22438

11920

3 Hours / 70 Marks Seat No.

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

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figure to the right indicate full marks.

(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) Identify Kinematic pairs and named it. Refer Fig. No. 1
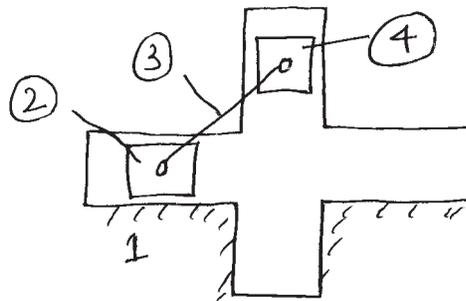
Fig. No. 1

    b) Define completely constrained motion and successfully constrained motion.

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

    d) State the reason of using roller follower over kinfe edge follower.

    e) Define base circle and pressure angle.

    f) Draw a neat sketch of internal expanding shoe brake and lable it.

    g) State the adverse effect of imbalance on rotating element of machine.

Marks

2. **Attempt any <u>THREE</u> of the following:** **12**

a) Draw a neat sketch of crank and slotted lever quick return mechanism of shaper. Write formula of cutting ratio.

b) Compare Belt Drive and Chain Drive (four points)

c) Explain with neat sketch method of drawing displacement diagram for SHM of follower.

d) 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 tensions in the belt.

3. **Attempt any <u>THREE</u> of the following:** **12**

a) Explain the working of Scotch Yoke mechanism with neat sketch.

b) Differentiate between mechanism and machine.

c) Write any two functions and applications of clutch.

d) Write the classification of follower

(i) As per shape

(ii) As per motion.

Draw sketch of any one follower.

e) Draw and explain the turning moment diagram of 4-stroke I.C. Engine.

4. **Attempt any <u>TWO</u> of the following:** **12**

a) Define following terms

(i) Kinematic link
(ii) Kinematic pair
(iii) Kinematic chain
(iv) Mechanism
(v) Machine
(vi) Inversion

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

c) A cam operates a roller follower, axis passing through the axis of cam.

The specifications are

Minimum radius of cam = 25 mm

Lift of follower = 30 mm

Diameter of roller = 15 mm

Angle of lift = 120° with SHM

Outer dwell angle = 30°

Angle of return = 150° with uniform

acceleration and retardation.

Draw the cam profile.

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

a) Explain with neat sketch compound type Gear Train. Derive the equation for velocity ratio of gear train. Write it's application.

b) In reciprocating engine the crank is 250 mm long and connecting rod is 1000 mm long. The crank rotates at 150 rpm. Find velocity and acceleration of piston.
And angular velocity and angular acceleration of connecting rod when the crank makes an angle of 30° to IDC.
Use analytical method.

c) Three masses m_1, m_2 and m_3 are of 100N, 200N and 150N respectively. The corresponding radii are 0.3 m, 0.15 m and 0.25 m respectively. Angles between masses m_1 and m_2 is 45° and between m_2 and m_3 is 75° and between m_3 and m_1 is 240°. Determine graphically the position and magnitude of the balance mass required if the radius of rotation is 0.2 m.

6.   **Attempt any <u>TWO</u> of the following:**   **12**

a) Two Pulleys one 450 mm diameter and other 200 mm diameter are on parallel shaft is 1.95 apart and are connected by cross-belt drive. Find the length of belt required and angle of contact between the belt and each pulley.

What power can be transmitted by belt, when the larger pulley rotates at 200 rpm, If maximum permissible tension in the belt is 1000 N, $\mu = 0.25$

b) Draw the sketch of multiplate clutch and describe its construction and working.

c) Compare flywheel with Governer.

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