}$ Determine an expression for the vertical deflection curve.

Q.9   A circular plate of outside radius of 200mm and inside radius 40 mm carries a shear force of 500 N at the inner edge. If the thickness of the plate is 8mm and $\gamma = 0.3$. Determine the maximum stress and deflection of the plate when the plate is simply supported at the outer edge. Take E=2 X 10^5 N/mm^2.

Q.10   Describe membrane analogy for the bending of thin plates. How this analogy can be used to determine the deflection of a plate.

GROUP C : All Questions are Compulsory.

Q.11 Fill in the blanks

(i)   The Dummy load method is based on the _____ energy.
(ii)   The shape factor for a solid circular shaft is _____.
(iii)   Unit of stress is _____.
(iv)   The distribution of bending stress in curved beam is_____.

(v)   _____ can be defined as the ability to resist / withstand repeated bending.

Q.12 Multiple choice question.

(i)   Rayleigh method is often employed to determine_____.
        (a) Deflection of beam   (b) Strengthen of beam
        (c) Both   (d) None of the these
(ii)   For very thin tubes, which of the formula gives the accurate result?
        (a) Bredt's formula   (b) exact formula
        (c) Lame's formula   (d) none of these
(iii)   The term _____ is used to indicate the rate of increase of stress as a stress raiser is approached.
        (a) Stress concentrations   (b) Stress gradient
        (c) Discontinuities   (d) Fatigue stress concentration
(iv)   What are the major types of contact stress problems _____.
        (a) Point contact   (b) Surface contact
        (c) Line contact   (d) Both a and c
(v)   Polar co-ordinates are _____.
        (a) (r, θ) (b) (s, θ)
        (c) (s, r) (d) (s, t)

Q.13 True or false

(i)   Stretch ratio is denoted by 'M'.
(ii)   The maximum pressure between two bodies in contact is equal to the average pressure on the surface of contact.
(iii)   Real potential method is used to solve two dimensional problems in polar co-ordinate.
(iv)   Maximum value of fatigue stress concentration factor is equal to 2.
(v)   Factor of safety is always greater than one.

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