



**KERALA AGRICULTURAL UNIVERSITY**  
**B. Tech. (Agrl. Engg.) 2020 Admission**  
**I Semester Final Examination – November 2021**

**Iden 1101**

**Engineering Mechanics (2+1)**

**Marks: 50**  
**Time: 2 hours**

**I Fill in the blanks**

**(10x1=10)**

1. The product of a force and the perpendicular distance of the line of action of the force from a point is known as \_\_\_\_\_ about that point.
2. A quantity which is completely specified by magnitude and direction is known as \_\_\_\_\_.
3. \_\_\_\_\_ means the forces are having same line of action.
4. The relation between number of joints (j) and the number of members (n) in a perfect frame is given by \_\_\_\_\_.
5. The point, through which the whole weight of the body acts, is known as \_\_\_\_\_.
6. The force of friction, acting on a body when the body is moving is called \_\_\_\_\_.
7. The ratio of rate of change of dimension of the body to the original dimension is known as \_\_\_\_\_.
8. The ratio of direct stress to the corresponding volumetric strain is known as \_\_\_\_\_.
9. The shear force changes suddenly at a section where there is a \_\_\_\_\_ load.
10. The two types of helical springs are \_\_\_\_\_ and \_\_\_\_\_.

**II Write short notes on ANY FIVE of the following**

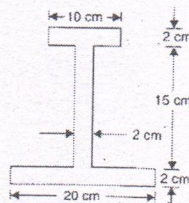
**(5x2=10)**

1. Hooke's Law
2. Modulus of rigidity
3. Moment of inertia
4. Torsion
5. Types of beams
6. Resolution of a force
7. Principal planes

**III Answer ANY FIVE of the following**

**(5x4=20)**

1. Write a short note on Parallel axis theorem.
2. Find the centre of gravity of the section shown in figure.

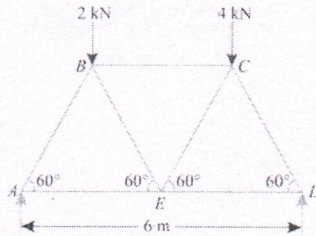


3. A body of weight 200 N is placed on a rough horizontal plane. If the coefficient of friction between the body and the horizontal plane is 0.3, determine the horizontal force required to just slide the body on the plane.
4. A rod, which tapers from 40 mm diameter to 20 mm diameter in a length of 400 mm, is subjected to an axial load of 5000 N. If  $E = 2.1 \times 10^5 \text{ N/mm}^2$ , find the extension of the rod.

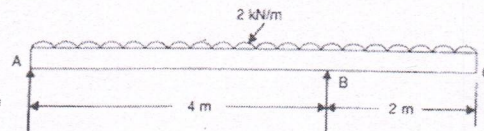
5. Draw the shear force and bending moment diagrams of a simply supported beam carrying a uniformly distributed load of  $w$  kN/m over the entire span of  $L$ .
6. What are the assumptions made in the derivation of shear stress produced in a solid circular shaft subjected to torsion? Also show the relationship between torque and power.
7. A closely coiled spring is to carry a load of 500 N. Its mean coil diameter is to be 10 times that of the wire diameter. Calculate the diameter if shear stress in the material of the spring is to be  $80 \text{ N/mm}^2$ .

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

1. A truss of span 6 m is loaded as shown in figure. Find the reaction and forces in the members of the truss.



2. Draw the shear force and bending moment diagrams for the overhanging beam carrying uniformly distributed load of  $2 \text{ kN/m}$  over the entire length as shown in figure. Also locate the point of contra flexure.



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