11819

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 :**   **5 × 2 = 10**

   (a)   List different kinematic chains.

   (b)   Define term 'Mechanism'.

   (c)   State the relationship between linear and angular velocity.

   (d)   Enlist different followers used in cam-follower mechanism.

   (e)   Define 'Lift' of cam.

   (f)   Classify Brakes.

   (g)   State the significance of 'Co-efficient of fluctuation of speed'.

2.   **Attempt any THREE :**   **3 × 4 = 12**

   (a)   Explain in brief the term 'Inversion of Mechanism' with suitable example.

(b)   Compare between Flat and 'V' belts.

(c)   Classify 'Cams'. State their applications.

(d)   Explain the procedure of 'Selection of Belt' for given application.

3.   **Attempt any THREE :**   **3 × 4 = 12**

(a)   Explain 'Scotch-Yoke' Mechanism with neat sketch.

(b)   Draw the constructional feature of 'Centrifugal Clutch'.

(c)   Explain in brief the construction of 'Rotary Engine' with neat sketch.

(d)   Distinguish between uniform velocity motion and simple harmonic motion of follower.

(e)   Explain the procedure of balancing of several masses revolving in same plane.

4.   **Attempt any TWO :**   **2 × 6 = 12**

(a)   Draw 'Withworth's Quick Return Mechanism'. Explain its working.

(b)   The crank of a slider crank mechanism rotates clockwise at a constant speed of 300 rpm. The crank is 150 mm and the connecting rod is 600 mm long. Determine :

(i)   Linear velocity and acceleration of midpoint of connecting rod,

(ii)   Angular velocity and angular acceleration of connecting rod at a crank angle of 45° from inner dead centre position.

(c) A cam with a minimum radius of 50 mm, rotating clockwise at a uniform speed is required to give motion to knife edge follower as below :

(i) To move outward through 40 mm during 100° rotation of cam.

(ii) To dwell for next 80°.

(iii) To return to its starting position during next 90°.

(iv) To dwell for the rest period of a revolution.

Draw the profile of cam when the line of stroke of follower is offset by 15 mm.

5. **Attempt any TWO :** $2 \times 6 = 12$

(a) Calculate the power transmitted by a belt running over a pulley of 600 mm diameter at 200 rpm. The co-efficient of friction between belt and pulley is 0.25, angle of Lap is 160° and Maximum tension in the belt is 2500 N.

(b) The crank and connecting rod of reciprocating engine are 50 mm and 175 mm respectively. The crank is rotating in clockwise at 120 rad/s. Find with the help of Klein's construction

(i) Velocity and acceleration of piston

(ii) Angular velocity and angular acceleration of connecting rod at the instant when the crank is at 30° to inner dead centre.

(c) Draw neat sketch of 'Proell governer'. Explain its working.

6. **Attempt any TWO :** $2 \times 6 = 12$

(a) Enlist the factors to be considered while selecting 'Chain drives'. List different types of chain drives along with their industrial applications.

P.T.O.

(b) The simple band brake is operated by a lever of length 500 mm. The brake drum has a diameter of 500 mm and the brake band embraces 5/8 of the circumference. One end of the band is attached to the fulcrum of the lever while other end is attached to a pin on the lever 100 mm from the fulcrum. If the effort applied to the end of lever is 2 kN and co-efficient of friction is 0.25. Calculate the maximum bending torque on the drum.

(c) Draw turning moment diagram for single cylinder 4-stroke diesel engine with explanation.

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