

22344

11920

3 Hours / 70 Marks

Seat No.

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- 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.

Marks

1. Attempt any FIVE of the following :

10

- (a) Define : (i) Machine, (ii) Mechanism.
- (b) List any four inversions of single slider crank chain.
- (c) State the inter-relation between linear velocity and angular velocity.
- (d) State the types of followers according to the surface in contact.
- (e) Enlist various motions by which follower can move.
- (f) State the function of (i) Brake, (ii) Clutch.
- (g) State the various applications of the flywheel.

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

- (a) Explain completely constrained motion and incompletely constrained motion, with neat sketch.
- (b) State the merits and demerits of using gear drive over chain drive. (two each)
- (c) Draw simple sketch of cam and follower arrangement and show on it.
 - (i) Base circle
 - (ii) Cam profile
 - (iii) Pitch circle
 - (iv) Pitch curve
- (d) Explain various materials that can be used to manufacture the 'V' belts or flat belts, for the transmission of power.

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

- (a) Explain Elliptical trammel with neat sketch.
- (b) Draw a neat sketch of the mechanism used in shaper machine, to obtain the quick return motion of the ram.
- (c) Explain leading shoe and trailing shoe, of an internal expanding shoe brake.
- (d) For high speed applications roller followers are preferred one knife-edge follower, justify your answer.
- (e) Differentiate between flywheel and governors. (any four)

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

- (a) With neat sketch, explain the construction and working of scotch yoke mechanism.
- (b) In a slider crank mechanism, the length of crank is 125 mm and that of connecting rod is 500 mm. The centre of gravity point of the connecting rod (point 'G') is 275 mm from the slider. The crank speed is 600 r.p.m. in clockwise direction. When the crank has turned 45° from the inner dead centre position, determine :
 - (i) Velocity of the slider
 - (ii) Velocity of point 'G' and
 - (iii) Angular velocity of the connecting rod
- (c) A cam, with minimum radius of 50 mm, rotating in clockwise direction, is required to give a motion to knife edge follower as below :
 - To move outwards by 40 mm during 100° cam rotation.
 - To dwell for next 80° .
 - To return to its original position during next 90° , and
 - To dwell for the remaining period.

The displacement of the follower is to take place by uniform acceleration and uniform retardation. Draw the profile of the cam when the line of stroke of the follower is offset by 15 mm.

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

- (a) State and explain various methods of lubrication in chain drive.
- (b) In a slider crank mechanism, the length of crank and connecting rod are 100 mm and 400 mm respectively. The crank rotates uniformly at 600 rpm clockwise, when the crank has turned through 45° from the inner dead centre, find velocity and acceleration of the slider by Klein's construction method.
- (c) Explain with sketch, how centrifugal governor can be used to regulate the engine speed by controlling the fuel supply.

P.T.O.

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

- (a) With suitable sketch of epicyclic gear train, explain tabular method for calculating the velocity ratio of epicyclic gear train.
 - (b) Explain with neat sketch construction and principle of working of centrifugal clutch.
 - (c) Four masses A, B, C and D are attached to a shaft and revolve in the same plane. The masses are 22 kg, 20 kg, 32 kg and 25 kg respectively and their radii of rotation are 80 mm, 100 mm, 120 mm and 60 mm respectively. The angular position of the masses B, C and D are 60° , 135° and 270° respectively from the mass A. Find the magnitude and position of the balancing mass at a radius of 150 mm.
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