

KERALA AGRICULTURAL UNIVERSITY

B.Tech (Food.Engg) 2012 Admission
IVth Semester Final Examination- July -2014

Cat. No: Cien.2204

Marks: 80

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

Time: 3 hours

PART A

- I. Fill up the blanks (10X1 = 10 marks)
1. The forces that meet at one point are known as.....forces.
 2. The C.G of a semi circular lamina is at a distance offrom its centre.
 3. The efficiency of a screw jack can be increased by
 4. The reaction may be horizontal, vertical or inclined depending upon loading in the case of support.
 5. A perfect frame satisfies the relation.....
 6. The path of a projectile is
 7. A man pulls a mass of 100kg and produces an acceleration of 2m/sec^2 , the force exerted isN.
 8. The bodies rebound after impact are called.....
 9. The stress strain curve is a straight line up to
 10. At neutral axis the stress is zero.

PART B

- II. Answer ANY TEN questions (10X3 = 30 marks)
1. Explain the laws of static friction.
 2. Sketch the stress strain diagram of mild steel.
 3. Discuss the various types of equilibriums.
 4. Define Hooke's law.
 5. What are the sign conventions observed for drawing the Mohr's circle?
 6. List the assumptions made in theory of simple bending.
 7. State the moment area theorem.
 8. Define Hoop stress and longitudinal stress. Give the expressions.

9. Differentiate bending stress and shear stress.
10. Derive the relation for power transmitted by a shaft.
11. Sketch the shear stress distribution for a rectangular section. How the maximum stress is calculated?
12. State the Lami's theorem.

PART C

III. Answer ANY SIX questions

(6 X 5 = 30 marks)

1. A triangle ABC has its sides AB = 40 mm along the positive X axis and side BC = 30 mm along positive Y axis. Three forces of 40 kgf, 50 kgf and 30 kgf act along the sides AB, BC and CA respectively. Determine the resultant of such a system of forces.
2. Find the moment of inertia of a rectangular section 60 mm wide and 40 mm deep about its centre of gravity.
3. At a point in a bracket the stresses on two mutually perpendicular planes are 400 N/mm^2 and 300 N/mm^2 both tensile. The shear stress across these planes is 200 N/mm^2 . Find the principal stresses and maximum shear at that point.
4. A mild steel tube 25 mm internal diameter, 32 mm external diameter, length 3 m is used as a strut, one end fixed, the other end hinged. Calculate the collapse load using $E = 2 \times 10^5 \text{ N/mm}^2$.
5. A cantilever 1.8 m span carries a uniformly distributed load of 25 kN/m over the right hand half. Construct the S.F.D and B.M.D.
6. A steel joist of I section 300 mm deep X 150 mm wide, has flanges 9.4 mm thick and web 6.7 mm thick. If the permissible stress is 120 N/mm^2 , find the safe uniformly distributed load that this section will carry over a simply supported span of 5 m.
7. A train of weight 100 tonnes is pulled by an engine on a level track at a constant speed of 44.5 kmph. The resistance due to friction is 1% of the train. Find the power of the engine.
8. A hollow circular shaft, 500 mm long, with an internal diameter of 40 mm and an external diameter of 80 mm, is rotating under a pure torque T. The maximum shear stress is 80 MN/m^2 , evaluate T and the angle of twist taking $G = 80 \text{ GN/m}^2$.

PART D

IV. Answer ANY ONE question

(1 X 10 = 10 marks)

1. A King post truss of 8m span is loaded as shown in Fig.1.

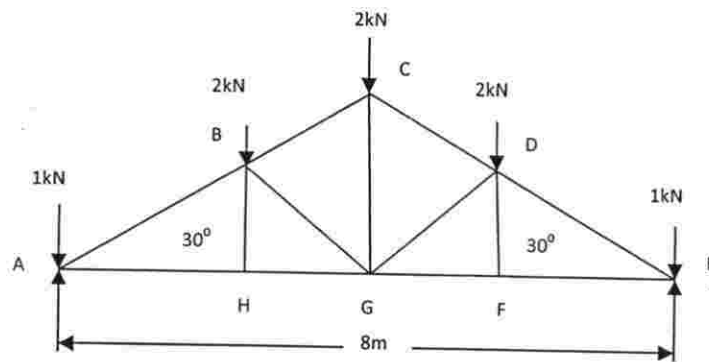


Fig.1

Find the forces in the members and tabulate the results.

2. A simply supported beam A of 4m span carries a uniform load of 30kN/m over the right hand half of the span. Construct the S.F.D and B.M.D.