Code: 13A03401

R13

B.Tech II Year II Semester (R13) Regular Examinations May/June 2015

KINEMATICS OF MACHINERY

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Differentiate: (i) Lower and higher pairs. (ii) Turning and Lower pairs.

(b) What do you mean by a degree of freedom of a kinematic pair?

(c) Define pressure angle of a cam mechanism and state the ideal value of the pressure angle.

(d) What is an epicyclic gear train?

(e) What is the use of a differential in automobile?

(f) What is the difference between sliding friction and rolling friction?

(g) What are the advantages of V-belt drives when compared to flat belt drives?

(h) List the types of cams and followers.

(i) What is coriolis component of acceleration?

(j) Explain the applications of Hooke's joint.

PART – B

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

UNIT – I

2 (a) Explain the classification of kinematic pairs with the help of examples.

(b) Explain the inversion of double slider crank mechanism which is used in elliptical trammel.

(OR)

3 Explain:

(a) Tchebicheff mechanism.

(b) Robert mechanism.

UNIT – II

4 (a) How can you select the belt drives? Explain types of belt drives.

(b) Explain classification of chains.

(OR)

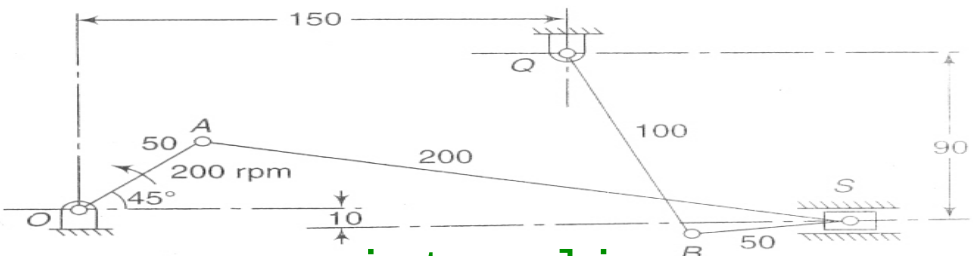
5 What are the types of Steering gears? Explain them with neat sketches.

UNIT – III

6 A Hooke's joint connects two shafts whose axes intersect at 18^0. The driving shaft rotates at a uniform speed of 210 rpm. The driven shaft with attached masses has a mass of 60kg and the radius of gyration of 120 mm. determine: (i) The torque required at the driving shaft if a steady torque of 180 N.m resists rotation of the driven shaft and the angle of rotation is 45^0. (ii) The angle between the shafts at which the total fluctuation of speed of the driven shaft is limited at 18 rpm.

(OR)

7 Figure shows given below a mechanism in which O and Q are the fixed centers. Determine the acceleration of the slider S and the angular acceleration of the link BQ for the given configuration.



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UNIT – IV

8 In an epicyclical gear train and annular wheel A having 54 teeth mesh with a wheel B which gears with a sun wheel C, the wheels A and C being coaxial. The wheel B is carried on a pin fixed on one end of arm P which rotates about the axis of the wheels A and C. if the wheel A makes 20 r.p.m in a clockwise sense and the arm rotates at 100 r.p.m in the anticlock direction and the wheel C has 24teeth, determine r.p.m and sense of rotation of C.

(OR)

9 What are the various types of gear trains? Explain them with neat sketch.

UNIT – V

10 A disc cam used for moving a knife edge follower with SHM during lift and uniform acceleration and retardation motion during return. Cam rotates at 300 r.p.m clockwise direction. The line of motion of the follower has an offset 10 mm to the right angle of cam shaft axis. The minimum radius of the cam is 30 mm. The lift of the follower is 40 mm. The cam rotation angles are: rise 60^0, dwell 90^0, return 120^0 and remaining angle for dwell. Draw the cam profile and determine the maximum velocity and acceleration during the lift and return.

(OR)

11 Draw the profile of a cam operating a roller reciprocating follower and with the following data:

Minimum radius of a cam = 25 mm

Lift = 30 mm

Roller diameter = 15 mm

The cam lifts the follower for 120^0 with SHM followed by a dwell period of 30^0. Then the follower lowers down during 150^0 of the cam rotation at a uniform speed of 150 r.p.m, calculate the maximum velocity and acceleration of the follower during the descent period.

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