

22484

23124

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) Define :
 - (i) Kinematic Link
 - (ii) Kinematic Pair
- (b) Name the four motions by which follower moves, during its applications.
- (c) Write down the mathematical expressions for open belt drive for the following :
 - (i) Length of belt
 - (ii) Angle of contact
- (d) Define machine design.



- (e) Draw stress-strain diagram for ductile material and label it.
- (f) State functions of key.
- (g) Define “Basic static load rating” of rolling contact bearing.

2. Attempt any THREE of the following :

12

- (a) Draw a neat sketch of Oldham’s coupling and label the following parts :
 - (i) Shaft
 - (ii) Flanges
 - (iii) Bearing
 - (iv) Centre block
- (b) Enlist types of constrained motion and explain any one of them.
- (c) Explain construction and working of radial cam with suitable sketch.
- (d) Explain construction and working of compound gear train with neat sketch showing power transmitting direction.

3. Attempt any THREE of the following :

12

- (a) Differentiate between open belt drive and cross belt drive.
- (b) Find the power transmitted by a belt running over a pulley of 600 mm diameter at 200 rpm. The Coefficient of Friction between the belt and pulley is 0.25, angle of lap is 165° and maximum tension in the belt is 2550 N.

- (c) State the following material specifications :
- (i) 25C8
 - (ii) FeE250
 - (iii) FG200
 - (iv) 45Cr20Si2
- (d) Define “Factor of Safety” and state the factors affecting on selection of factor of safety for brittle material.

4. Attempt any THREE of the following : 12

- (a) Explain the phenomenon of (i) Slip of belt (ii) Creep of belt.
- (b) Explain general considerations in machine design.
- (c) Draw a neat sketch of knuckle joint and state its strength equations (any four).
- (d) Explain construction of leaf spring with neat sketch.
- (e) Explain with neat sketch the different types of radial ball bearings.

5. Attempt any TWO of the following : 12

- (a) Explain construction and working of ‘Whitworth Quick Return Mechanism’, with neat sketch.
- (b) A cam is designed for knife edge follower with following data. Cam lift 40 mm during 90° of cam rotation with SHM, Dwell for 30° , during return stroke 60° of cam rotation by SHM and remaining for dwell, draw cam profile.
- (c) Compare the weight, strength and stiffness of a hollow shaft of same external diameter as that of solid shaft. The inside diameter of hollow shaft is half of the external dia. Both the shafts have same material and length.

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

- (a) A solid shaft is transmitting 1 MW at 240 rpm. Determine the diameter of shaft if the maximum torque transmitted exceeds the mean torque by 20%. Take the maximum allowable shear stress as 60 N/mm^2 .
- (b) Write down the design procedure of muff coupling with neat sketches.
- (c) Explain the followings :
- (i) Transverse shear stress
 - (ii) Crushing stress
 - (iii) Compressive stress
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