4E4140

Roll No. _____ Total No of Pages: 4

4E4140

B. Tech. IV Sem. (Main/Back) Exam., June/July-2014

Mechanical Engg.

4ME1A Kinematics of Machines

Common with AE

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No.205)

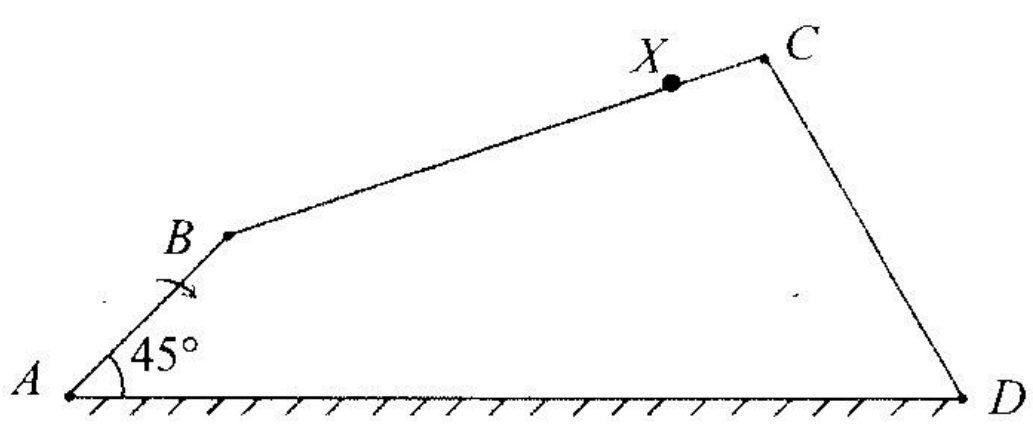
1._____ 2._____

UNIT-I

Q.1. (a) Present a classification of kinematic pairs. [4]

(b) Draw and describe Oldham coupling. [4]

(c) Determine velocity of point 'x' on following four bar chain, when crank AB rotates at 600 rpm clockwise. [8]



$AB = 4cm$

$BC = 7cm$

$CD = 5cm$

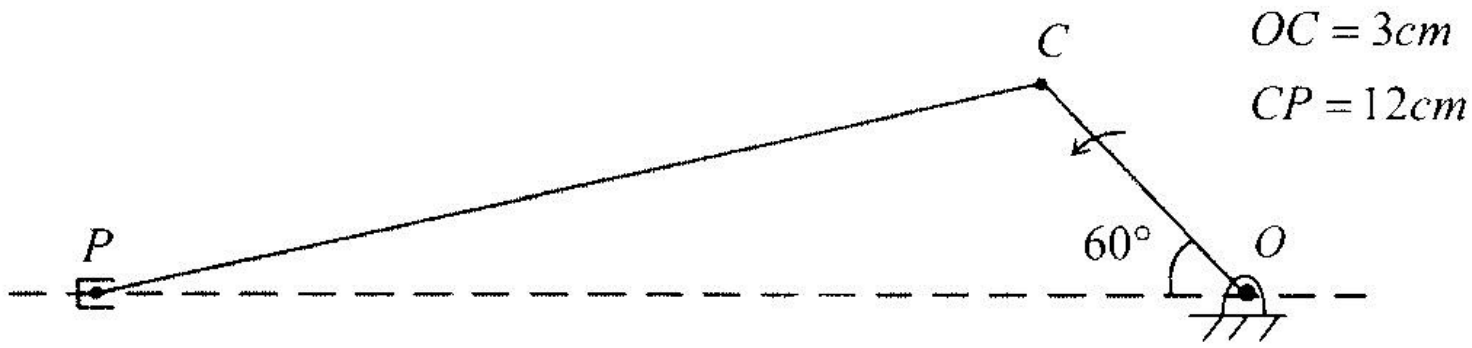
$DA = 12cm$

$CX = 2cm$

OR

Q.1. (a) Derive an expression for coriolis acceleration and explain its direction. [8]

(b) Locate Instantaneous centers and determine velocity of slider for following arrangement. Crank OC rotates at 300 rpm anticlockwise. [8]



UNIT-II

Q.2. (a) With help of a neat sketch, explain working principle of Scott Russel mechanism. [8]

(b) Describe Hooke's joint and derive an expression for angular velocity ratio of driver and driven shaft. [8]

OR

Q.2. (a) What is condition for correct steering? Discuss Ackerman steering mechanism with help of a neat sketch. [8]

(b) Derive an expression for time period of Trifler Suspension. [8]

UNIT III

Q.3. (a) A thrust bearing has contact surface 200 mm external diameter and 150 mm internal diameter. The coefficient of friction is 0.08, the total axial load is 3000 N and maximum uniform intensity of pressure is $0.35 N/mm^2$. Calculate the number of collars required and the power lost in friction at 420 rpm. [8]

