

NETTUR TECHNICAL TRAINING FOUNDATION
DIPLOMA IN TOOL ENGINEERING & DIGITAL MANUFACTURING– CP01
III SEMESTER REGULAR & SUPPLEMENTARY EXAMINATION-JAN 2023

Subject: Strength Of Materials
Subject Code: CP01312T

Total Time: 2 Hr.
Total Marks: 50 Marks

PART B

1.0 ANSWER ANY EIGHT OF THE FOLLOWING

2*8=16

- 1.1 What is the difference between compressive load & tensile load?
- 1.2 Convert a) N/m^2 to N/mm^2 and b) Gpa to N/mm^2
- 1.3 Write the formula for elongation due to self-weight when
 - a) Specific weight is given
 - b) total weight is given
- 1.4 What is Modular ratio in the composite bar?
- 1.5 What is Poisson's ratio?
- 1.6 What is Modulus of rigidity?
- 1.7 Write the Euler's formula for crippling load
- 1.8 Write the formula for thermal stress.
 - a) When expansion is totally prevented
 - b) when expansion is partially prevented
- 1.9 What is Slenderness ratio?
- 1.10 What is bucking load?

2.0 ANSWER ANY SIX OF THE FOLLOWING

3*6=18

- 2.1 Explain the following terms a) Post b) Boom c) Stanchion
- 2.2 Determine the change in length, breadth and depth of a steel bar 4 m long, 30 mm wide, and 20 mm thick, when it is subjected to an axial pull of 30 KN in the direction of its length. Take E of steel as $= 2 \times 10^5 N/mm^2$ and Poisson's ratio as 0.3.
- 2.3 Write the formula for Modulus of Elasticity
- 2.4 Compare shear stress to normal stress
- 2.5 Write the difference between column and struts

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2.6 A wooden tie bar is 75 mm wide, 150 mm deep and 1.50 m long. It is subjected to an axial pull of 45000 N. The stretch of the member is found to be 0.6380 mm. Find the young's modulus for the material.

2.7 What is meant by Stress and strain?

2.8 A rod of 150 cm long and diameter of 2 cm is subjected to an axial pull of 20 KN. If the modulus of elasticity of the material of the rod is $5 \times 10^5 \text{ N/mm}^2$, determine

(a) Stress, (b) Strain, and (C) Elongation of the rod.

3.0 ANSWER ANY FOUR OF THE FOLLOWING

4*4=16

3.1 Explain the Tensile Test of M.S specimen with stress- strain curve.

3.2 Write the assumptions made in Euler's Theory of columns

3.3 Explain the following:

a) Elasticity b) Plasticity c) Toughness d) Hardness

3.4 A copper alloy wire of 1.5 mm diameter and 30 m long is hanging freely from a tower. What will be the elongation due to the self-weight of the wire? Take specific weight of copper and its modulus of elasticity as 89.2 kN/m^3 and 90 GPa, respectively

3.5 A bar 30 mm x 30 mm x 250 mm long is subjected to a pull of 90 KN in the direction of its length. The elongation of the bar was found to be 0.125 mm, while the decrease in each lateral dimension was found to be 0.00375 mm. Find the young's modulus, Poisson's ratio, modulus of rigidity and bulk modulus for the material of the bar

3.6 Write the crippling load formulae for all 4 types of end conditions

LIST OF FORMULAE

1.	δl	$\frac{wl^2}{2E}$ (or) $\frac{Wl}{2AE}$	
2.	p_t	$E \left(\frac{\alpha T l - \delta}{l} \right)$	
3.	P	$\frac{\pi^2 EI}{L^2}$	Both the end hinged
4.	P	$\frac{\pi^2 EI}{4L^2}$	One end fixed other end free
5.	P	$\frac{4\pi^2 EI}{L^2}$	Both the ends fixed
6.	P	$\frac{2\pi^2 EI}{L^2}$	One end hinged other end free
7.	f_t	$E\alpha T$	
8.	δl	αTL	
9.	δl	$\alpha tl - \delta$	
10.	f_t	$E(\alpha tl - \delta)/L$	
11.	$\frac{1}{m}$ or μ :	$\frac{\text{Lateral Strain}}{\text{Longitudinal strain}}$	
12.	E	$3K \left(1 - \frac{2}{m} \right)$	
13.	E	$\frac{9KG}{3K + G}$	
14.	E	$2G \left(1 + \frac{1}{m} \right)$	