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

Question Paper Code: 31414

B.E. / B.Tech. DEGREE EXAMINATION, MAY 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. State Castigliano's first theorem.
2. Define Maxwell's reciprocal theorem.
3. Write the maximum deflection of fixed beam having uniformly distributed load throughout its length.
4. Define theorem of three moments.
5. State second moment of area theorem.
6. What are the basic assumptions while deriving deflection of determinate beams?
7. Define core of a section of columns.
8. What are the stresses are induced in the thin cylinder?
9. Explain how unsymmetrical bending is developed in a beam.
10. Define residual stresses.

PART - B (5 x 16 = 80 Marks)

11. (a) Calculate the central deflection and the slope at ends of a simply supported beam carrying a UDL w/unit length over the whole span by Castigliano's theorem. (16)

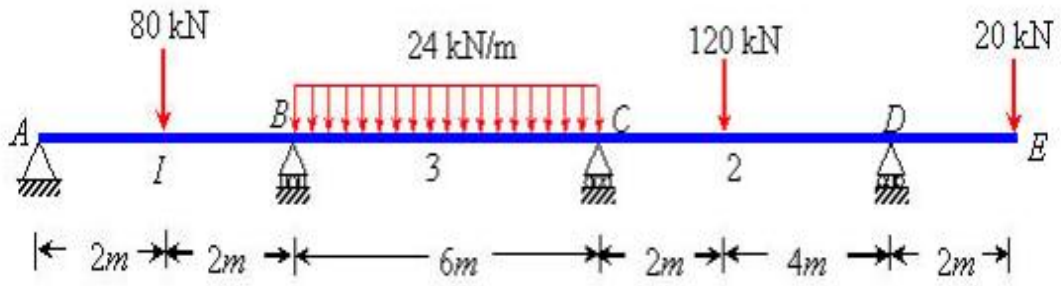
Or

(b) A cantilever, 8 *m* long, carrying a point loads 5 *kN* at the center and an udl of 2 *kN/m* for a length 4m from the free end. If EI is the flexural rigidity of the cantilever find the reaction at the prop by using energy principles. (16)

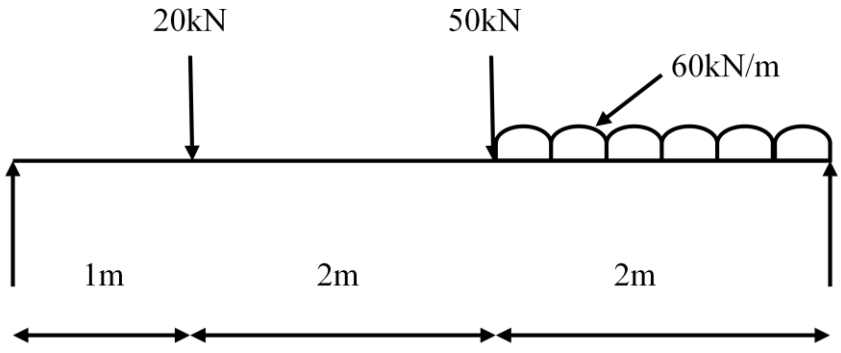
12. (a) A fixed beam *AB* of span 4.5 *m* is subjected to a concentrated couple of 400 *kNm* applied at a section 3 *m* from end *A*. Find the end moments from the first principles and draws the bending moment and shear force diagram. (16)

Or

(b) Analyze the continuous beam shown in below figure by the three moment equation. Draw the shear force and bending moment diagram. (16)

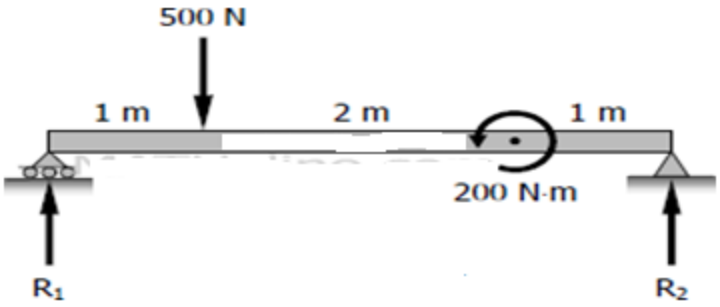


13. (a) Determine the slope and deflection under the 50 *kN* load for the beam shown in below figure loading system by Macaulay's method. E = 200 GN/m^2; I = 83 x 10^6 m^4. (16)



Or

(b) Find the value of deflection at the point of application of the 200 *Nm* couple shown in below figure by conjugate method. (16)

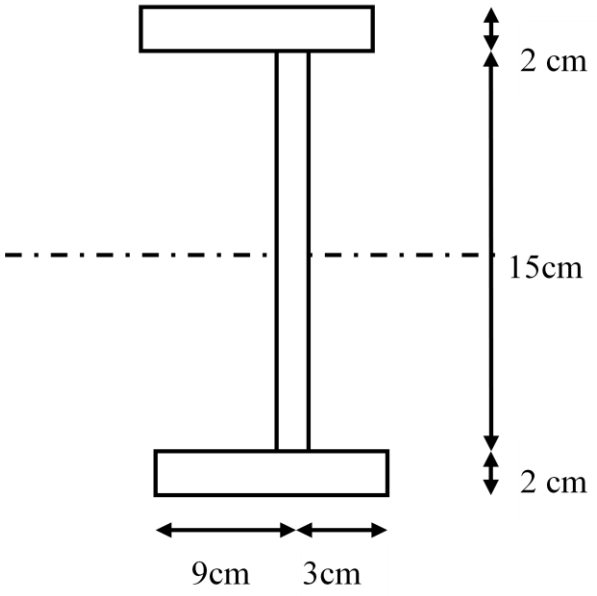


14. (a) Derive the Euler's formula for strut for one end fixed and other end hinged condition. (16)

Or

(b) A steel column made of a 4 *m* long channel section, 300 x 100 *mm*, is fixed at both the ends. The thickness of flange is 11.6 *mm* while the thickness of web is 6.8 *mm*. Using Rankines formula the load it can carry with a factor of safety of 3. Take fc = 330 N/mm^2 and Rankines constant = 1/7500. (16)

15. (a) Locate the shear centre of the unsymmetrical I-beam cross section as shown in below figure. (16)



Or

(b) A 60 *mm* x 40 *mm* x 6 *mm* unequal angle is placed with the longer leg vertical, and is used as a beam. It is subjected to a bending moment of 12 *kNm* acting in the vertical plane through the centroid of the section. Determine the maximum bending stress induced in the section. (16)