KERALA AGRICULTURAL UNIVERSITY
B.Tech.(Food Engg. & Technology)
VIII Semester Final Re- Examination – August 2023
2019 Admission

Cien.2204   **Mechanics and Strength of Materials (2+1)**   **Marks: 50**
Time: 2 hours

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

1. Centroid of a rectangular lamina is at ....of its height from its base.
2. The point at which the sign of bending moment changes..............
3. Effective length when both the ends are fixed is ....

       Answer the following

4. Define normal stress and normal strain.
5. Write down the simple torsion formula with units of each variable.
6. What is slenderness ratio?
7. State Varignon's theorem of moments.
8. Define theory of the principle of virtual work.
9. Write D'Alemberts equation.
10. Difference between compressive force and tensile force

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

1. What is s bulk modulus?
2. Define volumetric strain.
3. Define Young's modulus and Modulus of rigidity.
4. Define Modular ratio.
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   **Answer ANY FIVE of the following**   **(5x4=20)**

1. Define principal stress and principal strain. Give expressions for the same.
2. What is the procedure to find the thermal stresses in a composite bar?
3. Draw SFD and BMD for a simply supported beam carrying a point load at the centre.
4. Draw SFD and BMD for a cantilever beam carrying a point load at the free end.
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 Pa, find the radius of curvature.
7. 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 $C = 8 \times 10^4 N/mm^2$

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

1. A cantilever beam of span 2 m. has linearly varying cross-section of size 200 mm. x 200 mm. at fixed end and 100 mm. x 100 mm. at free end. If it carries a concentrated load of 4 kN at free end, find the maximum stress developed in the beam.

2. Draw shear force bending moment diagrams for the cantilever beam shown in figure below.

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