

KERALA AGRICULTURAL UNIVERSITY

B.Tech (Food.Engg) 2012 and Previous Admission

IVth Semester Final Examination- (Re-Examination)-June/July -2015

Cat. No: Cien.2204

Marks: 80.00

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

Time: 3 hours

PART A

- I. Fill up the blanks (10X1 = 10 marks)
1. The forces whose lines of action lie on the same plane are known as.....forces.
 2. Moment of inertia of a hollow circular section 'D' and 'd' as outer and inner diameter respectively is given by.....
 3. A load which is spread over a beam in such a manner that its extent varies uniformly on each unit length is
 4. The reaction on a roller support is always To the support.
 5. A frame is said to be redundant when the number of members is more than.....
 6. The relationship $S = ut + \frac{1}{2} a t^2$ is applicable to bodies moving with
 7. The ordinate point at which there is an increase in strain without an increase in stress is known as.....
 8. The movement of a boat is an application of Newton's law.
 9. The flexural rigidity of a beam is calculated by
 10. The bending moment at the support of a simply supported beam is

PART B

- ii. Answer ANY TEN questions (10X3 = 30 marks)

1. State three forces principle.
2. Explain the theorem of parallel axis.
3. Write short notes on types of dynamic friction.
4. What is D'Alembert's principle?
5. Mention the assumptions made in the analysis of perfect frames.
6. Sketch the types of beams and mention the features of each.

7. Derive the relation for time of flight of a projectile on a horizontal plane.
8. What is a screw jack? Define pitch and lead of a screw.
9. How the moment of inertia of a composite section is determined?
10. State the law of conservation of energy. How the energy transfer occurs in the case of an electric heater and electric bulb?
11. Discuss about limiting friction.
12. Write the assumptions made for deriving torsion formula.

PART C

III. Answer ANY SIX questions

(6 X 5 = 30 marks)

1. The following forces act at a point. 20 N inclined at 30° towards North of East, 25 N towards North, 30 N towards North of West and 35 N inclined at 40° towards South of West. Find the magnitude and direction of the resultant force.
2. Find the moment of inertia of a T-section having flange and web both 120 mm X 10 mm about XX passing through the CG of the section.
3. The principal stresses at a point in a material are 400N/mm^2 and 1200N/mm^2 both tensile. Find the normal and shear stresses on a plane inclined at 30° to the plane of greater principal stress.
4. A cantilever 1.8 m span carries loads of 25 kN, 15 kN and 20 kN at 0.6 m intervals. Construct the S.F.D and B.M.D.
5. A truss member carries an axial tensile force of 70 kN. If the permissible stress in the member is 130 MPa, determine the minimum area of the member required.
6. A steel tube, 4 m long, having external and internal diameters of 80 mm and 50 mm respectively, is freely supported at each end and carries a load of W N at a distance of 1.5 m from one end. Evaluate W if the maximum bending stress is not to exceed 120 N/mm^2 .
7. Calculate the work done in pulling up a block of wood weighing 2 kN for a length of 10 m on a smooth plane inclined at an angle of 15° with the horizontal.

8. The angle of twist of a solid shaft, whose diameter is 80 mm was observed to be 0.06 radian on a length of 5m when rotating at 240 rev/min. If $G = 80 \text{ GN/m}^2$, calculate the maximum shear stress and the power transmitted.

PART D

IV. Answer ANY ONE question

(1 X 10 = 10 marks)

1. A framed structure of 6m span is carrying a central load of 10kN as shown in Fig.1. Find, by any method, the magnitude and nature of forces in all members of the structure.

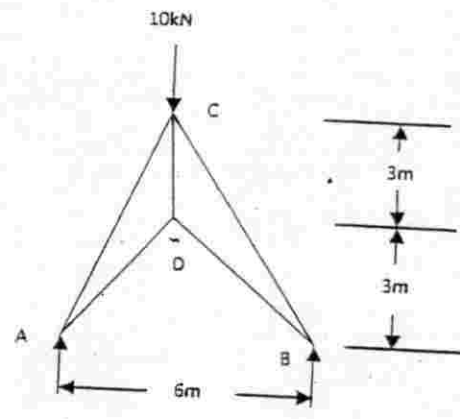


Fig.1.

2. A simply supported beam of 4m effective span, has a load of 120kN/m uniformly distributed over 0.5m, 0.75m away from the centre towards the right. Construct the S.F.D and B.M.D.