Cat. No:Meen 2105

Title: Kinematics of Machinery(2+1)

Marks: 50

Time : 2 hours

I. Fill in the blanks: (10 x 1=10)

1. In kinematic chain ternary joint is equivalent to -----------

2. Instantaneous centre of a slider in a linear guide lies at ----------

3. Friction is independent of ----------- between two surfaces.

4. In case of flat pivot bearing, the rubbing velocity is maximum at ----------

5. When the axis of the first and last gear are coaxial, the gear train is known as ----------

6. The function of a governor is to regulate ----------- of an engine.

7. For V belt, the included angle is usually ----------

8. The locus of a point on the circumference of a circle, which rolls without slipping on a fixed straight line, is known as ----------

9. Sensitiveness of a governor is defined as the ratio of ----------

10. The point on the cam pitch curve having maximum pressure angle, is called -----------

II. Write short notes/answers on ANY FIVE: (5x 2=10)

1. State the difference between mechanism and structure.

2. Write down the Grashof's Law for a four bar mechanism.

3. What is instantaneous centre of rotation? How do you know the number of instantaneous center in a mechanism.

4. Write short note on anti friction bearings.

5. What is meant by a self-locking brake?

6. What are the relative advantages of chain drives?

7. Define the terms a) sensitiveness and b) hunting in connection with governor.

III Write answers on ANY FIVE: (5 x 4=20)

1. Sketch and explain crank and slotted lever mechanism.

2. State and prove Kennedy's theorem of Instantaneous centers.

3. Make a sketch of cone clutch and describe its working.

4. Deduce an expression for the ratio of tight and slack side tensions in case of flat belt drive.

5. What is the difference between a simple gear train and a compound gear train? Explain with neat sketch.

6. With neat sketch explain the working of porter governor.

7. Explain the procedure for balancing several masses rotating in different planes.

IV. Write essay on any ONE

1. In a four link mechanism, the crank AB rotates at 36 rad/s. The lengths of the links are AB= 200 mm, BC=400 mm, CD=450 mm and AD=600 mm. AD is the fixed link. At the instant when AB is at right angles to AD, determine the velocity of

   a) The mid point of link BC

   b) A point on the link CD,100 mm from pin connecting the links CD and AD.

2. A cam with 40 mm as minimum diameter is rotating clockwise at a uniform speed of 900 rpm and has to give the following motion to a roller-follower 10mm diameter.

   i) Follower to Complete outward stroke of 30mm during 90° of cam rotation with equal uniform acceleration and retardation.

   ii) Follower to dwell for 60° of cam rotation.

   iii) Follower to return to its initial position during 120° of cam rotation with equal uniform acceleration and retardation.

   iv) Follower to dwell for the remaining 90° of the cam rotation.

Draw the profile of the cam if the axis of the roller-follower passes through the axis of the cam.

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