

# KERALA AGRICULTURAL UNIVERSITY

B.Tech.(Food Engg.) 2015 Admission  
IV<sup>th</sup> Semester Final Examination – July - 2017

C. No: Cien 2204

Title: Mechanics and Strength of Materials (2+1)

Marks: 50

Time : 2 hours

## I. Fill up the blanks / Define:

(10 x 1=10)

1. Centroid of a triangular lamina is at -----of its height from its base.
2. If 'l' is the length of a column, its effective length when both the ends are hinged is equal to -----
3. What is the principle of virtual work?
4. Give any one application of D'Alemberts principle.
5. Define stress and strain.
6. List any two methods to find slope and deflection of elastic beams.
7. What is point of contraflexure?
8. Write down the simple torsion formula with units of each variable.
9. What is slenderness ratio?
10. State Varignon's theorem of moments.

## II. Write short notes on ANY FIVE:

(5x 2=10)

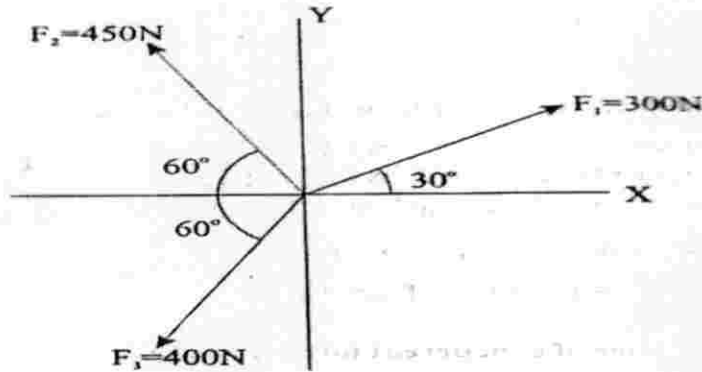
1. State Hooke's law.
2. Define volumetric strain.
3. Define Young's modulus and Modulus of rigidity.
4. Define hoop stress.
5. What are the various support conditions of beams and their reactions?
6. Write the assumptions made in Eulers's theory of columns.
7. What are the laws of static friction?

## III Write answers on ANY FIVE:

(5 x 4=20)

1. Derive the relation between modulus of elasticity and bulk modulus.
2. Explain the construction of Mohr's circle to obtain principal stresses when a body is subjected to mutually perpendicular principal tensile stresses of unequal intensities?
3. Draw SFD and BMD for a simply supported beam carrying a point load at the centre.
4. Derive the relation among loading, shear force and bending moment in a beam.
5. A tensile test is conducted on a mild steel rod of 25 mm diameter using a gauge length of 200 mm produced the following observations:  
Extension under a load of 75 KN = 0.15 mm,  
Load at yield point= 160 KN,  
Breaking load =250 KN,  
Total extension=55 mm,  
Maximum load=265 KN.  
Determine Young's modulus, yield stress and ultimate stress.

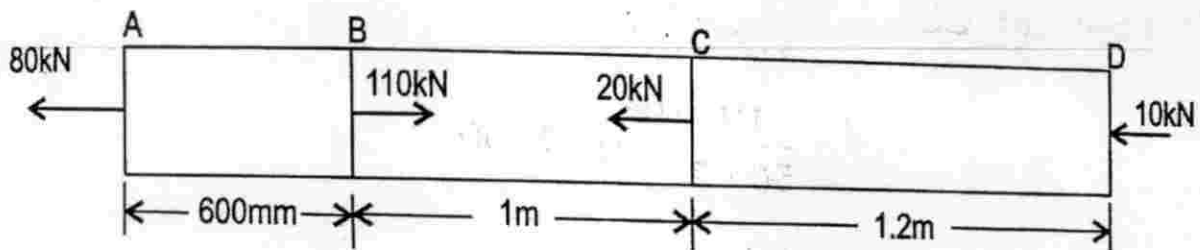
6. A 250 mm deep beam experiences a maximum stress of 500MPa. Given  $E = 2000 \text{ Pa}$ , find the radius of curvature.
7. Find the resultant of the force system?



**IV. Write essay on any ONE**

(1 x 10=10)

1. A brass bar, having cross-section area of  $50\text{mm}^2$ , is subjected to axial forces as shown in Fig., Find the total elongation of the bar. Take  $E = 2 \times 10^5 \text{ N/mm}^2$



2. A solid shaft is 100 mm. in diameter. It transmits 120 kW at 200 r.p.m. Find the maximum intensity of shear stress induced and the angle of twist for a length of 6 meters. Take  $C = 8 \times 10^4 \text{ N/mm}^2$

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