Registration No:

Total Number of Pages : 02   **M.TECH**

M.TECH 1ST SEMESTER REGULAR EXAMINATIONS, DECEMBER 2017
ADVANCED MECHANICS OF SOLID
Branch: MD, Subject Code:MMDPC1020
Time: 3 Hours
Max Marks : 70
The figures in the right hand margin indicate marks.

PART-A   (10 X 2=20 MARKS)

1. Answer the following questions.

a. Distinguish between state of plane stress and state of plane strain?
b. Explain st.venant's principle?
c. State the principle of super position?
d. What do you mean by membrane analogy for thin walled tube?
e. What do you mean by slenderness ratio?
f. State Hamilton's principle?
g. Explain the concept of Unsymmetrical Bending. What are the conditions that should be satisfied for a beam to bend without twisting?
h. What is resilience?
i. How Euler's beam is differing from Timoshenko beam?
j. Define Harmonic Excitation of a system?

PART-B   (5 X 10=50 MARKS)

Answer any five questions from the following.

2. A close coiled helical spring whose free length when not compressed is 15cm, is required to absorb strain energy equal to 50Nm when fully compressed with the coils in contact. The maximum shearing stress limited to 140Mpa.Assuming a mean coil diameter of 10cm. C=80Gpa.

  a) Find the diameter of the steel wire required.   **5**

  b) Find the number of coils.   **5**

3.a) Derive an equation of radial stress for thick cylinder subjected to internal pressure P_1 and external pressure P_2?   **5**

  b) Derive an equation of circumferential stress for thick cylinder subjected to internal pressure P_1 and external pressure P_2?   **5**

4.a) What do you mean by plane stress condition? Give example.   **2**

  b) Derive the equation of Cauchy's stress formula?   **8**

5. a). State Maxwell-Betti-Rayleigh Reciprocal theorem?   **2**

  b).Find the deflection,bending moments and maximum stresses for a simply supported circular plate of radius R carrying a uniform load of intensity w_o,which is constant   **8**

6. a) What do you mean by slenderness ratio?   **2**
   b) For a given state of stress, determine the principal stresses?   **8**

$$\begin{matrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{matrix}$$

7. A steel disc of uniform thickness and of diameter 400mm is rotating about its axis at 2000 RPM. The density of the material is 7700kg/m^3 and poison's ration is 0.3.   **5**
   a) Determine the variations of circumferential stresses.   **5**
   b) Determine the variations of radial stresses.

8. a) Find the total potential energy for deformable bodies using principle of virtual work and minimum potential energy theorem?   **5**
   b) Find the total potential energy for deformable bodies using minimum potential energy theorem?   **5**

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