(b) Derive an expression for moving a body up on inclined plane. [8]

OR

Q.3 (a) A flat belt of 200×12 mm^2 cross section runs between two pulleys. The allowance strength of belt material is 2.5 N/mm^2 Determine the maximum power that can be transmitted by it if the ratio of tension is 2 and the density of the material of the belt is 1000 kg/m^3. [8]

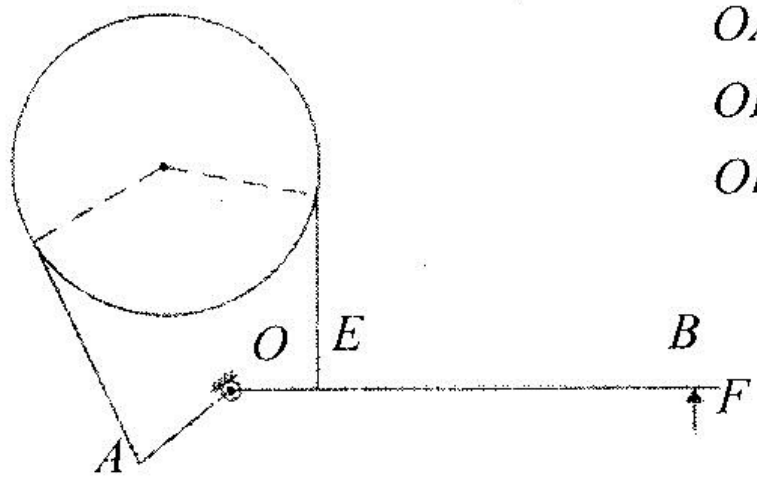
(b) What is the effect of centrifugal tension on power transmission capacity of a belt? [4]

(c) Discuss chordal action in a chain drive. [4]

UNIT-IV

Q.4. (a) Derive a formula for ratio of tensions $\left(Tn/To\right)$ in a Band and Block brake. (8)

(b) A band brake as shown is figure has an angle of contact 225° and is required to sustain a torque of 350 N-m. The diameter of drum is 350 mm and coefficient of friction is 0.3. Determine the effort F. For what value of OE the brake is self locking. [8]

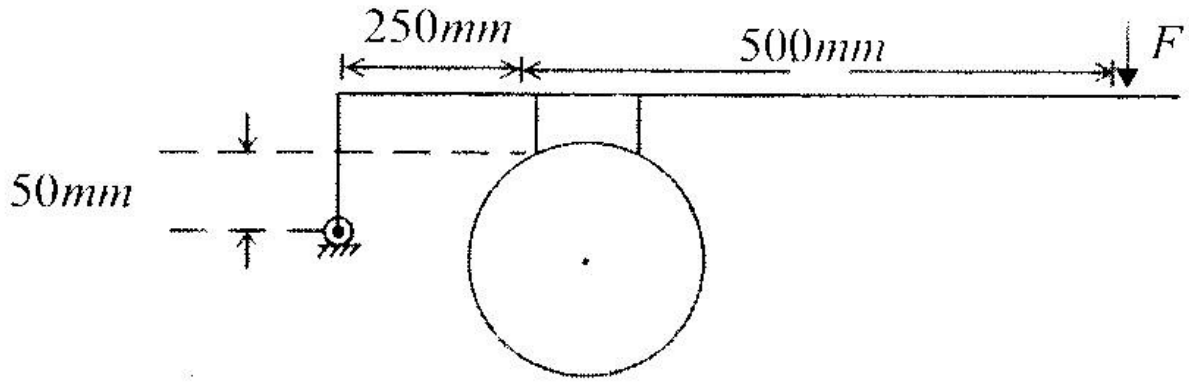


OR

Q.4. (a) Draw and describe belt transmission dynamometer. [8]

(b) For a block as shown in figure, the diameter of brake drum is 400 mm and angle of contact is 40°. The applied effort F is 2 KN and coefficient of friction is 0.35. Determine braking torque when drum is rotating.

(i) clockwise and (ii) anticlockwise [8]



UNIT-V

Q.5. (a) Describe pressure angle of a cam. Discuss its importance in cam design. [4]

(b) A cam drives a knife edge follower. During first 90° of rotation the follower moves outward through a distance 30 mm with SHM. The follower dwells for next 90° of rotation. During next 90° the follower moves inward with SHM and then dwells for remaining 90° of cam rotation. Draw cam profile, if base circle radius is 30 mm. [12]

OR

Q.5. Draw profile of a cam driving a roller follower. For first 120° of cam rotation follower moves upward through a distance of 40 mm with uniform acceleration and then dwells for next 120°. In the last part of cam rotation follower returns to initial position with SHM. Give that base circle radius is 40 mm, draw the cam profile. [16]
