314304

12526

4 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) 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 kinematic link and kinematic chain.

b) Why roller follower is preferred over knife edge follower ?

c) Define angle of contact in belt drives.

d) Enlist four types of loads acting on machine element.

e) State any two functions of key.

f) Enlist inversions of four bar kinematic chain.

g) State any two conditions for selection of factor of safety.

Marks

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

a) Explain construction and working of elleptical trammel with neat sketch.

b) Differentiate between machine and mechanism.

c) Enlist constrained motion and explain any one with neat sketch.

d) Explain method of drawing displacement diagram for uniform SHM of follower during it's application.

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

a) Draw the schematics of the following :

i) Knife edge follower

ii) Roller follower

iii) Flat faced follower

iv) Spherical faced follower

b) Find the power transmitted by a belt running over a pulley of 600 mm diameter at 200 rpm. The coefficient of friction between belt and pulley is 0.25, angle of lap is 165° and max. tension in the belt is 2550 N.

c) For flat belt, prove that, $\frac{T_1}{T_2} = e^{\mu\theta}$.

d) Compare cross belt and open belt drive.

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

a) Explain steps involved in general machine design procedure.

b) Explain stress-strain diagram for mild steel with a neat sketch.

c) Write down design procedure of knuckle joint.

d) Define the following terms with respect to spring :-

i) Spring index

ii) Spring rate

iii) Free Length

iv) Solid height

Marks

e) State the following material specifications -

i) FeE200

ii) 25C8

iii) FG200

iv) 45Cr20Si2

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

a) Explain construction and working of crank and slotted lever quick return mechanism with neat sketch.

b) Draw a cam profile for knife edge follower :-

i) Minimum radius of cam = 6 cm

ii) Stroke of follower = 4 cm

iii) Outstroke 90° with uniform velocity.

iv) Dwell for next 60°

v) Follower return to original position during 90° of cam rotation with uniform velocity. The axis of cam and axis of knife edge follower coincides with each other and Cam rotates in clockwise direction.

c) Explain with neat sketch compound type gear train and write its equation for finding velocity ratio of gear train.

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

a) i) Explain the term bending stress with neat sketch.

ii) Explain modern asthetic design consideration to be considered in design of machines.

b) Write down design procedure of flange coupling with neat sketch.

c) Compare the weight, strength and stiffness of a hollow shaft of same external diameter as that of solid shaft. The inside diameter of hollow shaft is half of the external diameter. Both the shafts have same material and length.

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