

Code: 9A03401

R09

B.Tech II Year II Semester (R09) Supplementary Examinations December/January 2015/2016

KINEMATICS OF MACHINERY

(Mechanical Engineering)

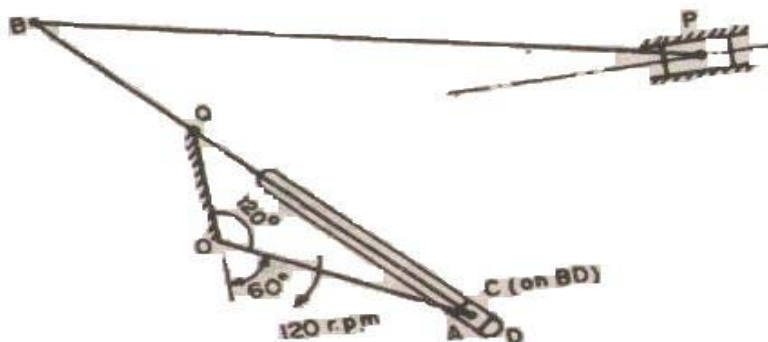
Time: 3 hours

Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

- 1 (a) Sketch and explain any two inversions of a double slider crank chain.
(b) In a crank and slotted lever quick return motion mechanism, the distance between the fixed centre's O and C is 200 mm. The driving crank CP is 75 mm long. The pin Q on the slotted lever, 360 mm from the fulcrum O, is connected by a link QR 100 mm long, to a pin R on the ram. The line of stroke of R is perpendicular to OC and intersects OC produced at a point 150 mm from C. Determine the ratio of times taken on the cutting and return strokes.
- 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 Whitworth quick return motion mechanism, as shown in fig. the various dimensions are given as: OQ = 100 mm, OA = 200 mm, BQ = 150 mm, BP = 500 mm find the velocity of block P and the angular velocity of link BQ.



- 4 (a) Sketch the Davis gear and show that it satisfies the condition for correct steering. What are the difference between Ackermann steering gear and Davis gear?
(b) Determine the maximum permissible angle between the shaft axes of a universal joint if the driving shaft rotates at 800 rpm and the total fluctuation of speed does not exceed 60 rpm. Also find the maximum and the minimum speeds of the driven shaft.
- 5 A Draw the profile of a cam which raises a valve with S.H.M through 3 cm in $1/3$ of revolution, keep it fully raised through $1/12$ revolution and it is closed in next $1/3$ revolution with S.H.M the valve remains closed during the rest of the revolution. The diameter of the roller is 1 cm and minimum radius of the cam is to be 2 cm. the axis of the valve rod is offset by 1.0 cm from the axis of cam shaft.
- 6 (a) Define the term 'Length of arc of contact' and prove that it is equal to length of path of contact divided by cosine of the pressure angle.
(b) Two mating involute spur gears with module pitch of 10 mm have 20 teeth (on pinion) and 40 teeth (on gear wheel) of 20° pressure angle. The addendum is equal to one module. Does the interference occur?
- 7 A cross-belt drive is to transmit at 7.5 kW at 1000 r.p.m of the smaller pulley. The diameter of the smallest pulley is 25 cm and velocity ratio is 2. The centre distance between the pulleys is 125 cm. A flat belt of thickness 6 mm and of coefficient friction is 0.3 is used over the pulleys. Determine the necessary width of the belt if the maximum allowable stress in the belt is 175 N/cm^2 and density of the belt is 1 gm/cm^3 .
- 8 Two parallel shafts are connected with the help of two gears one gear on each shaft. The number of teeth on one gear is 40 and speed of the shaft is 500 r.p.m. if the speed ratio is 2.5 and circular pitch of the gears is 24 mm, and then find:
(a) Number of teeth and speed of other shaft.
(b) Centre distance between the two shafts.