314304

24225

4 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) 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) Give two differences between a machine and structure.

b) Mention any two application of rotary engine mechanism.

c) List any two application of cam and follower.

d) Name two materials used for making flat belts.

e) Define the term bending stress and torsional stress.

f) State the commonly used materials for shafts.

g) Mention any two conditions for selecting FOS.

Marks

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

a) Draw and explain the displacement diagram of a follower under simple harmonic motion.

b) Explain with neat sketch working of Elliptical trammel.

c) Differentiate between constrained motion and unconstrained motion with examples.

d) Describe the working of Oldham's coupling and its application.

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

a) Give the classification of cams –

i) According to follower motion

ii) According to motion

b) Derive the formula for the velocity ratio between the tight side and slack side tensions in belt drive.

c) Describe the working principle of chain drive. Enlist the different type of chains.

d) Give the merits and demerits of V belt over flat belt drive.

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

a) Explain the classification of springs. What are the important terminologies and material specification for helical springs ?

b) Explain the design of a Knuckle joint with their application.

c) Explain the phases in the design process with an example of a machine component.

d) Draw and explain the stress strain diagram for mild steel and discuss its significance in material selection.

e) Enlist the modern aesthetic design consideration ?

Marks

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

a) Explain the working principle of quick return mechanism used in shaper machine with neat sketch.

b) Draw the profile of radial cam with a roller follower for the following motion conditions. Follower moves outward with uniform acceleration and retardation during the first half of stroke dwell for 90° of cam rotation, return with simple harmonic motion in next 120° of cam rotation, Base circle diameter = 50 mm, roller radius = 10 mm, lift = 40 mm.

c) Compare belt drives, chain drives and gear drives, based on efficiency, cost, maintenance and application.

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

a) Define the factor os safety. Explain the conditions for selecting factor of safety.

b) Enlist the various type of couplings ? Explain the design of muff coupling with neat sketch.

c) Compare solid and hollow shafts in terms of strength and rigidity in which application would you prefer a hollow shaft over a solid one ?
