B. Tech. 7th Semester (ME) F. Scheme Examination,
December–2017
STRENGTH OF MATERIALS-II
Paper–ME-401-F

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *Attempt any **five** questions. **Question No. 1 is compulsory** and attempt at least one question from each section.*

1. Explain following : 4×5=20

(a) Strain energy

(b) Moment of Inertia

(c) Leme's Equation

(d) Open coiled helical spring and closed coiled helical spring.

Section–A

2. A beam 4 m in length is simply supported at the ends and carries a uniformly distributed load of 5 kN/m length. Determine the strain energy stored in the beam. E = 200 GPa, I = 1200 cm^4. 20

3. (a) Write in brief various Theories of Elastic Failure. 12

(b) A circular shaft of 3 cm diameter is 2 m long. It is required to transmit 7.5 kW at 80 r.p.m. Determine the strain energy stored in the shaft. G = 84 GPa. 8

Section–B

4. Define shear centre. Derive an expression of shear centre for any an I-section. 20

5. A thin spherical vessel 100 mm diameter and 12.5 mm thick is filled with water. More water is pumped in until the pressure reaches 4.2 MPa. How much water was required to reach this pressure ? 20

Section–C

6. A thick spherical shell of 100 mm internal diameter is subjected to an internal fluid pressure of 30 N/mm^2. If the permissible tensile stress is 80 N/mm^2, find the thickness of the shell. 20

7. A disc of 60 cm diameter and uniform thickness is rotating at 2400 r.p.m. Determine the maximum stress induced in the disc.

   If a hole of 10 cm diameter is drilled at the centre of the disc. Determine the maximum intensities of radial and hoop stresses induced. Take $\upsilon = 0.28$, density of the disc = 7800 kg/m^3. 20

Section–D

8. A flat spiral spring is made of 6 mm wide and 2.5 mm thick wire and is 300 cm long. Assuming the maximum stress of 840 MPa to occur at the point of greatest bending, calculate the torque, the work stored and the number of turns to wind up the spring. E = 210 GPa. 20

9. Deduce an expression for axial deflection of the open-coiled helical spring under the action of an axial load. 20