Karunya UNIVERSITY

(Karunya Institute of Technology & Sciences)
(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

Reg.No. _____

End Semester Examination – Nov/Dec - 2016

Semester : 2016-17 ODD
Code : 09CE206 / 12CE210 / CE241
Duration : 3 hrs
Sub. Name : Mechanics of Deformable Bodies II / Advanced Strength of Materials / Mechanics of Deformable Bodies II
Max. marks : 100

Q. No.	Questions	Marks
	PART-A(10X1=10 MARKS)	
1.	Write the relationship between actual beam and conjugate beam.	(1)
2.	Give the moment curvature relationship.	(1)
3.	State the modes of failure of short columns and long columns.	(1)
4.	Give any two assumptions made in Euler's theory of buckling of columns.	(1)
5.	Say true or false – '*Plane sections perpendicular to the longitudinal axis of the cylinder is not plane after the application of internal pressure'.*	(1)
6.	The maximum principal stress theory proposed by Rankine states that the _____ _____ _____ triggers failure in the materials.	(1)
7.	Define shear centre of a section.	(1)
8.	_____ _____ propounded a theory for deeply curved beams where the neutral axis and centroidal axis does not coincide.	(1)
9.	Discuss when bending is defined as unsymmetrical bending.	(1)
10.	Write down the expression for deflection of a beam due to unsymmetrical bending.	(1)
	PART B(5 X 3= 15 MARKS)	
11	State Mohr's theorems.	(3)
12	List the four possible end conditions of short columns, give the effective length, crippling load and discuss the limitations of Euler's theory.	(3)
13	State Lame's equations and any 3 (three) assumptions made while deriving the equations.	(3)
14	What are the assumptions made in the derivation of stresses in a curved bar which is subjected to bending moments?	(3)
15	Define: (a) Product of Inertia; and (b) Principal Axes.	(3)
	PART C(5 X 15= 75 MARKS)	
16.	A beam of length 6m is simply supported at its ends and carries two point loads of 50kN and 40kN at distances 2m and 4m respectively from left support. Find deflection under each load and also maximum deflection. Take I = 12 x 10^6 mm^4 and E = 210 GPa.	
	(OR)	
17.	Using conjugate beam method find the deflection and slope at the free end of a cantilever beam of span 6m carrying6kN at the free end and 12kN at the centre. Take I = 60 x 10^6 mm^4 and E = 210 GPa.	
18.	Derive the expression for crippling load when one end of the column is fixed and the other end is free.	
	(OR)	
19.	A hollow cylindrical cast iron column is 4m long. With both ends fixed it has to carry a safe load of 250kN whose internal diameter is 80% of external diameter. Considering fc = 550 MPa, factor of safety = 5 and $\acute{\alpha}$ = 1/1600, determine the minimum diameter of the column.	

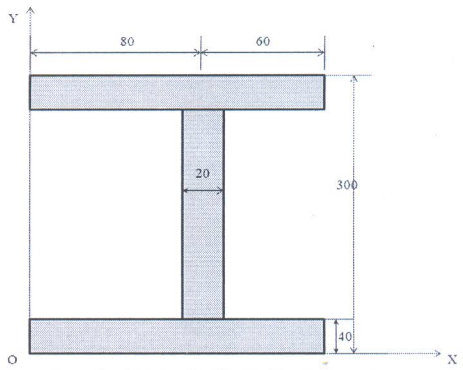
20. A steel tube of 200mm external diameter is to be shrunk on to another steel tube of 60mm internal diameter. After shrinking, the diameter at the junction is 120mm. Before shrinking, the difference of diameter at the junction is 0.08mm. Find the hoop stresses developed in the two tubes after shrinking on and the radial pressure at the junction. Take E – 2 x 10^5 MPa.

(OR)

21. A shaft is subjected to a maximum torque of 10kN – m and a maximum bending moment of 7.5kN-m at a particular section. If the allowable equivalent stress is simple tension is 160 MN/m^2, find the diameter of the shaft according to maximum shear stress theory.

Fig. 22.1

22. Determine the position of shear centre of the section of the beam as given in the figure (22.1). All dimensions are in mm.



(OR)

23. A steel ring has a rectangular cross – section 70mm in the radial direction and 40mm perpendicular to the radial direction. The mean radius of the ring is 140mm and maximum tensile stress is limited to 175MPa. Determine the tensile load the ring can carry.

24. Determine the principal moment of inertia of unequal angle section 90 x 60 x 10mm when 90mm leg is placed vertical.

(OR)

25. A 80mm equal angle is used as a freely supported beam with one leg vertical. On the application of bending moment in the vertical plane YY, the mid-section of the beam deflects in a clock-wise direction at 30°15' to the vertical. $x = \bar{y} = 23.4mm$; $I_{xx} = I_{yy} = 87.36 \times 10^{-8} m^4$. Determine

a) The II moment of area of the section about its principal axis; and (8)

b) The bending stress at the left top corner of the section if the bending moment is 15kN-m (7)

← *ALL THE BEST* →