22232

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 of the following :   **10**

(a) List any four inversions of single slider crank mechanism.

(b) Define incompletely constrained motion & successfully constrained motion.

(c) State the necessity of drawing velocity & acceleration diagram of a mechanism.

(d) State any four applications of cams and followers.

(e) State the bad effects of improper balancing of rotating parts.

(f) List applications of clutches.

(g) State the reason why roller follower is preferred over knife edge follower.

2. Attempt any THREE of the following : 12

(a) Draw a neat labelled sketch of elliptical trammel. Explain in brief.

(b) Compare Belt drive & gear drive. (any four points)

(c) Explain with neat sketch method of drawing displacement diagram for uniform acceleration & retardation.

(d) An I.C. engine is developing power of 10 kW, to be transmitted to a M/c by flat belt. A 0.8 m. diameter pulley is fitted on engine shaft & rotates at 300 rpm. The angle of lap is 175° & μ between pulley & belt is 0.30. Determine tensions in the belt.

3. Attempt any THREE of the following : 12

(a) Explain the working of Beam engine with neat sketch.

(b) Differentiate between machine & structure.

(c) Write any two functions and applications of brakes.

(d) Write the classification of cams. Draw sketch of any one.

(e) Draw & explain turning moment diagram of four stroke cycle I.C. engine.

4. Attempt any TWO of the following : 12

(a) Draw the construction of crank & slotted lever quick return mechanism.

(b) A cam is to be designed for knife edge follower with following data :

Cam lift 50 mm during 120° of cam rotation with uniform velocity, Dwell for 30°, during return stroke 90° of cam rotation by SHM & remaining is dwell. Draw the cam profile.

(c) Explain Klein's construction to determine velocity & acceleration of different links in single slider crank mechanism.

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

(a) Explain with neat sketch compound type gear train and write its equation for finding velocity ratio of gear train.

(b) In reciprocating engine, crank is 200 mm., long & connecting rod is 800 mm. long. The crank rotates at 150 rpm. Find velocity & acceleration of piston & angular velocity & angular acceleration of connecting rod when crank makes an angle of 30° to IDC use analytical method.

(c) Draw neat labelled sketch of centrifugal governor & explain its working.

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

(a) Differentiate between flywheel & governor.

(b) Draw the sketch of single plate clutch & explain its working.

(c) Two pulleys, one 450 mm. diameter & other 200 mm. diameter are mounted on parallel shaft is 2 m. apart & are connected by cross belt drive. Find the length of belt required & angle of contact between the belt & each pulley. Also calculate power transmitted by belt, when larger pulley rotates at 200 rpm. If maximum permissible tension in the belt is 1000 N, & $\mu = 0.25$.

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