

Reg. No. :

--	--	--	--	--	--	--	--	--	--	--

Question Paper Code: 41144

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

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 the uses of Castigliano's theorem.
3. Define statically indeterminate beam.
4. What are the advantages of continuous beams over simply supported beams?
5. Define Flexure rigidity of beams.
6. Write down the formula to find the slope and deflection of any section of a given beam by conjugate beam method?
7. What are the assumptions followed in Euler's equation?
8. Define thick cylinders.
9. Define shear center.
10. Define unsymmetrical bending

PART - B (5 x 16 = 80 Marks)

11. (a) Derive the expression for strain energy in Linear Elastic Systems for the following cases. (i) Axial loading (ii) Flexural Loading [moment (or) couple] (16)

Or

- (b) (i) A beam simply supported over a span of l m carries a point load W at mid-span. Find the strain energy stored by the beam and calculate the central deflection. (10)
- (ii) Find the deflection at the free end of a cantilever carrying a concentrated load at the free end. Assume uniform EI . (6)
12. (a) A fixed beam AB of length $6m$ carries point load of $160 kN$ and $120 kN$ at a distance of $2m$ and $4m$ from the left end A . Find the fixed end moments and the reactions at the supports. (16)

Or

- (b) A continuous beam ABC consists of two spans AB and BC of length 6 metres and 8 metres. The span AB carries a point load of $120 kN$ at $4 m$ from A , while the span BC carries a point load of $160 kN$ at $5 m$ from C . Find the moments and reactions at the supports. (16)
13. (a) A beam $ABCD$ is simply supported at A and D over a span of $10 m$. The beam carries point loads $60 kN$ and $40 kN$ at distances $3 m$ and $6 m$ from the end A . Neglecting the weight of the beam. Find the slopes at A, B, C and D Also find the deflections at C and D . Take $I = 12 \times 10^8 \text{ mm}^4$ and $E = 200 \text{ kN/mm}^2$ by using conjugate beam method. (16)

Or

- (b) A simply supported beam is carrying a load W at the center. Calculate the slopes at its ends and the central deflection, using conjugate beam method. (16)
14. (a) Derive the expression for crippling load when both ends of the column are fixed. (16)

Or

- (b) A thin walled special vessel having a diameter of $1.5 m$ is made of steel plates of uniform thickness. It is fitted with water which is pumped on until the pressure is 1.75 N/mm^2 . After the pumping has been completed a relief valve fitted to the vessel is opened and water is allowed to escape until the pressure falls to atmospheric. If the volume of water which escapes is 3500 cc determine the thickness of the plates. Take $K = 2 \times 10^3 \text{ N/mm}^2$, $E = 2 \times 10^5 \text{ N/mm}^2$ and Poisson's ratio = 0.286 . (16)
15. (a) Derive the formula for the deflection of beams due to unsymmetrical bending. (16)

Or

- (b) A pipe of 200 mm internal diameter of radial pressure and 100 mm thickness contains a fluid at a pressure of 6 N/mm^2 . Find the maximum and the minimum hoop stress across the section. (16)