Code: R7220302

R7

B.Tech II Year II Semester (R07) Supplementary Examinations, April/May 2013

KINEMATICS OF MACHINERY

(Mechanical Engineering)

Time: 3 hours Max Marks: 80

Answer any FIVE questions

All questions carry equal marks

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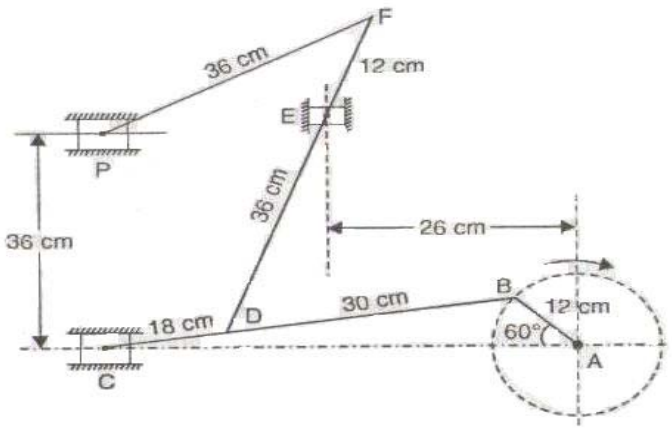
1 (a) Explain the difference between the mechanism and structure.

(b) In a crank and slotted lever quick return motion mechanism, the distance between the fixed centres is 120 mm and the length of the driving crank is 60 mm. Find the inclination of the slotted bar with the vertical in the extreme position and the time ratio of cutting stroke to the return stroke. If the length of the slotted bar is 225 mm, find the length of the stroke if the line of stroke passes through the extreme positions of the free end of the lever.

2 (a) Name the different mechanisms which are used for approximate straight line motion.

(b) Describe the Watt's parallel mechanism for straight line motion and derive the condition under which the straight line is traced.

3 In a steam engine mechanism, shown in figure, the crank AB rotates at 200 r.p.m the dimension of the various links are : AB = 12 cm, BC = 48 cm, CD =18 cm DE = 36 cm and EF = 12 cm and FP = 36 cm, Find the velocities of C, D, E, F and P.



Contd. in Page 2

Code: R7220302

R7

4 (a) A Hooke's joint connects two shafts which are having 160^0 as the included angle. The driving shaft rotates uniformly at 1500 r.p.m find the maximum angular acceleration of the driven shaft and the maximum torque required if the driven shaft carries a flywheel of mass 12 kg and 100 mm radius of gyration.

(b) Sketch the Davis gear and show that it satisfies the condition for correct steering. Also, explain why Ackermann steering gear is preferred to Davis gear in actual practice.

5 (a) Define and explain the terms:

(i) Cam profile. (ii) Base circle. (iii) Prime circle.
(iv) Pitch curve. (v) Lift and period of dwell

(b) Draw the displacement, velocity and acceleration diagrams for a follower when it moves with S.H.M. Derive the expression for velocity and acceleration during outstroke and return stroke of the follower.

6 (a) Explain the terms: (i) Module. (ii) Addendum.

(b) Two mating in volute spur gears with module pitch of 5 mm have 20 and 40 teeth of 20^0 pressure angle and 5 mm addendum. Determine the maximum velocity sliding and the angle turned through by pinion, when one pair of teeth is in mesh and pitch line speed is 1.2 m/s.

7 (a) Obtain an expression for the length of a belt in an open belt drive

(b) An engine shaft running at 120 r.p.m is required to drive a machine shaft by means of a belt. The pulley on the engine shaft is of 2 m diameter and that of the machine shaft is 1 m diameter. If the belt thickness is 5 mm. Determine the speed of the machine shaft, when (i) There is no slip and (ii) There is a slip of 3%.

8 (a) Explain the procedure of obtaining the velocity ratio of epicyclic gear train by tabular method.

(b) Two parallel shafts are to be connected by spur gearing. The approximate distance between the shafts is 600 mm. If one shaft runs at 120 r.p.m and the other at 360 r.p.m find the number of teeth on each wheel, if the module is 8 mm. Also determine the exact distance apart of the shafts.

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