



AIKTC/KRRC/SoET/ACKN/QUES/2021-22/

Date: 02/08/2022

School: SoET-REV. C-Scheme

Branch: CIVIL ENGG.

SEM: III

To,
Exam Controller,
AIKTC, New Panvel.

Dear Sir/Madam,

Received with thanks the following Semester/Unit Test-I/Unit Test-II (Reg./ATKT) question papers from your exam cell:

Sr. No.	Subject Name	Subject Code	Format		No. of Copies
			SC	HC	
1	Engineering Mathematics-III	CE-C301			
2	Mechanics of Solids	CE-C302		✓	
3	Engineering Geology	CE-C303		✓	
4	Architectural Planning & Design of Buildings	CE-C305		✓	
5	Fluid mechanics- I	CE-C306		✓	

Note: SC – Softcopy, HC - Hardcopy

(Shaheen Ansari)
Librarian, AIKTC

7/6/2022
Evening

University of Mumbai
Examination: First Half 2022 (May-June 2022)
Program: Civil Engineering
Curriculum Scheme: R2019 (C Scheme)
Examination: SE Semester: III

Course Code: CEC302
Time: 2 Hour 30 Minutes

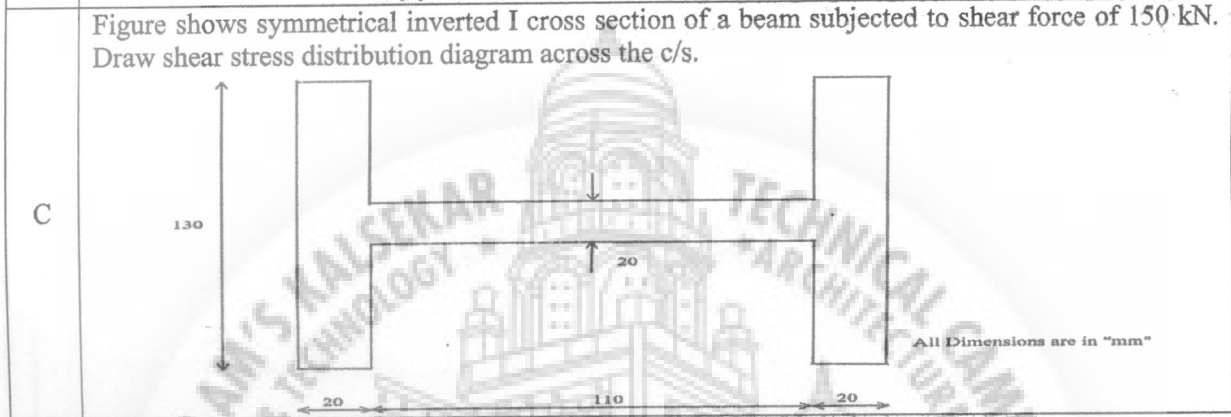
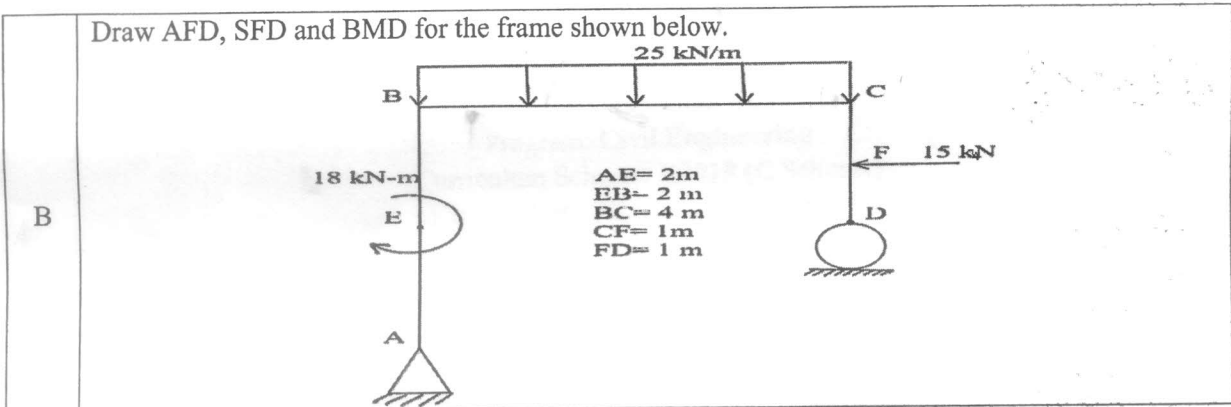
Course Name: Mechanics of Solids
Max. Marks: 80

Q1.	Choose the correct option for the following questions. All the Questions are compulsory and carry 2 marks each.
1.	A thin cylinder of inner radius 0.5 m and thickness 15 mm is subjected to an internal pressure of 1.5 MPa. The average circumferential (hoop) stress in MPa is
Option A:	25
Option B:	50
Option C:	100
Option D:	200
2.	Shear Force and Bending moment at B is _____ & _____.
Option A:	31.25 kN & 67.71 kN.m (Hogging)
Option B:	31.25 kN & 67.71 kN.m (Sagging)
Option C:	21.25 kN & 67.71 kN.m (Hogging)
Option D:	21.25 kN & 67.71 kN.m (Sagging)
3.	Elongation of steel rod is if length and c/s of rod is 900 mm and 600 mm ² respectively, subjected to an axial pull of 40 kN. Take E= 200 GPa.
Option A:	0.1 mm
Option B:	0.2 mm
Option C:	0.3 mm
Option D:	0.4 mm
4.	Moment of Inertia about the bottom of a triangle with base B and height H is
Option A:	$BH^3/36$
Option B:	$BH^3/12$
Option C:	$BH^3/48$
Option D:	$BH^3/24$
5.	Maximum shear stress developed on the surface of a solid circular shaft under pure torsion is 240 MPa. If the shaft diameter is doubled then the maximum shear stress developed corresponding to the same torque will be
Option A:	120 MPa
Option B:	60 MPa
Option C:	30 MPa
Option D:	15 MPa
6.	For a circular shaft of diameter d subjected to torque T, the maximum value of the shear stress is
Option A:	$(64T) / (\pi d^3)$
Option B:	$(32T) / (\pi d^3)$
Option C:	$(16T) / (\pi d^3)$
Option D:	$(8T) / (\pi d^3)$

