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**Question Paper Code: 34104**

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

Fourth Semester

Civil Engineering

01UCE404 - MECHANICS OF SOLIDS II

(Regulation 2013)

Duration: One hour

Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

**(Answer any six of the following questions)**

- The strain energy stored by the body within elastic limit when loaded externally is called  
(a) Resilience (b) Proof resilience (c) Modulus of resilience (d) None of these
- In case of solid shaft the strain energy in torsion per unit volume is equal to  
(a)  $\tau^2/2C$  (b)  $\tau^2/4C$  (c)  $\tau^2/6C$  (d)  $\tau^2/8C$
- A beam of length 6 m carries a point load 120 kN at its centre. The beam is fixed at both ends. The fixing moment at the ends is  
(a) 40 kNm (b) 90 kNm (c) 120 kNm (d) 150 kNm
- A continuous beam has  
(a) One support (b) two support  
(c) more than two supports (d) very long span
- The maximum deflection of a fixed beam carrying a central point load lies at  
(a) fixed ends (b) centre of beam  
(c) 1/3 from fixed ends (d) none of these

6. A beam of length  $L$ , fixed at both ends, carries a point load  $W$  at its centre. If  $EI$  is the flexural rigidity of the beam, the maximum deflection in the beam is  
 (a)  $WL^3/48EI$       (b)  $WL^3/192EI$       (c)  $WL^3/96EI$       (d)  $WL^3/24EI$
7. Lamé's theorem deals with the design of  
 (a) long column      (b) short column      (c) thick cylinder      (d) beams
8. In water bound macadam roads, binding material, is  
 (a) Sand      (b) Stone dust      (c) Cement      (d) Brick dust
9. The maximum spacing of contraction joints in rigid pavements is  
 (a)  $2.5\text{ m}$       (b)  $3.5\text{ m}$       (c)  $4.5\text{ m}$       (d)  $5.5\text{ m}$
10. In a thick cylinder the Stress distribution across the wall thickness will be  
 (a) linear      (b) parabolic      (c) hyperbolic      (d) cubic

PART – B (3 x 8= 24 Marks)

**(Answer any three of the following questions)**

11. An axial pull of  $50\text{ kN}$  is suddenly applied to a steel rod  $2\text{ m}$  long and  $10\text{ cm}^2$  in cross –section. Calculate the strain energy that can be absorbed, if  $E = 200\text{ GN/m}^2$  (8)
12. A fixed beam  $AB$  of length  $6\text{ m}$  carries point load of  $160\text{ kN}$  and  $120\text{ kN}$  at a distance of  $2\text{ m}$  and  $4\text{ m}$  from the left end  $A$ . Find the fixed end moments and the reactions at the supports. (8)
13. A cantilever of length  $4\text{ m}$  carries an u.d.l of  $12\text{ kN/m}$  for a length of  $2.5\text{ m}$  from fixed end and a point load of  $10\text{ kN}$  at free end. Determine the maximum slope and deflection using moment area method. Take  $EI = 6.3 \times 10^4\text{ kN/m}^2$ . (8)
14. Derive the expression for crippling load when both ends of the column are fixed. (8)
15. Derive the formula for the deflection of beams due to unsymmetrical bending. (8)