22438

12425

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.

Marks

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

(a) Define inversion with example.

(b) Define (i) Kinematic link (ii) Kinematic chain.

(c) State the necessity of Acceleration diagram of a mechanism.

(d) Enlist various follower motion.

(e) State types of cams.

(f) Write any two disadvantages of chain drive.

(g) State the function of flywheel.

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

(a) Define completely constrained motion and successfully constrained motion with neat sketch. State one example of each.

(b) State the advantage of Roller follower over Knife edge follower.

(c) State applications of

(i) Band brake

(ii) Disc brake

(iii) Internal expanding brake

(iv) External shoe brake

(d) Draw turning moment diagram for single cylinder four stroke I.C. engine.

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

(a) Explain Klein's construction to determine velocity and acceleration of different links in single slider crank mechanism.

(b) Draw the following displacement diagram for follower.

(c) A simple band brake is operated by a lever 40 cm long. Brake drum diameter is 40 cm and brake band embrace 225° of its circumference. One end of band is attached to the fulcrum, while the other end is attached to a pin, 8 cm from fulcrum. The co-efficient of friction is 0.3. The effort applied to the end of lever is 400 N. Find braking torque applied, if it rotates anti-clock wise, when effort is applied upwards.

(d) Differentiate between multiplate clutch and single plate clutch.

(e) Explain the term

(i) Slip

(ii) Creep

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

(a) Draw the construction of "Whitworth Quick Return Mechanism".

(b) The mass of reciprocating parts of horizontal I.C. engine is 2 kg. Length of crank is 6 cm and connecting rod is 24 cm long. When crank has travelled (turned) through 30° from I.D.C. find accelerating force, if engine runs at 600 rpm.

(c) Draw the profile of cam operating a knife edge follower having a lift of 30 mm. The cam raises the follower with S.H.M. for 150° of its rotation followed by a period of dwell of 60°. The follower descends for next 100° rotation of cam with uniform velocity again followed by dwell period. The cam rotates at a uniform velocity of 120 rpm and has least radius of 20 mm.

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

(a) Explain the construction of epicyclic gear train with neat sketch.

(b) An I.C. engine developing 10 kW of power is to be transmitted to a machine by flat leather belt. A 0.8 m diameter pulley is fitted on engine shaft and rotates at 300 rpm. The angle of lap is 175° and coefficient of friction in belt and pulley is 0.25. Determine tension in the belt. If mass of belt is 1.4 kg/m length of belt, then find maximum and initial tension.

(c) Three masses 10 kg, 20 kg & 15 kg are attached at a common point at a distance of 20 cm, 25 cm & 15 cm respectively. If angle between successive masses is 60° & 90°, determine the balancing mass to be attached at a radius of 30 cm. (Also find position of balanced mass.)

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

(a) Describe with neat sketch, working of Scotch Yoke Mechanism.

(b) Differentiate between belt drive and gear drive.

(c) Draw neat labelled sketch of Hartnell governor and explain its working.