Question Bank for Unit Test-1 (K Scheme)

Name of subject- THEORY OF MACHINE (313313)   **Course- ME4K**

Chapter 1- Fundamentals and Types of mechanisms

Questions for2 marks

1) Define a) Higher pair b)Lower pair with one example

2) Define : a) Kinematic link (b) Kinematic chain(c) Kinematic pair with example

3) State the types of constrained motion. Draw the sketch of any one

4) Define the following with example (i)Mechanism (ii) Machine (iii) Inversion

5) Define sliding pair and turning pair with example

6) List any four inversions of single slider crank chain mechanism

7) Define completely constrained motion and successfully constrained motion

Questions for 4 marks

1) Explain crank and slotted lever mechanism with neat sketch

2) State the inversions of four bar chain mechanism and explain any one with neat sketch

3) Give the classification of kinematic pairs. Explain any one

4) Explain with neat sketch working of beam engine

5) Explain with neat sketch working of Scotch Yoke mechanism

6) Explain the working of Whitworth Quick Return mechanism

7)Draw a neat sketch of Oldham's coupling and explain it.

Chapter 2- Velocity and acceleration in mechanisms

 (1)Define the following terms- (i) Linear velocity (ii) Angular velocity

(2) Define the following terms- (i) Absolute velocity (ii) Relative velocity

(3) Define the following terms- (i) Angular velocity (ii) Angular acceleration

 (4)State the inter-relation between linear velocity and angular velocity

 (5) Name the four motions by which follower moves, during its applications

Questions for 4 marks

(1)In reciprocating engine the crank is 250mm long and connecting rod is 1000mm long. The crank rotates at 150rpm. Find velocity and acceleration of piston and angular velocity and angular acceleration of connecting rod when the crank makes an angle of 300to IDC. Use Relative velocity and acceleration method.

(2)The crank and connecting rod of a steam engine are 0.5m and 2m long respectively. The crank makes 180rpm in clockwise direction. When it has turned through 45degree from IDC , Find the velocity of piston and angular velocity of connecting rod by relative velocity method

(3) In a four bar chain ABCD link AD is fixed and is 200mm long. The crank AB is 60mm long and rotates at 120 rpm clockwise while the CD 100mm long oscillates about D. BC and AD are of equal length. Find the angular velocity of link CD, when angle BAD = 60^0

(4)In a slider crank mechanism, the crank rotates uniformly, at 800 rpm in clockwise. The length of connecting   rod are 600 mm and crank of 300 mm. Find the velocity and acceleration of the connecting rod, if the crank has turned through 45° from IDC. (Note : use analytical method)

(5)The crank of a slider crank mechanism rotates clockwise at a constant speed of 300 rpm. The crank is 150 mm and the connecting rod is 600 mm long. Determine linear velocity and acceleration of the midpoint of the connecting rod at a crank angle of 45° from inner dead centre position. Use graphical method

(6) In the engine mechanism, crank OB = 50 mm, length of connecting rod = 225 mm. The centre of gravity of the rod is at 'G' which is 75 mm from 'B'. The speed is 200 rpm, and the crank OB is rotated at 45° from 'OA'. Find out the velocity of point 'G' and angular velocity of AB by relative velocity method.

Chapter 3- Cams and Followers

Questions for 2 marks

1) Define the following terms with one example i) Pitch Circle ii) Pressure Angle iii) Lift of follower

2) State the advantages of roller follower over knife edge follower

3) Give classification of followers and explain any one

4) Draw the schematics of the following :

(i) Cam with knife edge follower (ii) Cam with roller follower

(iii) Cam with flat faced follower (iv)   Cam with spherical faced follower

5) List any four types of followers

6) State the applications of roller follower and flat faced follower.

7) State the reason of using roller follower over knife   edge follower.

8) Define base circle and pressure angle.

9) Name the four motions by which follower moves, during its applications

Questions for 4 marks

(1)Draw displacement diagram for a follower subjected to SHM during rise and uniform acceleration and retardation during return with following details:

Stroke length=60mm,Angle of rise=150^0,Angle of return=120^0,Angle of dwell after return=90^0

(2)Draw displacement diagram for a follower subjected to uniform velocity during rise and SHM during return with following details:

Stroke length=70mm, Angle of rise=90^0, ,Angle of return=120^0 , Angle of dwell after return=150^0

 (3)Draw the profile of cam to give uniform velocity motion during outstroke of 40mm to a roller follower of diameter 20mm during the first half of cam rotation. The return of the cam takes place with SHM during remaining half of cam rotation. Draw the displacement diagram

(4) Draw the profile of cam to raise a valve with SHM through 45mm in 1/4thof revolution, keep it fully raised through 1/10th revolution and to lower it with uniform acceleration and retardation in 1/6th revolution. The minimum radius of cam is 40mm.The axis of valve passes through axis of the cam shaft. Consider knife edge follower.

(5)Draw the profile of a cam operating a roller reciprocating follower having a lift of 40mm. The roller diameter is 20mm. The minimum radius of cam is 30mm. The cam raises the follower with SHM for 110 degree of its rotation followed by a period of dwell for 80 degree. The follower descend for next 120 degree rotations of cam follower with uniform velocity followed by dwell period.

(6)A cam is to be designed for a knife edge follower with the following data : Minimum radius of cam = 50 mm ,Stroke of the follower = 30 mm, Outstroke 90° with uniform velocity. Dwell for next 60° of cam rotation. Follower returns to original position during 90° of cam rotation with uniform velocity. The axis of follower passes along with axis of cam & cam rotates in clockwise direction. Dwell for remaining 120° of cam rotation. Draw profile of a cam

(7)A cam is to give the following motion to a knife edge follower : (i) Outstroke during 60° of cam rotation with SHM. (ii) Dwell for next 30° of cam rotation. (iii) Return stroke during next 60° of cam rotation with uniform velocity. (iv) Dwell for the remaining 210° of cam rotation. The stroke of the follower is 40 mm and the minimum radius of the cam is 50 mm. Draw the profile of cam when the axis of the follower passes through the axis of the camshaft

(8)A cam operates a roller follower, axis passing through the axis of cam. The specifications are Minimum radius of cam = 25 mm Lift of follower = 30 mm Diameter of roller = 15 mm Angle of lift = 120^0 with SHM Outer dwell angle = 30^0 Angle of return = 150^0 with uniform acceleration and retardation. Draw the cam profile