Reg.No. _____

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

End Semester Examination – Nov/Dec – 2016

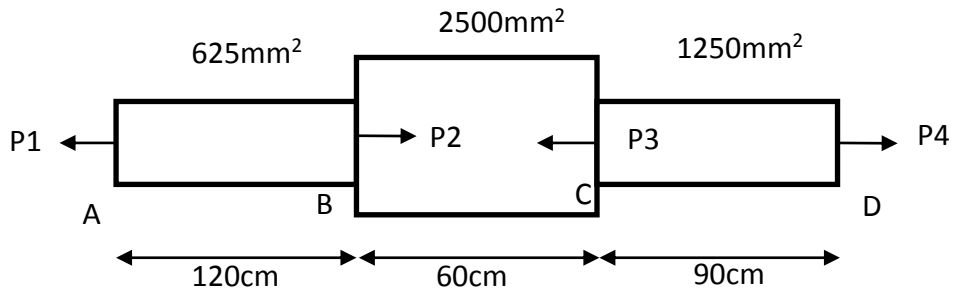
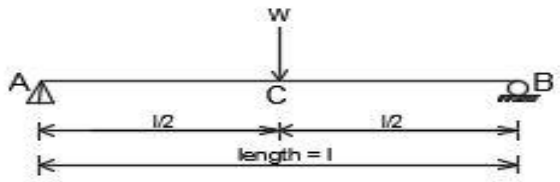
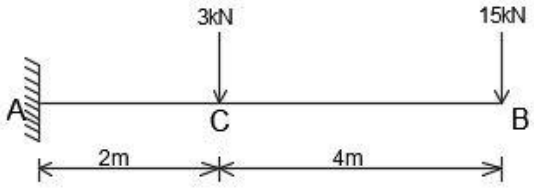
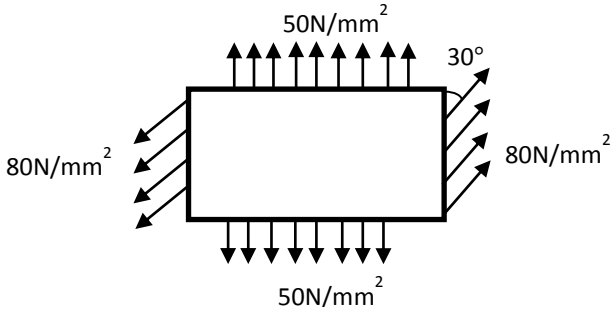
Code : 14CE2002 **Semester :** 2016-17 ODD
Sub. Name : Mechanics of Solids **Duration :** 3hrs
Max. marks : 100

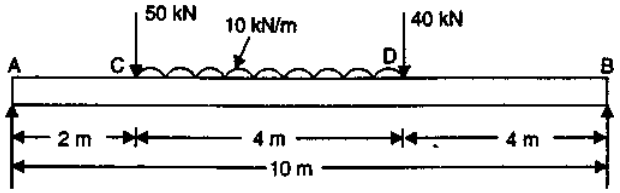
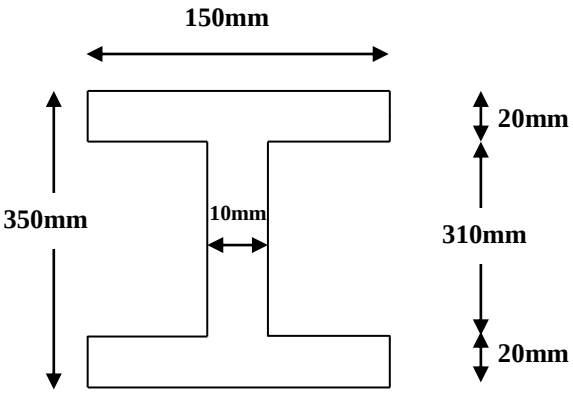
Q. No.	Questions				Course outcome	Marks
	PART-A (40X1=40 MULTIPLE CHOICE QUESTIONS)					
1.	The unit of simple stress is					
	a. N/mm	b. N/mm^2	c. kN/m	d. kg/cm	CO1	(1)
2.	Poisson's Ratio is defined as					
	a. lateral strain /volumetric strain	b. linear stress/ linear strain	c. lateral strain/linear strain	d. linear strain/ linear stress	CO1	(1)
3.	Simple stress often called as					
	a. direct stress	b. transverse stress	c. total stress	d. any of the above	CO1	(1)
4.	The unit of Pascal is					
	a. kg/m^2	b. N/m^2	c. kN/mm^2	d. kg/mm^2	CO1	(1)
5.	The change is length due to external force is represented by					
	a. Pl/2AE	b. $2Pl/AE^2$	c. Pl/A^2E	d. Pl/AE	CO1	(1)
6.	The internal resistance which the body offers to meet the load or external force is called					
	a. Stress	b. Strain	c. Pressure	d. None of the above	CO1	(1)
7.	_____ loading induces, direct and bending stress at the section.					
	a. Uniformly distributed	b. Eccentric	c. Either of the two	d. None of the two	CO1	(1)
8.	Modulus of rigidity is					
	a. ratio between normal stress to linear strain	b. ratio between shear stress to shear strain	c. ratio between normal stress to shear strain	d. ratio between shear strain to shear stress	CO1	(1)
9.	Modulus of elasticity is defined as the ratio of					
	a. Shear stress to shear strain	b. linear stress to linear strain	c. . linear strain to lateral strain	d. lateral strain to linear strain	CO1	(1)
10.	The unit of modulus of elasticity is represented by					
	a. N/mm^2	b. GN/mm^2	c. MN/mm^2	d. All the above	CO1	(1)
11.	The graphical method of Mohr's circle represents shear stress (τ) on _____					
	a. X-axis	b. Y-axis	c. Z-axis	d. None of the above	CO3	(1)
12.	Mohr' s circle is a graphical method to find					
	a. Bending stresses	b. Bucking stresses	c. Maximum shear stresses	d. None	CO3	(1)
13.	A principal plane is a plane of					
	a. Zero tensile	b. Zero	c. Zero shear stress	d. None	CO3	(1)

