

Code: 15A03402

R15

B.Tech II Year II Semester (R15) Regular Examinations May/June 2017

KINEMATICS OF MACHINES

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

PART - A

(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- (a) Define degrees of freedom.
 - (b) Distinguish between lower pair and higher pair.
 - (c) What are the uses of a pantograph?
 - (d) What is the condition of correct steering?
 - (e) Define instantaneous centre of rotation.
 - (f) What is coriolis acceleration?
 - (g) Write the condition to avoid minimum number of teeth to avoid interference between gears.
 - (h) Differentiate between simple and compound gear trains.
 - (i) List out the types of cams.
 - (j) State three centers in-line theorem.

PART - B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

- 2 What do you mean by inversion of a mechanism? Explain with sketches all the inversions of single slider crank mechanism. Where these inversions are used?

OR

- 3 With a neat sketch, explain the working of Scott – Russell mechanism and modified Scott-Russel mechanism.

UNIT - II

- 4 Describe with a neat sketch the working of Davis steering gear mechanism. Also prove that for Davis steering gear $\tan \alpha = \frac{W}{2L}$.

OR

- 5 Determine the maximum power that can be transmitted using a belt of 100 mm x 10 mm with an angle of lap of 160°. The density of belt is 10^{-3} gm/mm^3 and coefficient of friction may be taken as 0.25. The tension in the belt should not exceed 1.5 N/mm².

UNIT - III

- 6 In a four bar chain ABCD, AD is fixed and is 15 cm long. The crank AB is 4 cm long and rotates at 120 rpm clockwise, while the link CD (= 8 cm) oscillates about D. BC and AD all of equal length. Find the angular velocity of link CD when angle BAD = 60°.

OR

- 7 A link AB of a four bar linkage ABCD revolves uniformly at 120 rpm in a clockwise direction. Find the angular acceleration of links BC and CD and acceleration of point E in link BC. Given : AB = 7.5 cm, BC = 17.5 cm, EC = 5 cm, CD = 15 cm; DA = 10 cm and (BAD = 90°).

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R15**UNIT - IV**

- 8 A pair of spur gear with involute teeth is to give a gear ratio of 4:1. The arc of approach is not to be less than the circular pitch and the smaller wheel is the driver: The angle of pressure is $14\frac{1}{2}$ degrees.

(i) What is the least number of teeth that can be used on each wheel?

OR

- 9 What is the function of a differential gear in an automobile? Explain its working with a neat sketch.

UNIT - V

- 10 Differentiate between:

- (a) Cam angle and pressure angle.
- (b) Period of ascent and period of decent.

OR

- 11 Draw the profile of a cam operating a knife-edge follower (when the axis of the follower passes through the axis of cam shaft) from the following data:

- (a) Follower to move outward through 30 mm with simple harmonic motion during 120° of cam rotation.
- (b) Follower to dwell for the next 60° .
- (c) Follower to return to its original position with uniform velocity during 90° of cam rotation.
- (d) Follower to dwell for the rest of the cam rotation.

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