



Registration No:

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M.TECH

Total Number of Pages : 2

M.TECH 1ST SEMESTER SUPPLE EXAMINATIONS, DECEMBER 2018

ADVANCED MECHANICS OF SOLIDS

Branch: MD, Subject Code:MMDPC1020

(Regulations 2017)

Time: 3 Hours

Max Marks : 70

Question Code: SD18002044

PART-A (10 X 2=20 Marks)

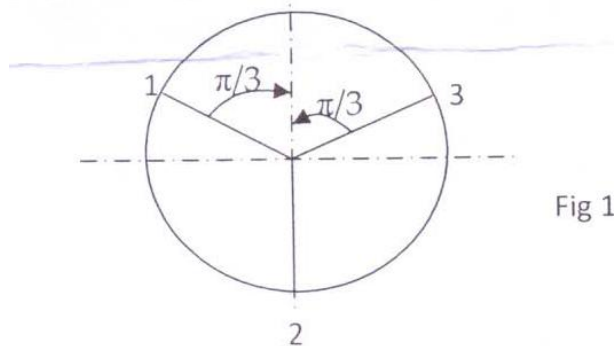
1. Answer the following questions.

- State the reasons for unsymmetrical bending.
- Write down Winkler-bach formula. Name each term. Where it is used?
- Which two types of failure of slender columns are possible?
- What do you mean by beams on elastic foundation give an example.
- Explain how a membrane is different from plate?
- Differentiate between Homogeneous and sandwich plate?
- What type of stress will be generated when a thin plate is subjected to bending?
- How Euler's beam is differing from Timoshenko beam?
- Explain the concept of Unsymmetrical Bending. What are the conditions that should be satisfied for a beam to bend without twisting?
- What is resilience?

PART-B (5 X 10=50 Marks)

Answer any five questions from the following.

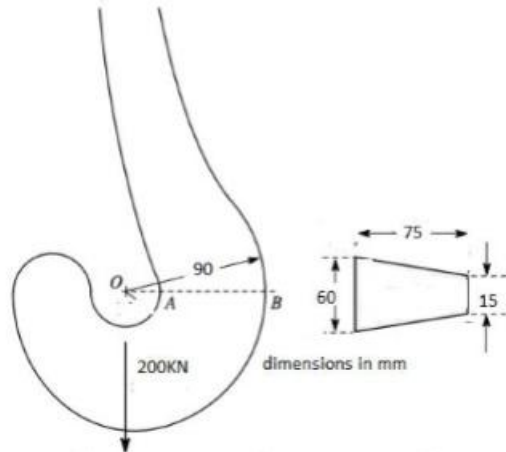
2. a) What do you mean by membrane analogy for thin walled tube? [2]
b) Determine the bending moments, torques and shear forces in a ring supported by three equally spaced supports and carrying uniformly distributed load W_0 (fig 1) [8]



3. a) A beam of T-section (flange:150mmx25mm, web:200mmx15mm) is 2.5m in length and is simply supported at the ends. It carries a load of 3.2KN inclined at 30° to the vertical and passing through the centroid of the section (beam loaded centrally). If $E=200\text{GN/mm}^2$ determine [8]
(i) Maximum tensile stress (ii) maximum compressive stress
(iii) deflection due to load (iv) position of neutral axis
b). Define product of inertia. [2]

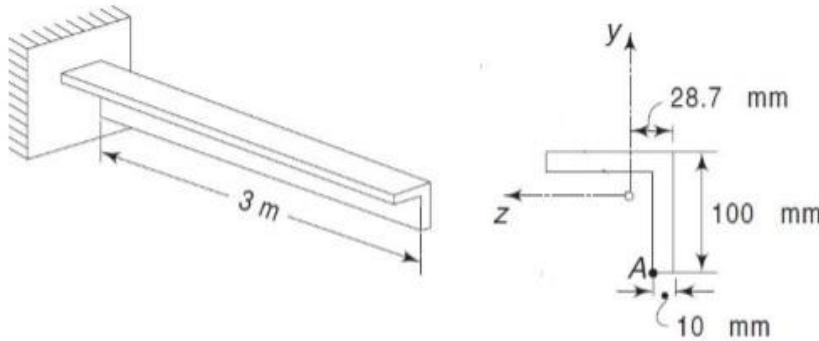


4. a. Find out the stresses at point A and B. [8]



b. Why the trapezoidal cross-section of a crane hook is preferred over a rectangular cross-section? [2]

5. a) A beam of equal-leg angle section, shown in figure below, is subjected to its own weight. Determine the stress at point A near the built-in section. It is given that the beam weighs 1.48N/cm. Given:., $I_{zz}=180\text{cm}^4$ $I_{zy}=106.57\text{cm}^4$ [8]



b). Briefly discuss the theorem of virtual work. [2]

6. a)A steel disc of uniform thickness and of diameter 400 mm is rotating about its axis at 2000 r.p.m. The density of the material is 7700kg/m³ and Poisson's ratio is 0.3. Determine the variations of circumferential and radial stresses. [5]

b) State the limitations for the use of Euler's formula? [5]

7. An external pressure of 10MN/m² is applied to a thick cylinder of internal diameter 150mm and external diameter of 300mm. If the maximum hoop stress permitted on the inside wall is 35MN/m². calculate [5]

a) The maximum internal pressure that can be applied. [5]

b) The change in outside diameter if cylinder has the closed ends.

8. Write short notes on

a) Airy's stress function [5]

b) Unsymmetrical bending. [5]