7.	A simply supported beam of span (L) m is subjected to a point load (W) kN at the center. Maximum deflection in beam is _____ m.
Option A:	$\frac{5WL^4}{384 EI}$
Option B:	$\frac{WL^3}{48 EI}$
Option C:	$\frac{5WL^4}{348 EI}$
Option D:	$\frac{WL^3}{84 EI}$
8.	A simply supported beam of span length 6 m and 75 mm diameter carries a uniformly distributed load of 2 kN/m. The maximum bending stress is
Option A:	72.43 MPa
Option B:	217.30 MPa
Option C:	325.15 MPa
Option D:	651.90 MPa
9.	A rectangular beam 100 mm wide and 250 mm deep is subjected to a shear force of 50 kN. What will be the maximum shear stress at the neutral axis?
Option A:	1.5 MPa
Option B:	3 MPa
Option C:	4.5 MPa
Option D:	6 MPa
10.	A solid round bar of 3 m long and of 50 mm diameter is used as a column with both ends hinged. Crippling load by Eulers is _____, If $E = 2 \times 10^5$ MPa
Option A:	67.29 kN
Option B:	57.29 kN
Option C:	62.29 kN
Option D:	70.29 kN

Q2.	Solve any 4 out of 6	5 marks each
A	With usual notations, establish the relation between E, G, K and μ .	
B	A thin cylindrical shell 3.2 m long is having 1.2 m internal diameter and it is 15 mm thick. Calculate hoop stress, longitudinal stress and maximum shear stress if internal fluid pressure is 1.6 MPa.	
C	Draw SFD and BMD for a simply supported beam AB of span "L" m carrying a triangular load of zero intensity at the support A and (W) kN/m at the support B.	
D	Define core or kernel of the section. Locate core of the solid rectangular section having width of 300 mm and depth of 400 mm.	
E	A steel rod of 16 mm diameter and 5 m long is connected to two grips, one at each end at a temperature of 120°C . Find the pull exerted when the temperature falls to 40°C . i. If the ends do not yield. ii. If the ends yield by 1 mm Take $E = 2 \times 10^5$ N/mm ² and $\alpha = 12 \times 10^{-6} / ^\circ\text{C}$.	
F	An unknown weight falls through 15 mm on a collar rigidly attached to the lower end of the bar 4 m long and 800 mm ² in area. If the maximum instantaneous elongation is 3 mm, find the corresponding stress and the value of unknown weight. Take $E = 2 \times 10^5$ N/mm ²	

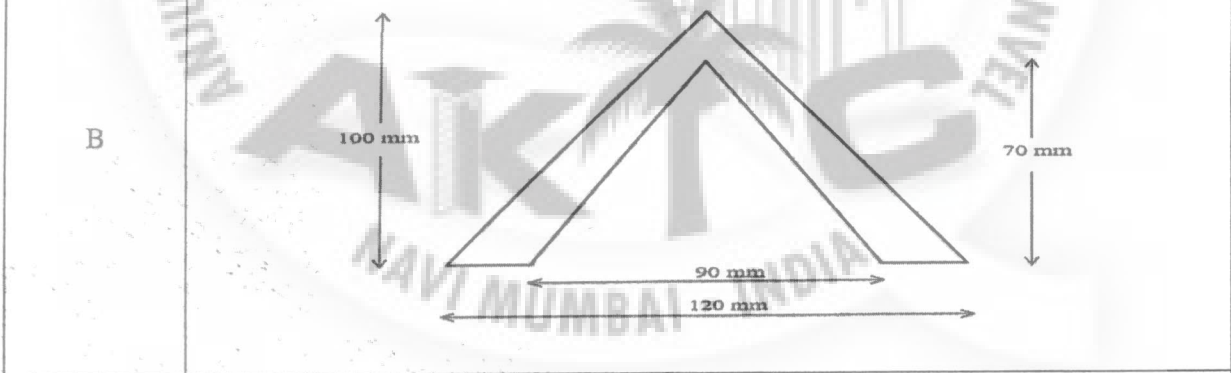
Q3	Solve any 2 Questions out of 3	10 marks each
A	In an experiment, a bar of 40 mm diameter and 200 mm in length is subjected to a pull of 70 kN. Change in length and diameter is 0.09 mm and 0.0039 mm respectively. Calculate the Poisson's ratio, Modulus of Elasticity, Shear Modulus and Bulk Modulus.	



Q4 Solve any 2 Questions out of 3 10 marks each

A A hollow circular steel shaft of 6 m length has to transmit 180 kW power at 150 rpm. If internal diameter is 0.6 times external diameter, total angle of twist is not to exceed 4° and shear stress is limited to 50 N/mm^2 , determine diameter of the shaft. Take $G = 84 \text{ kN/mm}^2$.

B A beam of 6 m span is loaded with a UDL of 15 kN/m . The given fig. is symmetrical about Y-Y axis. Determine and draw the maximum tensile and compressive bending stresses across the section.



C For the S/S beam shown, calculate slope at supports and maximum deflection by using Macaulay's method. Take EI constant.

