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

Question Paper Code: 54103

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Fourth Semester

Civil Engineering

15UCE403-MECHANICS OF SOLIDS - II

(Regulation 2015)

Duration: 1.15 hrs Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. The energy stored in a beam of length L subjected to a constant B.M. is CO1-R

   (a) $M^2L/2EI$ (b) ML/2EI (c) 2 ML/2EI (d) M^2L/EI

2. The strain energy stored by the body within at elastic limit when loaded externally is called CO1- R

   (a) Resilience (b) Proof resilience

   (c) Modulus of resilience (d) Strain energy

3. The deflection due to couple M at the free end of a cantilever length L is (Remember) CO2-R

   (a) ML/EI (b) 2ML/EI (c) ML/2EI (d) $ML^2/2EI$

4. The product EI is called CO2- R

   (a) Flexural rigidity (b) Torsional rigidity

   (c) Second moment of area (d) Moment of area

5. The ratio of the maximum deflections of a beam simply supported at its ends with an isolated central load and that of with a uniformly distributed load over its entire length, is CO3-R

   (a) 1 (b) 15/24 (c) 24/15 (d) 2/3

6. A fixed beam of length 6 m carries a point load 120 kN at its centre. The fixed end moment at the ends is CO3- R

   (a) 40 kNm (b) 90 kNm (c) 120 kNm (d) 150 kNm

7. If the effective length of a column is twice the actual length, then the column is (Remember) CO4-R

(a) Fixed at both ends

(b) Hinged at both ends

(c) Fixed at one end and free at the other end

(d) Fixed at one end and hinged at the other end

8. A cylinder can be assumed as a thin cylinder when the diameter to thickness ratio is CO4- R

(a) <20 (b)>20 (c) 10 (d) Negligible

9. In cantilever beam, slope and deflection at free end is CO5-R

(a) Zero (b) Maximum (c) Minimum (d) 10

10. In a channel section symmetrical about XX axis, shear centre lies at CO5 R

(a) The centre of the vertical web (b) The centre of the top flange

(c) The centroid of the section away (d) None of the above

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Using castigliano's theorem , calculate the vertical deflection at the middle of a simply supported beam which carries a uniformly distributed load of intensity W over the full span. The flexural rigidity EI of the beam is constant and only strain energy of bending is to be considered. CO1-App (8)

12. A horizontal beam of uniform section and 6m long is simply supported at its ends. Two vertical concentrated loads of 48KN and 40KN acts at 1m and 3m resp. from the left hand support. Determine the position and magnitude of the maximum deflection , using Macaulay's method, if E – 200GN/m^2, and I = 85x10^{-6} m^4 CO2-App (8)

13. A continuous beam ABC of constant moment of inertia is simply supported at A,B and C. The beam carries a central point load of 4 KN in a span AB and central clockwise moment of 30 KN m in span BC. span BC is 15 m. Draw the Bending moment diagram. CO3-App (8)

14. Derive the expression to find the buckling load of a long column fixed at both ends. CO4-U (8)

15. A curved beam of rectangular cross section initially unstressed is subjected to a bending moment of 1500NM, which leads to straighten the bar. The section is 4cm wide and 5cm deep in the plane of bending and mean radius of curvature is 10cm. Find the position of neutral; axis and the best bending stress. CO5-App (8)