

22344

21819

3 Hours / 70 Marks

Seat No.

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- 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) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1. Attempt any FIVE of the following :

10

- (a) Name any one inversion of single slider crank chain. Give its application.
- (b) Define :
 - (i) Inversion
 - (ii) Mechanism
- (c) State the relationship between linear velocity and angular velocity of a link.
- (d) Name various motions by which the follower can move.
- (e) Roller followers are preferred for high speed applications. Justify the statement.
- (f) State how the function of a clutch is different than brakes.
- (g) Differentiate between flywheel and governors. (min. two points each)

- 2. Attempt any THREE of the following : 12**
- (a) Explain incompletely constrained motion with suitable sketch.
 - (b) Suggest the suitable gear train for wrist watches. Justify your answer.
 - (c) Give detail classification of the followers.
 - (d) State various merits and demerits of compound gear train.
- 3. Attempt any THREE of the following : 12**
- (a) Explain the working of Oldham's coupling with neat sketch.
 - (b) Describe constructional features of Elliptical trammel with neat sketch.
 - (c) Explain the working principle of disc brake with neat sketch.
 - (d) Explain the working of cylindrical cam with reciprocating follower, with neat sketch. State the applications of this cam and follower.
 - (e) Explain turning moment diagram of single cylinder 4-stroke petrol engine, with sketch.
- 4. Attempt any TWO of the following : 12**
- (a) Explain construction and working of quick return mechanism of shaper machine with neat sketch.
 - (b) In a single slider crank mechanism, length of crank is 60 mm & length of connecting rod is 140. The crank rotates at 250 rpm clockwise. Find out the velocity at the midpoint of connecting rod, and angular acceleration of the connecting rod, when crank is at 45° from the line of stroke.
 - (c) Draw the profile of Cam for following data :
 - Lift of knife edge follower = 50 mm.
 - Follower moves outward with uniform velocity for 90° ;
 - Dwell for next 30° ;
 - Follower returns for next 90° with SHM; & remaining is the dwell period.
 - Minimum radius of cam = 30 mm

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

- (a) Two parallel shafts are to be connected by spur gears. Approximate distance between the shaft is 600 mm. If one shaft runs at 120 rpm, and the other at 360 rpm, find the number of teeth on each wheel, if the module is 8 mm. Also, determine the exact distance between the shafts.
- (b) In crank slider mechanism, length of crank is 40 mm and length of connecting rod is 150 mm. The crank rotates at 200 rpm, in clockwise direction. Find out the velocity and acceleration of slider by Klein's constructions, when crank is at 45° from inner dead centre.
- (c) With neat sketch explain the construction and working of centrifugal governor.

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

- (a) An open belt drive running over two pulleys 240 mm and 800 mm diameter connects two parallel shafts 3.5 metres apart & transmits 4 kW from smaller pulley that rotates at 300 rpm. Coefficient of friction between the belt & pulley is 0.3 and safe working tension is 10 N per mm width. Determine
 - (i) Minimum width of the belt
 - (ii) Initial tension in belt
 - (iii) Length of belt required
 - (b) State the assumptions made in uniform pressure theory and uniform wear theory. Suggest suitable theory for clutches. Also, justify your answer.
 - (c) Define coefficient of fluctuation of speed ; coefficient of fluctuation of energy, and state it's significance.
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