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

Question Paper Code: 53103

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

Third Semester

Civil Engineering

15UCE303 - MECHANICS OF SOLIDS - I

(Regulation 2015)

Duration: One hour Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. Poisson's ratio is defined as ratio of CO1 R

   (a) linear stress / Linear strain (b) lateral stress / longitudinal strain
   (c) Longitudinal strain/ Lateral strain (d) lateral strain/ Longitudinal strain

2. Which law is also called as the elasticity law? CO1 R

   (a) Bernoulli's law (b) Stress law (c) Hooke's law (d) Poisson's law

3. A body is subjected to a tensile stress of 1200 MPa on one plane and another tensile stress of 600 MPa on a plane at right angles to the former. It is also subjected to a shear stress of 400 MPa on the same planes. The maximum normal stress will be CO2- App

   (a) 400 MPa (b) 500 MPa (c) 900 MPa (d) 1400 MPa

4. Principal planes are those planes on which CO2- U

   (a) Normal stress is maximum (b) Normal stress is minimum
   (c) Normal stress is either maximum or minimum (d) Shear stress is maximum

5. Which of the following statements is false about frame/truss? CO3-U

   (a) Bent member is never used in a truss
   (b) Internal hinges are used to connect members in a truss
   (c) All members in the truss are two force members
   (d) Multiforce members can be used in a frame

6. Trusses are subjected to _____ stress. CO3-U

   (a) Compressive (b) Tensile (c) Lateral (d) Direct

7. What do you meant by point of contra flexure? CO4- R

(a) It is the point of maximum bending stress (b) It is the point of zero bending stress

(c) It is the point of maximum shear stress (d) It is the point of minimum shear force

8. Sagging, bending moment occurs at the _____ of the beam CO4- R

(a) Support (b) Mid span

(c) Point of contra flexure (d) Point of emergence

9. Two closely coiled helical springs 'A' and 'B' are equal in all respects but the number of turns of spring 'A' is half that of spring 'B' The ratio of deflections in spring 'A' to spring 'B' is CO5- App

(a) 1/8 (b) 1/4 (c) 1/2 (d) 1

10. When a close-coiled helical spring is subjected to an axial load, it is said to be under CO5- U

(a) Bending (b) Torsion (c) Shear (d) Crushing

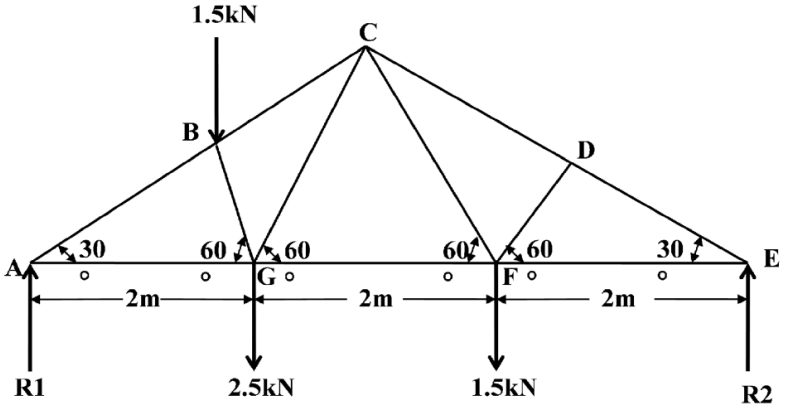
PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

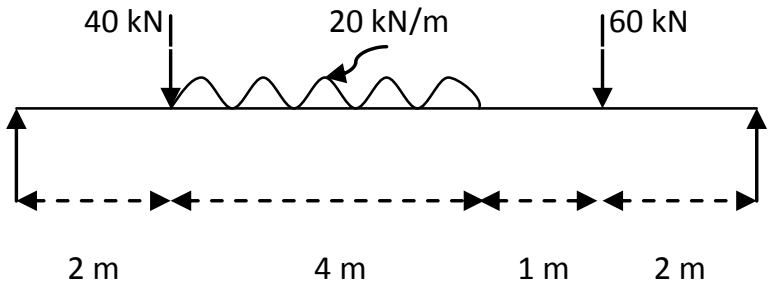
11. A reinforced concrete column 500 mm × 500 mm in a section is reinforced with 4 steel bars of 25 mm diameter; one in each corner, the column is carrying a load of 1000 KN. Find the stress in the concrete and steel bars. Take E for steel = 210×10^3 N/mm^2 and E for concrete = 14×10^3 N/mm^2 CO1- App (8)

12. A plane element in a boiler is subjected to tensile stresses of 400 MPa on one plane and 200 MPa on the other at right angles to the former. Each of the above stresses is accompanied by a shear stress of 100 MPa. Determine the principal stresses and their directions. Also, find maximum shear stress. CO2- App (8)

13. A truss of 12 m span is loaded as shown in the figure. Determine the forces in the members of the truss by method of joints. CO3- Ana (8)



14. Draw the bending moment and shear force diagram of the beam shown in the figure and locate the point of maximum moment as well find its magnitude. CO4 App (8)



15. A hollow steel shaft 3m long must transmit a torque of 25kNm. The total angle of twist in this length is not to exceed 2.5^0 and the allowable shearing stress is 90MPa.Determine the inside and outside diameter of the shaft if G = 85GPa. CO5 App (8)