B.E. 4th Semester (Mech. Engg.) Examination,
December–2010

STRENGTH OF MATERIALS

Paper - ME-206-E

Time allowed : 3 hours]                    [Maximum marks :100

Note : Attempt any five questions.

1.  Find the expression for hoop & longitudinal stresses in case of thin cylindrical shells when subjected to internal fluid pressure.                    20

2.  Determine the maximum and minimum hoop stress across the section of a pipe of 400 mm internal diameter and 100 mm thick, when the pipe contains a fluid at a pressure of $8 N/mm^2$. Also sketch the radial pressure distribution and hoop stress distribution across the section.                    20

3.  A steam turbine is running at 4200 rpm. It is to be designed for uniform strength for a stress of $85 MN/m^2$. If the thickness of the rotor at the centre is 25 mm and density of its material is 800 $kg/m^3$, find the thickness of rotor at the radius of 350 mm.    20

4.  A closed ring of mean radius of curvature 90 mm is subjected to a pull of 3kN. The line of action of the load passes through the centre of ring. Calculate the maximum tensile and compressive stresses in the material of the ring if the ring is circular in cross section with diameter equal to 15 mm.    20

2109-P-2-Q-7 (10)                                        [P.T.O.]

5.　The principal stresses at a point in an elastic material are 100N/mm² (tensile), 80 N/mm² (tensile) and 50 N/mm² (compressive). If the stress at the elastic limit in simple tension is 200 N/mm², determine whether the failure of material will occur according to maximum principal stress theory. If not then determine the factor of safety.　　20

6.　A leaf spring carries a central load of 3000 N. The leaf spring is to be made of 10 steel plates, 5 cm wide and 6 mm thick. If the bending stress is limited to 150 N/mm² determine :

(i)　Length of the spring

(ii)　Deflection at the centre of spring.

Take $E = 2 \times 10^5$ N/mm².　　20

7.　Find the expression for strain energy stored in body subjected to simple bending moments with a neat sketch.　　20