	stress	compressive stress				
14.	A cantilever is a beam whose					
	a. one end is fixed and the other end free	b. both ends are fixed	c.both ends are simply supported	d. None of the above	CO4	(1)
15.	In a cantilever beam with uniformly distributed load the shearing force varies following a					
	a. linear law	b. parabolic law	c. either of the above	d. none of the above	CO4	(1)
16.	In a cantilever, carrying a load whose intensity varies uniformly from zero at the end to w per unit run at the fixed end, the shear force changes following a					
	a.linear law	b. parabolic law	c.cubic law	d.none of the above	CO4	(1)
17.	In a cantilever of length l carrying uniformly distributed load over the entire length of the beam, the maximum bending moment is,					
	a. $wl^2/4$	b.$wl^2/2$	c. wl/4	d.wl/2	CO4	(1)
18.	Bending moment at supports in case of simply supported beam is always					
	a. less than unity	b. more than unity	c.zero	D none of the above.	CO4	(1)
19.	In a simply supported beam carrying a uniformly distributed load of w per unit run over the whole span the maximum bending moment is equal to,					
	a.$wl^2/4$	b.$wl^3/6$	c.$wl^2/8$	d.$wl^3/8$	CO4	(1)
20.	For any part of the beam, between two concentrated load Shear force diagram is a					
	a. II order curve	b. Vertical straight line	c. Line parallel to x-axis	d. None of the above	CO3	(1)
21.	In a simple supported beam having length = l and subjected to a concentrated load (W) at mid-point then maximum bending moment is					
	a. Wl/4 at the mid-point	b. Wl/4 at the end	c. Wl2/4 at the mid-point	d. Wl2/4 at the end	CO3	(1)
22.	A shear force at any point of a beam is					
	a. Maximum vertical force on left of the point	b. Maximum vertical force on right of the point	c. Net vertical force on one side of the point	d. None	CO3	(1)
23.	In a cantilever subjected to a concentrated load (W) at the free end and having length =l, Maximum bending moment is					
	a. Wl at the free end	b. Wl at the fixed end	c. Wl/2 at the fixed end	d. Wl at the free end	CO3	(1)
24.	A cantilever beam of length of 2m carries a U.D.L. of 150 N/m over its whole span. The maximum shear force in the beam will be					
	a. 150 N	b. 300 N	c. 150 N-m	d. 600 N-m	CO3	(1)
25.	In a cantilever of length ‘l’ carrying concentrated load ‘w’ at the distance of ‘a’ from the fixed support, the maximum bending moment at the support is					
	a. wa	b.$wa^2/2$	c. wa/4	d. wa/2	CO3	(1)
26.	Shear force in a beam is					
	a. Parallel to the length	b. Perpendicular to the length	c. Neither parallel nor perpendicular to the length	d. None of the above	CO3	(1)
27.	Which moment is considered as positive					
	a. Hogging Moment	b. Sagging Moment	c. Clockwise Moment	d. Anti-clockwise Moment	CO3	(1)
28.	In a simply supported beam carrying a concentrated load w at the distance of ‘a’ from					

