KERALA AGRICULTURAL UNIVERSITY
B.Tech.(Agrl. Engg.) 2023 Admission
I Semester Final Examination - February 2024

Iden.1101 **Engineering Mechanics (2+1)** **Marks:50**
Time: 2 hours

I **Fill in the blanks** **(10x1=10)**

1. If a body is in equilibrium under the action of only two forces, those two forces are.....
2. .....is a force which brings the body to state of equilibrium. It is equal in magnitude but opposite to the resultant force.
3. Two parallel forces that are equal in magnitude but opposite in direction and separated by a definite distance are said to form a.....
4. Second moment of area about an axis normal to the area is termed as .....
5. The property of a material by virtue of which a body returns to its original shape after removal of the load is known as .....
6. Hooke's law holds good up to .....
7. The ratio of shear stress to shear strain is called .....
8. A tensile force (P) is acting on a body of length (L) and area of cross-section (A). The change in length would be .....
9. A simply supported beam of span (l) carries a point load (W) at the centre of the beam. The shear force diagram will be a .....in shape.
10. If a beam is fixed at both its ends, it is called a .....

II **Write short notes on ANY FIVE of the following** **(5x2=10)**

1. Define free body diagram.
2. What is Co -efficient of friction.
3. Define parallel axis theorem.
4. Explain the torsional rigidity.
5. Define Poisson's ratio.
6. Write the torsion equation.
7. Define the point of contraflexure.

III **Answer ANY FIVE of the following** **(5x4=20)**

1. A sphere weighing 100 N is tied to a smooth wall by a string as shown in Fig.1. Find the tension T in the string and the reaction R from the wall.

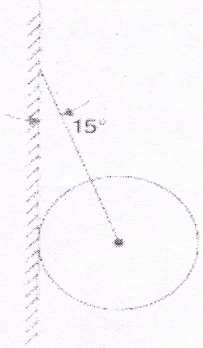

Fig.1

2. Determine the reaction developed in the simply supported beam shown in Fig.2.

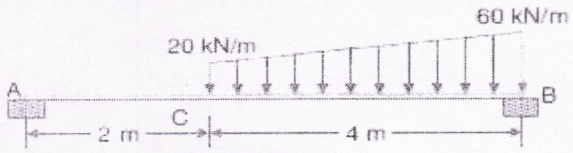

Fig.2.

3. Determine the horizontal force P to be applied to a block weighing 1500 N to hold it in the position shown in Fig. 3. The inclined plane is smooth and makes 30° with the horizontal.

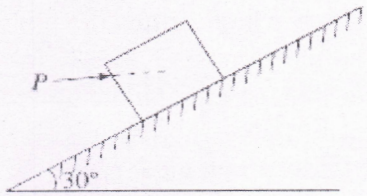

Fig.3.

4. Determine the resultant of the three forces acting on a hook as shown in Fig. 4.

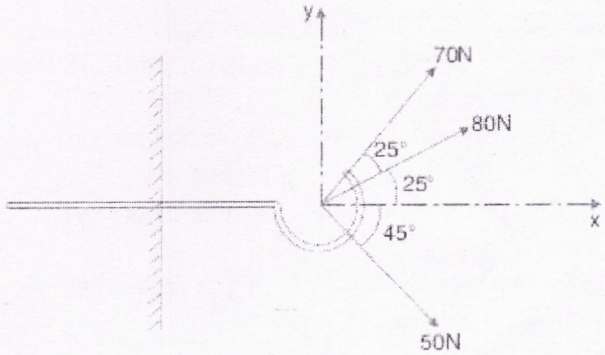

Fig. 4.

5. A brass bar, having cross-sectional area of 1000 mm^2, is subjected to axial forces as shown in Fig.5. Find the total elongation of the bar. Take E = 1.05×10^5 N/mm^2.

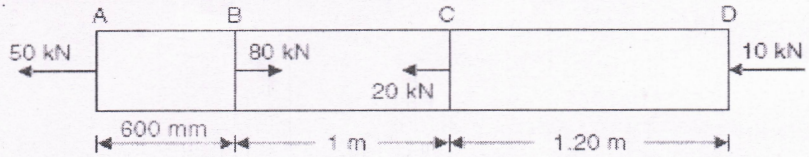

Fig.5

6. Two wooden pieces 10 cm × 10 cm in cross-section are glued together along line AB as shown in Fig.6. below. What maximum axial force P can be applied if the allowable shearing stress along AB is 1.2 N/mm^2 ?

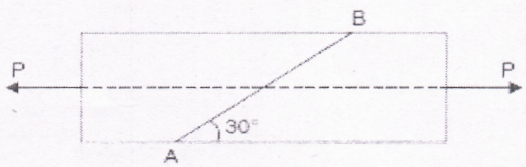

Fig.6.

7. In a hollow circular shaft of outer and inner diameters of 20 cm and 10 cm respectively, the shear stress is not to exceed 40 N/mm^2. Find the maximum torque which the shaft can safely transmit.

IV. Write an essay on ANY ONE of the following **(1x10=10)**

1. Determine the coordinates of the centroid of the shaded plane area shown in **Fig. 7.** with reference to the axis shown. (All dimensions are in mm).

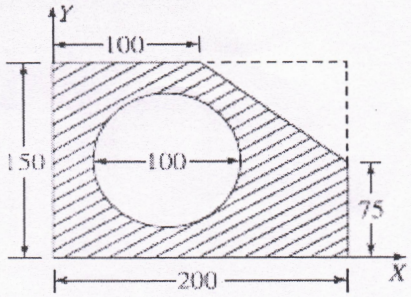

Fig. 7.

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

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