

KERALA AGRICULTURAL UNIVERSITY

B.Tech (Food. Engg) 2013 Admission

IVth Semester Final Examination-June/July -2015

Cat. No: Cien.2204

Marks: 50.00

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

Time: 2 hours

(10 x 1=10)

I Fill up the blanks

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 $S = ut + \frac{1}{2}at^2$ 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 _____

(5 x 2=10)

II Write short notes on any FIVE questions

1. Explain the theorem of parallel axis
2. Write short notes on types of dynamic friction
3. Mention the assumptions made in the analysis of perfect frames
4. Sketch the type of beams and mention the features of each.
5. How the moment of inertia of a composite section is determined
6. State the law of conservation of energy. How the energy transfer occurs in the case of an electric heater and electric bulb
7. Discuss about limiting friction

(5 x 4=20)

III Write short essay on any FIVE questions

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 400 N/mm^2 and 1200 N/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 20kN 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, 4m 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. 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.

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.

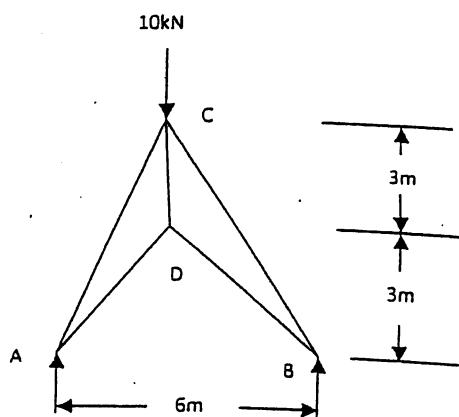


Fig.1.

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