

22370

23242

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.
 - (7) 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) State the law of inversion.
 - b) Enlist different types of follower motion.
 - c) State any two advantages of V belt drive over flat belt drive.
 - d) Define stability and hunting of governor
 - e) Define Kinematic link and Kinematic chain
 - f) Classify Cam
 - g) State types of gear trains.

P.T.O.

- 2. Attempt any THREE of the following:** **12**
- a) Define following term :
 - i) Strength
 - ii) Malleability
 - iii) Elasticity
 - iv) Plasticity
 - b) State four applications of ABS.
 - c) Explain with a neat sketch working of epicyclic gear train.
 - d) Draw turning moment diagram for single cylinder four stroke I.C. Engine. Label all parts.
- 3. 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 four applications of cam and followers.
 - c) Compare thermoplastics and thermosetting plastics.
(Any four points).
 - d) Enlist four properties of copper and give its two applications in industry.
 - e) State the four advantages of chain drive.
- 4. Attempt any THREE of the following:** **12**
- a) State any four properties and uses of stainless steel.
 - b) Give four properties and four applications of nano materials.
 - c) Explain with neat sketch working principle of Oldham's coupling.
 - d) Draw sketch of any four types of followers.
 - e) Compare flywheel and governor on any four points.

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

- a) A cam is to give the following motion to the knife edge follower:
- i) Out stroke 60° of cam rotation with uniform velocity
 - ii) Dwell for 30°
 - iii) Return stroke 60° with uniform velocity
 - iv) Dwell for remaining 210°

The stroke of follower is 40mm, minimum radius of cam is 50mm. Draw the cam profile when the axis of follower passes through the axis of cam shaft.

- b) Explain with neat sketch working of Quick return mechanism of Shaper.
- c) Define gear train. State and explain law of gearing with the help of suitable sketch.

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

- a) An open belt running over two pulleys 240mm and 600mm diameter connects two parallel shafts 3 metres apart and transmits 4kW from the smaller pulley that rotates at 300 r.p.m. coefficient of friction between the belt and the pulley is 0.3 and the safe working tension is 10N per mm width. Determine : 1. minimum width of the belt 2. initial belt tension and 3. length of the belt required.
- b) Four masses m_1 , m_2 , m_3 , m_4 are 200kg, 300kg, 240kg and 260kg, respectively. The corresponding radii of rotation are 0.2m, 0.15m, 0.25m, and 0.3m respectively and the angles between successive masses are 45° , 75° , and 135° . Find the position and magnitude of the balance mass required, if its radius of rotation is 0.2m.
- c) Draw Iron - Carbon equilibrium diagram and show important temperature and phases on it.
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