22240

21819

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

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

(2) Illustrate your answers 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) State the principle of transmissibility of forces.

b) Explain the methods of resolution of forces.

c) Define the potential energy and kinetic energy.

d) Differentiate mass and weight.

e) Define mechanical advantage (MA) velocity ratio (V.R) and Efficiency of simple machine.

f) Define reversible machine.

g) Define the static friction and kinetic friction

Marks

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

a) Explain work of force and work of couple moment.

b) In a lifting machine, an effort of 700 N is to be moved by a distance of 4m to raise the load of 11000 N by a distance of 1m. Determine the mechanical advantage, velocity ratio and efficiency of the machine.

c) Explain the stress- strain diagram for ductile material with a neat sketch.

d) State the types of lubricants with their properties.

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

a) Differentiate between centrifugal force and centripetal force.

b) State all the Newton's laws of motion.

c) Write the expressions of velocity ratio in respect of simple screw jack, worm and worm wheel, simple wheel and axle and single purchase crab machine. Also state the meaning of each term.

d) Differentiate between linear and angular momentum. A 5 kg slider is moving with a velocity of 2 m/s. Calculate its momentum.

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

a) The following observations are made during tension test carried out on a 15 mm diameter plain carbon steel rod: Yield load = 68 kN, Ultimate tensile load = 105 kN, find the yield strength and ultimate tensile strength of the rod.

b) Differentiate between the ball bearing and roller bearing with respect to the following points: Rolling element, Nature of contact, Load carrying capacity, Radial dimensions, Axial dimensions and Coefficient of friction.

c) Explain the procedure for selection of bearings from manufacturers catalogue.

d) State the laws of static friction and kinetic traction.

e) State the factors to be considered while selecting the factor of safety.

Marks

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

a) Explain any three inversions of four bar mechanism.

b) Enlist the different types of material with one example of each, and find out the diameter and stress in synthetic thread having E= 3.3 GPa and subjected to 100 N of tensile force. The length of thread increases by 1.1%.

c) State the advantages and disadvantages of chain drive over the belt drive.

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

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

b) Differentiate between the compound and epicyclic gear train.

c) Explain with neat sketch procedure to obtain stress strain curve with the help of UTM.