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SATHYABAMA UNIVERSITY

(Established under section 3 of UGC Act, 1956)

Course & Branch: B.E-CIVIL
Title of the Paper: Mechanics of Solids – II — Max. Marks: 80
Sub. Code: 6C0082 — Time: 3 Hours
Date: 24/11/2010 — Session: AN

PART - A (10 X 2 = 20)

Answer ALL the Questions

1. Define statically indeterminate beam with suitable example.

2. Define continuous beam with suitable example.

3. Define slenderness ratio.

4. State the assumptions made in Euler's theory.

5. A seamless pipe 800mm diameter contains a fluid under a pressure of $2N/mm^2$ if permissible tensile stress be $100N/mm^2$. Find minimum thickness of the pipe.

6. What is meant by compound cylinders?

7. Define maximum shear stress.

8. Define strain energy in terms of principle stresses.

9. When does unsymmetrical bending take place?

10. A beam bends about its neutral axis for both symmetrical and unsymmetrical bending. (True / False).

PART – B (5 x 12 = 60)

Answer All the Questions

11. A beam of length 'I' simply supported at the ends carriers a pointed 'W' at a distance 'a' from the left end. Find the deflection under the load and the maximum deflection.

(or)

12. A simply supported beam of span 'I' carries a point load 'W' at mid span. Find the strain energy stored by the beam and hence calculate the central deflection.

13. A strut 2.5m long is 60mm in diameter. One end of the strut is fixed while its other end is hinged. Find the safe compressive load for the members using Euler's formula allowing a factor of safety of 3.5. Take E = 2.1 x 10^5N/mm^2.

(or)

14. A column of circular section made of cast iron 200mm external dia and 20mm thick is used as a column 4m long. Both ends of the column are fixed. The column carries load of 150KN at an eccentricity of 25mm from the axis of the column. Find the extreme stresses on the column section. Find also maximum eccentricity in order there may be no tension anywhere on the section, Take E = 94000N/mm^2.

15. A thin seamless spherical shell of 1.5m dia is 8mm thick. It is filled with a liquid so that the internal pressure is 1.5N/mm^2, determine the increase in diameter and capacity of the shell. Take 1/m=0.3 and E = 2X10^5N/mm^2.

(or)

16. A thick spherical shell of 100m internal dia is subjected to an internal fluid pressure of 30N/mm^2. If the permissible tensile stress is 80N/mm^2. Find the thickness of the shell.

17. A rectangular block of materials is subjected to a tensile stress of 110N/mm^2 on one plane and a tensile stress of 47N/mm^2 on a plane at right angles, together with shear stress of 63N/mm^2 on the same planes. Find (i) The direction of the principle plane. (ii) The magnitude of the principle stresses. (iii) The magnitude of the greatest shear stress.

(or)

18. A crankshaft 200mm in diameter is subjected to a bending moment of 18.5KNm and a twisting moment of 27.75KNm. Find the greatest shear stress. Find also the plane of the maximum shear stress with respect to the axis of the shaft.

19. Derive and obtain an expression for the bending stress in an unsymmetrical section subject to bending, using the generalized '*k*' method.

(or)

20. Find the bending stress distribution of the section shown below and compare it with any one method.