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

Question Paper Code: 1084459

B.E. / B.Tech. DEGREE EXAMINATIONS, NOV / DEC 2024
Fourth Semester
Agricultural Engineering
U20CE408 – STRENGTH OF MATERIALS
(Regulation 2020)

Time: Three Hours | Maximum: 100 Marks

Answer ALL questions

PART – A (10 x 2 = 20 Marks)

1. Define young modulus.

2. State Hooke's law.

3. List the types of load acting on a beam.

4. Differentiate between hogging and sagging bending moment.

5. Write the maximum slope and maximum deflection of a cantilever beam subjected to UDL.

6. When do you prefer the Moment area method?

7. List the assumptions made in the theory of torsion.

8. What is a spring? Name the two important types of springs.

9. List the various types of trusses.

10. What is a perfect frame?

PART – B (5 x 16 = 80 Marks)

11. (a) Derive the relationship between Young's modulus and bulk modulus. (16)

(OR)

(b) A metallic bar 300 mm X 100 mm X 40 mm is subjected to a force of 5 kN (Tensile), 6 kN (Tensile) and 4 kN (Tensile) along x, y and z directions respectively. Determine the change in the volume of the block. Take E = 2 X 10^5 N/mm^2 and Poisson's ratio = 0.25. (16)

12. (a) A cantilever of length 2.0 m carries a uniformly distributed load of 2 kN/m length over the whole span and a point load of 3 kN at the free end. Draw the shear force and bending moment diagrams for the cantilever. (16)

(OR)

(b) A simply supported beam of length 6m carries point load of 3 kN and 6 kN at a distances of 2 m and 4 m from left end. Draw the shear force and bending moment diagrams for the beam. (16)

13. (a) A beam 6 m long, simply supported at its ends, is carrying a point load of 50 kN at its center. The moment of inertia of the beam (i.e. I) is given as equal to 78 x 10^6 mm^4 If E for the material of the beam = 2.1 x 10^5 N/mm^2 calculate: (i) deflection at the center of the beam and (ii) slope at the supports. (16)

(OR)

(b) A beam of uniform rectangular section 200 mm wide and 300 mm deep is simply supported at its ends. It carries a uniformly distributed load of 9 kN/m run over the entire span of 5 m. If the value of E for the beam material is 1 x10^4 N/mm^2 find (i) the slope at the supports and (ii) maximum deflection. (16)

14. (a) A hollow shaft of external diameter 120 mm transmits 300 kW power at 200 r.p.m. Determine the maximum internal diameter if the maximum stress in the shaft is not to exceed 60 N/mm^2. (16)

(OR)

(b) A closely coiled helical spring is to carry a load of 500 N. Its mean coil diameter is to be 10 times that of the wire diameter. Calculate these diameters if the maximum shear stress in the material of the spring are to be 80 MN/m^2. (16)

15. (a) Determine forces in all the members of truss shown in Fig.1. (16)

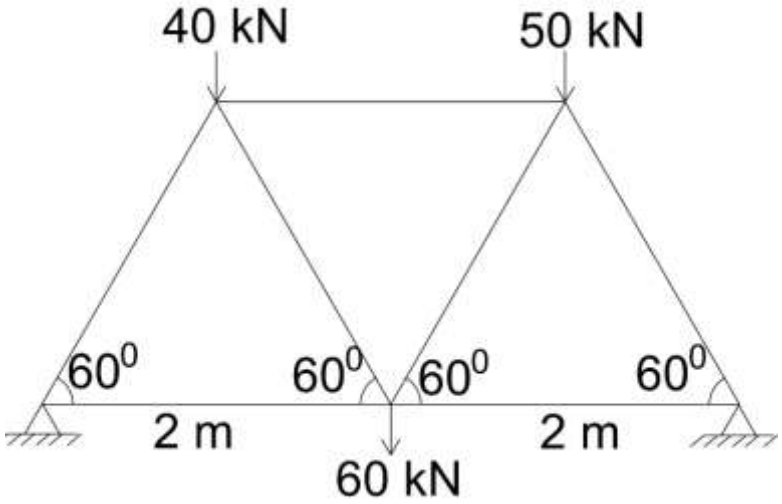

Fig.1

(OR)

(b) Determine forces in all the members of truss shown in Fig.2. (16)

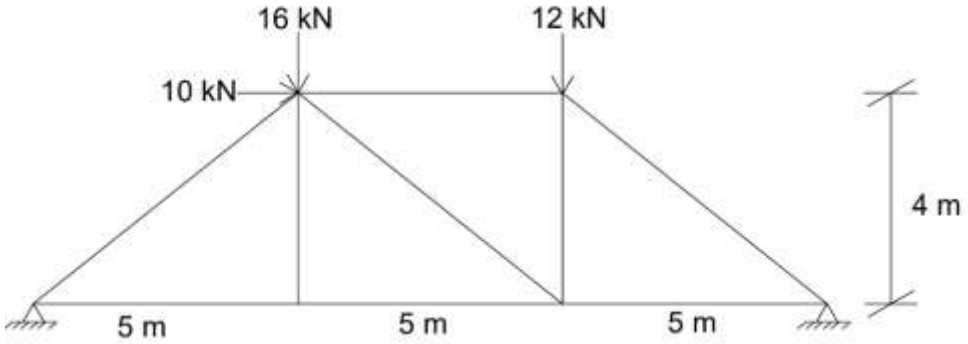

Fig.2

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