

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE, APRIL – 2023**

APPLIED MECHANICS AND STRENGTH OF MATERIALS

[Maximum Marks: 100]

[Time: 3 Hours]

PART-A

[Maximum Marks: 10]

I. (Answer *all* questions in one or two sentences. Each question carries 2 marks)

1. Define lateral strain.
2. Define angle of friction.
3. List the different types of riveted joints.
4. Distinguish between long column and short column.
5. Define spring index.

(5 x 2 = 10)

PART-B

[Maximum Marks: 30]

II. (Answer *any five* of the following questions. Each question carries 6 marks)

1. Explain briefly :
a) Ultimate stress b) Working stress c) Factor of safety
2. Draw and explain stress - strain diagram for ductile materials.
3. Explain Parallel axis theorem and perpendicular axis theorem.
4. A body weighing 540 N is pulled along a horizontal plane by a pull of 180 N acting at an angle of 30° with the horizontal. Find the coefficient of friction.
5. Illustrate different types of welded joints on plates.
6. Calculate the hoop stress and longitudinal stress in the material of a thin cylindrical shell of 3m diameter and 30mm thick subjected to an internal pressure of 1 N/mm^2 .
7. Illustrate the different types of beams.

(5 x 6 = 30)

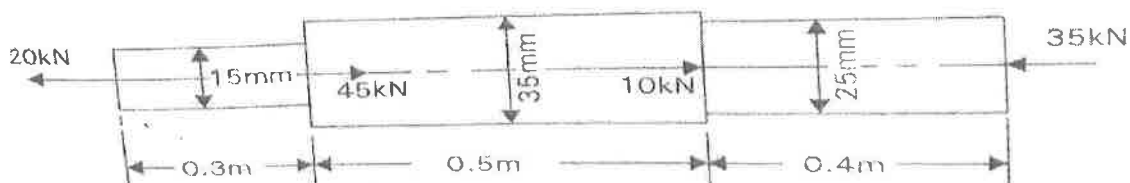
PART-C

[Maximum Marks: 60]

(Answer *one* full question from each Unit. Each full question carries 15 marks)

UNIT – I

III. a. A cylindrical bar of varying section is subjected to axial loads as shown in figure. (10)

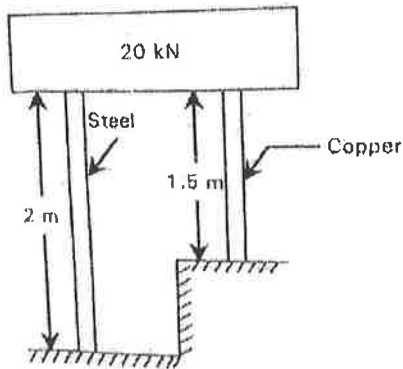


Determine stresses in each section.

b. Illustrate the temperature stress when the expansion is totally prevented. (5)

OR

IV. a. A steel rod together with a copper rod supports a load of 20 kN as shown in figure.

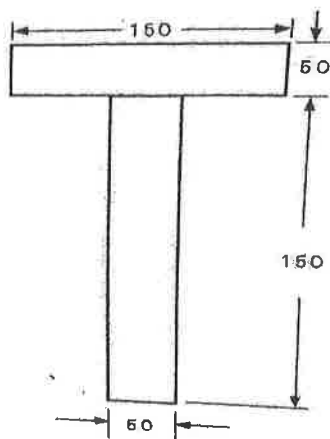


Diameter of each rod is 20 mm. Find the stresses in each rods. Take $E_s = 2.05 \times 10^5$ N/mm² and $E_c = 1.1 \times 10^5$ N/mm² (10)

b. Define a) Modulus of rigidity b) Poisson's ratio (5)

UNIT – II

V. a. Find the moment of inertia of the T section shown in figure about XX axis passing through the centre of gravity of the section.



(10)

b. Illustrate i) Sliding friction ii) Rolling Friction. (5)

OR

VI. a. Derive the expression for the moment of inertia of a rectangular section. (10)

b. State the laws of solid friction. (5)

UNIT- III

VII. a. A solid circular shaft running at 300 RPM transmits 200KW. Corresponding shear stress induced is 100N/mm². Calculate the suitable diameter of the shaft. (10)

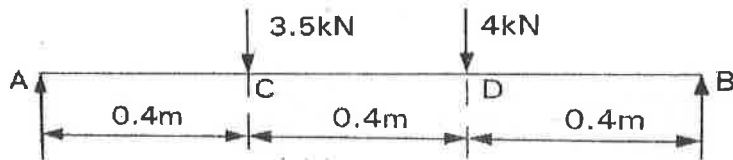
b. Illustrate the Purpose and procedure of Caulking and Fullering. (5)

OR

- VIII. a. A hollow shaft is to transmit 200 KW at 80 RPM. If the shear stress is not to exceed 60N/mm^2 . And internal diameter is 0.6 of external diameter, find the diameter of shaft. (10)
- b. Explain the different failures of riveted joint. (5)

UNIT - IV

- IX. a. Draw the shear force and bending moment diagrams.



(10)

- b. Distinguish between closely coiled and open coiled helical springs. (5)

OR

- X. a. A 1.75m long steel column of rectangular cross section 120 mm x 100 mm is rigidly fixed at one end and hinged at other end. Determine the buckling load on the column using Euler's formula. Take $E=2 \times 10^5 \text{ N/mm}^2$. (10)
- b. Illustrate the point of contra flexure. (5)
