22240

24225

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Illustrate your answer with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following: **10**

a) Define work and work of force.

b) Difference between mass and weight.

c) Define inversion of mechanism.

d) Define ultimate stress and working stress.

e) Write any four selection criteria for selection of bearings.

f) List the applications of gears.

g) Define coefficient of friction and state two factors affecting on friction.

P.T.O.

Marks

2. Attempt any THREE of the following: **12**

a) Differentiate between Kinetic energy and potential energy with example.

b) A horizontal force 'P' as shown in Figure No. 1. Keep the weight of 50N in equilibrium. Find 'P' and tension in string.

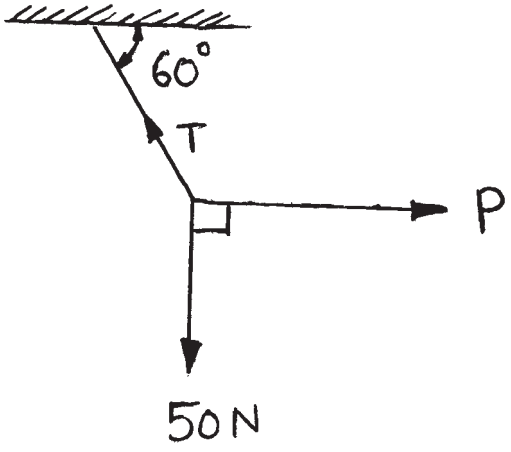

Fig. No. 1

c) In a simple lifting machine a load of 5kN is lifted by 45N effort while the load moves up by 30 mm, the effort moves through 4m. Calculate Mechanical Advantage, Velocity ratio and efficiency.

d) Classify various types of belts and one application of each.

3. Attempt any THREE of the following: **12**

a) Explain with neat sketch four bar chain mechanism.

b) Define homogeneous and orthotropic materials with their applications.

c) A bar of cross section 20 mm × 20 mm is axially pulled by a force 'P' kN. If the maximum stress induced in the bar is 50 MPa. Determine 'P'. if elongation of 1.2 mm is observed over a gauge length of 3 m. Determine Young's modulus.

d) Draw stress-strain curve for ductile material and define various points on it.

Marks

4. Attempt any THREE of the following: **12**

a) State the types of lubricants with their properties and application.

b) A steel rod of 500 mm long and 20 mm × 10 mm in section is subjected to an axial pull of 300 kN. If the modulus of elasticity is 2×10^5 MPa. Calculate the stress, strain and elongation of rod.

c) Explain with neat sketch construction of ball bearing. Give its suitable application in textile industry.

d) Explain with neat sketch construction and working of epicyclic gear train.

e) State the laws of static friction and kinetic friction.

5. Attempt any TWO of the following: **12**

a) Explain single slider crank mechanism with neat sketch.

b) Explain bearing specification and describe the system of code used for bearings.

c) Differentiate between centrifugal force and centripetal force.

6. Attempt any TWO of the following: **12**

a) Define following terms :–

i) Ultimate stress

ii) Elastic limit

iii) Factor of safety.

b) Explain the terms of interference, undercutting and backlash of gear with sketch.

c) Explain Kinematics for linear and angular motion with suitable example.

———