A **Reg. No. :** | | | | | | | | | | | | |

Question Paper Code: U5A03

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2023

Fifth Semester

Agricultural Engineering

21UAG503-STRENGTH OF MATERIALS FOR AGRICULTURE ENGINEERS

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The ratio of ultimate stress to allowable stress is called CO1- U

(a) Frature (b) maximum stress (c) theories of failure (d) factor of safety

2. Stress is defined as the ratio of CO1- U

(a) Load to area (b) pressure to area (c) load to volume (d) pressure to volume

3. Which equation is used to find out the perfect frame CO1- U

(a) m= 2j+3 (b) m= 2j-2 (c) m= 2j-3 (d) m= 2j+2

4. A frame in which all member not lie in a single frame is called CO1- U

(a) Plain frame (b) Space frame (c) deficient frame (d) redudant frame

5. The bending moment at end supports of a simply supported beam is CO1- U

(a) maximum (b) minimum (c) zero (d) uniform

6. Sagging, the bending moment occurs at the _____ of the beam. CO1- U

(a) At supports (b) Mid span (c) Point of contraflexure (d) Point of emergence

7. ___ is a measure of the strength of shaft in rotation. CO1- U

(a) Polar modulus (b) Sectional modulus (c) Torsion modulus (d) Torsional rigidity

8. The units of torsional rigidity is CO1- U

(a) Nmm^2 (b) N/mm (c) N-mm (d) N

9. The radius of curvature of the deflected beam is CO1- U

(a) $\frac{M}{I} = \frac{E}{R}$ (b) $\frac{M}{J} = \frac{E}{R}$ (c) $\frac{N}{I} = \frac{E}{R}$ (d) $\frac{M}{C} = \frac{E}{R}$

10. Deflection of simply supported beam with point load as centre is--- CO1- U

(a)$y_c = \frac{w\,l^3}{48EI}$ $(b)y_c = \frac{w\,d^3}{EI}$ (c) $y_c = \frac{w\,ld^3}{EI}$ $(d)y_c = \frac{w\,d^3}{El}$

PART – B (5 x 2= 10Marks)

11. Define poison's ratio CO1- U

12. List out the types of method of analysis of truss. CO1- U

13. List out the types of beam. CO1- U

14. State the assumption made in the derivation of torsion equation in shafts. CO1- U

15. Shortly give the notes of moment area method for finding deflection. CO1- U

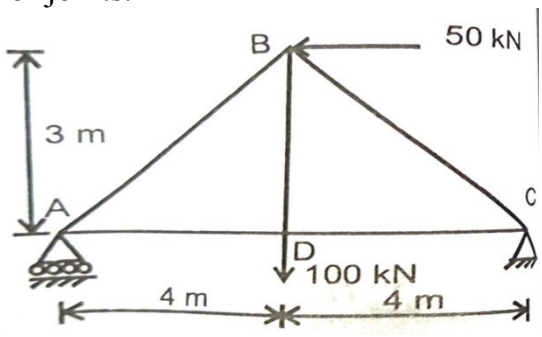
PART – C (5 x 16= 80Marks)

16. (a) A steel bar 300 mm long, 50 mm wide and 40 mm thick is subjected to a pull of 300 kN in the direction of its length. Determine the change in volume. Take E for steel is 2×10^5N/mm^2 and μ=0.25 CO2- App (16)

Or

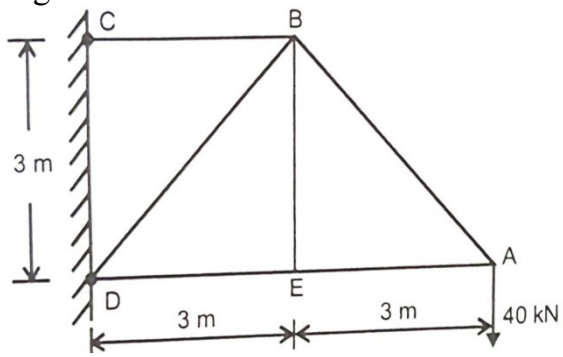
(b) A rod of 150 cm long and of diameter 2 cm is subjected to an axial pull of 20 kN. If the modulus of elasticity of the material of the rod is 2×10^5 N/mm^2. Determine(i) stress (ii) strain (iii) the elongation of the rod CO2- App (16)

17. (a) Determine the forces in all the members of the truss shown in fig. by using the method of joints. CO2- App (16)



Or

(b) Determine the forces in the members BC, BD and DE of the truss shown in fig. using the method of section. CO2- App (16)



18. (a) A cantilever beam of length 2 m carries a uniformly distributed load of 1 kN/m run over the entire length of 1.5 m from the free end draw the shear force and bending moment diagrams for the cantilever. CO2- App (16)

Or

(b) A 9 m length of SSB carries point load of 5 kN and 8 kN at distances of 3 m and 6 m from the left end. Draw the shear force and BM diagrams for the SSB CO2- App (16)

19. (a) Derive the equation for torque developed by the hollow circular shaft and give the assumptions. CO2- App (16)

Or

(b) The shearing stress is a solid shaft is not to exceed 40 N/ mm^2 when the torque transmitted as 20000 N- m. determine the minimum diameter of the shaft. CO2- App (16)

20. (a) Derive the equation of deflection for a simply supported beam with Uniformly Distributed Load CO2- App (16)

Or

(b) A beam of rectangular section 200 mm wide and 300 mm deep is simply supported at its ends. It carries a UDL of 9 kN/m run over the entire span of 5 m. if the value of beam material is 1×10^4 N/ mm^2 find the (i) slope of the beam (ii) maximum deflection CO2- App (16)

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