Subject: Strength of Material   **Total Time: 2 Hr.**
Subject Code: CP01403T   **Total Marks: 50**

PART B

1.0 ANSWER ANY EIGHT OF THE FOLLOWING   **2*8=16**

1.1 Mention any two elastic constants.

1.2 If the diameter of the steel rod is 4mm. What will be the moment of inertia of the rod?

1.3 What do you know about Torsion?

1.4 Why "Moment of inertia" is an important value.

1.5 In a closely coiled helical spring, the mean coil radius R = 50 mm, No. of coils n = 10. Find length of the wire.

1.6 Write the formula for Polar Moment of Inertia of a solid Circular Rod.

1.7 What do you understand about Neutral Layer in Bending?

1.8 Determine the torque of a solid shaft which will transmit 105 kW power at 160 rpm

1.9 What are the different forms of spring?

1.10 What is Torque in simple sentence?

2.0 ANSWER ANY SIX OF THE FOLLOWING   **3*6=18**

2.1 Write down the types of Beams with neat sketch.

2.2 Write the Torsional Equation with notations and Units.

2.3 Find the power that can be transmitted by a shaft 60 mm diameter, at 180 r.p.m. if the permissible shear stress is 85 N/mm^2.

2.4 Write the formula for Power Transmitted by the Shaft and explain its terms with units.

2.5 Write about a short note Bending Spring & Torsion spring

2.6 What is the maximum diameter of a solid shaft which will not twist more than 3º in a length of 6m when subjected to a torque of 12 KN-m? What is the maximum shear stress induced in the shaft? Take G = 82 GPa.

                                                            -PTO-

2.7 Explain about Angle of Twist with a neat Sketch.

2.8 Write the bending equation and explain its terms?

3.0 ANSWER ANY FOUR OF THE FOLLOWING   **4*4=16**

3.1 Write the assumptions made in theory of Pure Torsion.

3.2 A solid shaft 125mm in diameter transmits 120KW at 160 rpm. Find the maximum shear. Stress induced in the shaft. Find also the angle of twist in a length of 7.5 meter. Take modulus of rigidity = $8x10^4$ N/mm²

3.3 Explain the assumptions made in theory of simple bending.

3.4 A close coiled helical spring of 100 mm mean diameter is made of 10 mm diameter rod and has 20 turns. The spring carries an axial load of 200 N. Determine the shear stress and also calculate the stiffness of the spring.

3.5 Draw a neat sketch of Closed Coil Helical Spring & Open Coiled Helical Spring.

3.6 A cantilever of length 2 meter fails when a load of 2 kN is applied at the free end. If the section of the beam is 40 mm × 60mm, find the stress at the failure.
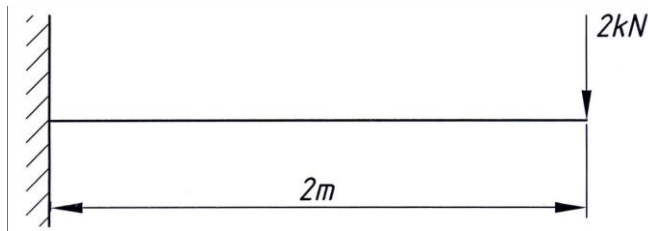
List of formulae

1. $P = \dfrac{2\pi NT}{60000}$

2. $T = f_s \times \dfrac{\pi d^3}{16}$

3. $Z = \dfrac{bd^2}{6}$

4. $M = \dfrac{wl^2}{8}$

5. $M = f \times Z$

6. $I_p = \dfrac{\pi(D^4 - d^4)}{32}$

7. $\dfrac{T}{Ip} = \dfrac{C\theta}{l}$