	the left support and 'b' from the right support, the reaction at the left support is					
	a. wa/l	b. wb/l	c. wab/l	d. w/2	CO3	(1)
29.	Which of the following is incorrect:					
	a. $M = \sigma . Z$	b. $M . y/I = \sigma$	c. $M = \sigma / Z$	d. $M / I = E / R$	CO4	(1)
30.	A cantilever beam of span 3m carries a point load 100 N at the free end. The maximum B.M in the beam will be					
	a. 100 N-m	b. 300 N-m	c. 150 N-m	d. 600 N-m	CO4	(1)
31.	Neutral axis of a beam always coincides with					
	a. Axis passing through bottom of beam	b. Axis passing through height h/2 from bottom	c. Axis passing through height h/3 from bottom	d. Axis passing through centroid	CO4	(1)
32.	If the bending moment is consistent there will be no _____ stresses					
	a. tensile	b. compressive	c.shearing	d. None of the above	CO4	(1)
33.	In the case of Rectangular section					
	a. $\tau_{max}=0.58\ \tau_{avg}$	b. $\tau_{max}=\tau_{avg}$	c. $\tau_{max}=1.5\ \tau_{avg}$	d. $\tau_{max}= 4/3\tau_{avg}$	CO4	(1)
34.	Pure bending is the zone where					
	a. Zero Shear force	b.Zero bending moment	c. maximum bending moment	d. Zero shear force and constant bending moment	CO4	(1)
35.	In the case of I-section beam maximum shear stress is at					
	a. the junction of the top flange and web	b. middle of the web	c.either a or b	d. None of the above	CO4	(1)
36.	In the case of circular section					
	a. $.\tau_{max}=1.5\ \tau_{avg}$	b. $.\tau_{max}=\tau_{avg}$	c. $.\tau_{max}=2/3\ \tau_{avg}$	d. $.\tau_{max}= 4\ /3\tau_{avg}$	CO4	(1)
37.	The Shear Stress equation can be written as					
	a. $.\tau = \frac{FA\bar{y}}{Ib}$	b. $\tau = \frac{FA\bar{y}}{I}$	c. $. \tau = \frac{FA}{Ib}$	d. $. \tau = \frac{A\bar{y}}{Ib}$	CO4	(1)
38.	In the circular section the section modulus is given by					
	a. $\pi d^2/16$	b. $\pi d^3/16$	c.$\pi d^3/32$	d.$\pi d^4/64$	CO4	(1)
39.	The bending equation is written as					
	a.$\frac{I}{M} = \frac{\sigma}{y} = \frac{E}{R}$	b.$\frac{M}{I} = \frac{\sigma}{y} = \frac{R}{E}$	c.$\frac{M}{y} = \frac{\sigma}{I} = \frac{E}{R}$	d.$\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$	CO4	(1)
40.	The strength of the beam mainly depends on					
	a. Bending Moment	b.Centre of gravity of the section	c. Section Modulus	d. its weight	CO4	(1)

	PART B(8 X 5 = 40 MARKS) (ANSWER ANY EIGHT)		
41.	A steel tube of 500 mm external diameter and 350mm internal diameter encloses a gun metal rod of 230mm diameter to which it is rigidly joined at each end. The temperature of the whole assembly is raised to 100°C and the nuts on the rod are then screwed lightly home on the ends of the tube. Find the intensity of stress in the rod when the common temperature has fallen to 30°C. The values of E for steel and gun metal are $2.1x10^5 N/mm^2$ and $1x10^5 N/mm^2$ respectively. The linear co-efficient of expansion for steel and gun metal is $9x10^{-6}$ per °C and $15x10^{-6}$ per °C.	CO1	(5)
42.	A member ABCD is subjected to point loads P1,P2,P3 and P4 as shown in Fig 1.11. calculate the force P2 necessary for equilibrium, if P1 = 45kN, P3 = 450kN and P4 = 130kN. Determine the total elongation of the member, assuming the modulus of elasticity to be $2.1 \times 10^5\ N/mm^2$	CO1	(5)

			
43.	At a point in a strained material the principal tensile stresses across two perpendicular planes are 100N/mm2 and 50N/mm2. Determine normal stress, shear stress and the resultant stress on a plane inclined at 30° with the major principal plane. Determine also the obliquity(if poisson's ratio = ¼).	CO2	(5)
44.	At a point in a strained material, the principal stresses 100N/mm^2(tensile) and 40N/mm^2(compressive Determine the resultant stress in magnitude and direction on a plane inclined at 60° to the axis of the major principal stress. Also determine the maximum intensity of shear stress in the material at the point.	CO2	(5)
45.	Draw the bending moment diagram for the simply supported beam shown in Fig . 	CO3	(5)
46.	Draw the shear force diagram for the beam shown in Fig 	CO3	(5)
47.	What are the sign conventions for shear force and bending moment in general?	CO3	(5)
48.	A rectangular beam of 100 mm wide and 250mm deep is subjected to a maximum shear force of 50kN. Determine the shear stress at 40mm above the neutral axis..	CO4	(5)
49.	A beam subjected to bending stress of 5N/mm^2, the section modulus is 3530 cm3, what is moment of resistance of the beam?	CO4	(5)
50.	How willyoufind the section modulus of a circular section of diameter 'D' ?	CO4	(5)
	PART C(2 X 10 = 20 MARKS) (ANSWER ANY TWO)		
51.	At point in a strained material is subjected to the stresses as shown in fig. Locate the principal planes, and evaluate the principal stresses. 	CO2	(10)

52.	Draw the shear force and bending moment diagrams for the beam shown in Fig 	CO3	(10)
53.	The Shear force acting on the section of a beam is 50kN. The section of the beam is T-shaped of dimensions shown in fig. The moment of inertia about he neutral axis is 314.221 x 10^4mm^4. Sketch the shear stress distriction across the secton. 	CO4	(10)

ALL THE BEST