Reg. No. : | | | | | | | | | | |

Question Paper Code: 31144

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2017

Fourth Semester

Civil Engineering

01UCE404 - MECHANICS OF SOLIDS II

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Define the term Proof resilience and Modulus of resilience.
2. State Castigliano's first theorem.
3. Define statically indeterminate beam.
4. State the theorem of three moments.
5. Define Flexure rigidity of beams.
6. What is conjugate beam?
7. Write the assumptions made in Euler's theory of long column.
8. Define thick cylinders.
9. Define shear center.
10. Define compound cylinder.

PART - B (5 x 16 = 80 Marks)

11. (a) An axial pull of 50 kN is suddenly applied to a steel rod 2 m long and 10 cm^2 in cross –section. Calculate the strain energy that can be absorbed, if E = 200 GN /m^2 (16)

Or

(b) A beam simply supported over a span of 3m carries a uniformly distributed load of 20 kN/m over the entire span. Taking EI = 2.25 MNm^2 and using Castiglian's theorem determine the deflection at the center of the beam. (16)

12. (a) A simply supported beam of 16 m effective span 0carries the concentrated loads of 4 kN, 5 kN and 3 kN at distances 3, 7, and 11 m respectively from the left support. Calculate maximum shearing force and bending moment. Draw the S.F and B.M diagrams. (16)

Or

(b) A rectangular beam 20 cm deep by 10 cm wide is subjected to a maximum bending moment of 500 kNm. Determine the maximum stress in the beam. If the value of E for the material is 200 GN / m^2, find out the radius of curvature for that portion of the beam where the bending moment is maximum. (16)

13. (a) A cantilever 15 cm wide and 20 cm deep projects 1.5 m out of a wall, and is carrying a point load of 20 kN at the free end. Find the slope and deflection of the cantilever at the free end by using Moment Area Method. Take E = 200 GN / m^2. (16)

Or

(b) A simply supported 6 m long rolled steel joist carries a uniformly distributed load of 8 kN per meter length. Determine slope and deflection at a distance of 2 m from one end of the beam. (16)

14. (a) A cylindrical air drum is 2.25 m in diameter with plates 1.2 cm thick. The efficiencies of the longitudinal and circumferential joints are respectively 75% and 40%. If the tensile stress in the plating is to be limited to 120 MN /m^2 find the maximum safe air pressure. (16)

Or

(b) Compare the crippling loads given by Rankine's and Euler's formula for tubular strut 2.25m long having outer and inner diameters of 37.5 mm and 32.5 mm loaded through pin – joint at both ends. Take yield stress as 315 MN /m^2, a = 1 / 7500 and E = 200 GN /m^2. If elastic limit for the material is taken as 200 MN /m^2, then for what length of the strut does the Euler formula cease to apply. (16)

15. (a) Derive the formula for the deflection of beams due to unsymmetrical bending. (16)

Or

(b) A 40 mm x 40 mm x 5 mm angle is used as a simply supported beam over a span of 2.4 m. It carries a load of 200 N along the vertical axis passing through the centroid of the section. Determine the resulting bending stresses on the outer corner of the section, along the middle section of the beam. (16)