



12089

13141

3 Hours/100 Marks

Seat No.

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**Instruction : All questions are compulsory.**

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**MARKS**

1. A) Attempt **any six** of the following : **12**
- a) Define kinematic link, where it is used ?
  - b) What do you mean by successfully constrained motion ? Show with the help of sketch.
  - c) Define Inversion. Write one example.
  - d) Sketch four bar chain and label turning pair.
  - e) Write the classification of follower.
  - f) Draw sketch of S.H.M. in rise of follower Lift 2 cm. Angle of rise  $120^\circ$ .
  - g) What are the two advantages and disadvantages of chain drive ?
  - h) What is balancing ? What are the methods of balancing ?
- B) Attempt **any two** of the following : **8**
- a) Draw Bicycle free wheel sprocket mechanism and describe its working.
  - b) Draw sketch of any one quick return motion mechanism. Write cutting ratio.
  - c) What are the different types of kinematic pair, describe any one.
2. Attempt **any four** of the following : **16**
- a) Draw neat sketch of Oldham's coupling, describe in brief its construction and working.
  - b) Draw single slider crank mechanism and construct velocity polygon. Show absolute velocity vectors.

**P.T.O.**



- c) An engine shaft running at 150 R.P.M. is required to drive machine shaft by means of a belt. The pulley on the engine shaft is of 2 meter diameter and that of machine shaft is 1 meter diameter. If the belt thickness is 5 mm, determine the speed of machine shaft when (i) No slip (ii) Slip of 3%.
- d) Compare Belt Drive and Chain Drive. (Four points)
- e) Draw neat sketch of Hartnell Governor, write its application. Describe working of it.
- f) Draw sketch of Ackerman's steering gear mechanism.

3. Attempt **any four** of the following :

16

- a) Distinguish between Flat Belt drive and V-Belt drive. (Atleast four points)
- b) Write the equation relating tension on slack and tight side. Explain in brief the terms in it.
- c) Draw compound type Gear train. Write its application. Write the velocity ratio of gear train.
- d) In a simple gear train of wheels the motion is to be transmitted from one shaft to another in the same direction of rotation with a velocity ratio of 15. If the follower has 12 teeth, find the number of teeth on the driver and the minimum number of intermediate wheel required. If the driving shaft rotates at 80 r.p.m. what shall be the speed of the driven shaft ?
- e) A V belt drive has the semi-groove angle of  $25^\circ$ . The belt speed is 20 m/sec, the angle of lap is  $160^\circ$  and the coefficient of friction is 0.28. The mass of the belt is 1 kg/m run. If the permissible tension in the belt is 2500 N, find the power that can be transmitted.
- f) Write the classification of CAMS. Draw radial Cam.

4. Attempt **any two** of the following :

16

- a) In a slider crank mechanism the length of connecting rod is 80 cm, ratio of length of connecting rod to length of crank is 4. Determine (i) Velocity of slider (ii) Velocity of connecting rod, if crank makes an angle of  $120^\circ$  with IDC.



b) Draw the cam profile for the following :

i) Least circle radius = 50 mm

ii) Stroke length = 40 mm

iii) Outstroke =  $120^\circ$  with SHM

iv) Dwell =  $30^\circ$

v) Return stroke =  $90^\circ$  with uniform velocity

vi) The axis of follower of 20 mm diameter is inline with the axis of cam and the cam rotates in clockwise direction.

c) Draw the sketch of multiplate clutch and describe its construction and working.

5. Attempt **any four** of the following :

16

a) If the power in friction of a collar thrust bearing carrying an end thrust of 60,000 N having external and inner radii of 250 mm and 150 mm respectively is not to exceed 3 kN, and if the shaft is rotating at 150 r.p.m, what should be the value of co-efficient of friction between collar and shaft ?

b) Define the terms :

1) Hunting of Governor

2) Isochronism.

c) Draw and explain the turning moment diagram of 4-stroke I.C. engine.

d) What is the function of fly wheel in the following applications ?

1) I.C. Engine

2) Mechanical Power Press.

e) Differentiate between brakes and dynamometer.

f) Draw the sketch of simple band brake and write the equation for effort applied. Direction of rotation of brake drum is anticlockwise.

**MARKS**6. Attempt **any four** of the following :**16**

- a) Write the classification of brakes.
  - b) Draw the sketch of internal expanding brake and describe its working.
  - c) Draw the Rope Brake dynamometer and write the equation for finding out power. State each term.
  - d) Describe the procedure for balancing of several masses revolving in same plane by graphical method.
  - e) What are the causes of vibration and its harmful effect on machine ?
  - f) Define linear velocity, angular velocity, absolute velocity and state the relation between linear velocity and angular velocity.
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