Uva Wellassa University, Sri Lanka
End Semester Examination – August 2011
SCT 366-2 Mechanics of Machines - Repeat

Time: Two (02) Hours

Total 04 Questions
Answer **all** questions

1. The mechanism of a wrapping machine, as shown in FigQ01, has the following dimensions O_1A = 100 mm; AC = 700 mm; BC = 200 mm; O_3C = 200 mm; O_2E = 400 mm; O_2D = 200 mm and BD = 150 mm.

   The crank O_1A rotates at a uniform speed of 100 rad/s.

   a. Locate all instantaneous centers for the mechanism shown in FigQ01.

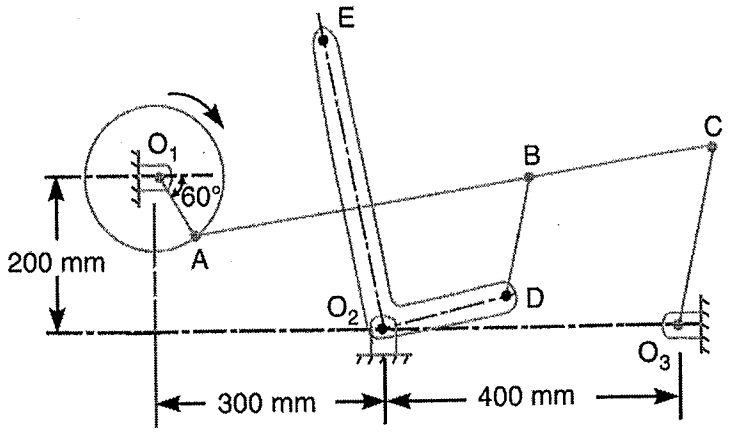
   (50 marks)

   b. Derive expression for velocity of the point B of the bell crank lever using instantaneous center method.

   (25 marks)

   c. Derive expression for velocity of the point E of the bell crank lever using instantaneous center method.

   (25 marks)



FigQ01

2. The mechanism, as shown in FigQ02, has the dimensions of various links as follows:

AB = DE = 150 mm ; BC = CD = 450 mm ; EF = 375 mm.

The crank AB makes an angle of 45° with the horizontal line and rotates about A in the clockwise direction at a uniform speed of 120 r.p.m. The lever DC oscillates about the fixed point D, which is connected to AB by the coupler BC.

The block F moves in the horizontal guides, being driven by the link EF.

a. Draw the velocity diagram

(25 marks)

b. Write expressions for followings.

i. Velocity of the block F,

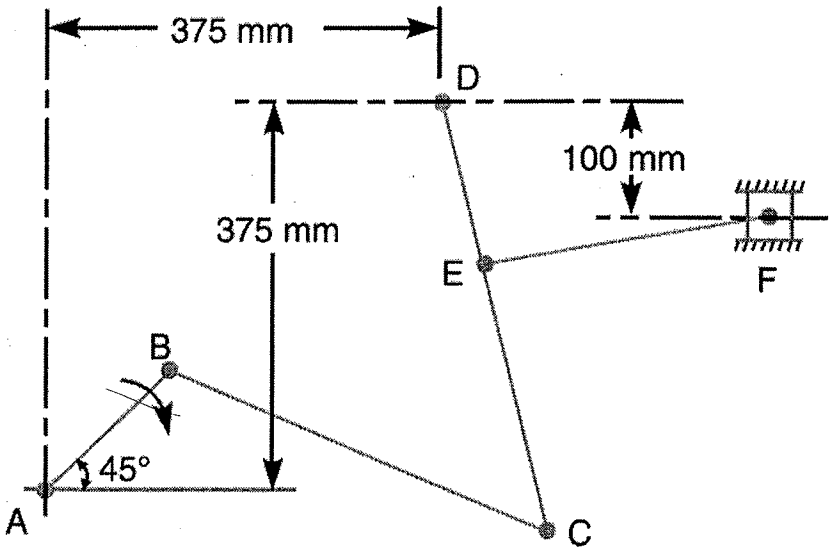
(25 marks)

ii. Angular velocity of DC, and

(25 marks)

iii. Rubbing speed at the pin C which is 50 mm in diameter.

(25 marks)



FigQ02

3. In a mechanism shown in FigQ03, the crank OA is 100 mm long and rotates clockwise about O at 120 r.p.m. The connecting rod AB is 400 mm long.

At a point C on AB and 150 mm away from A, the rod CE with a length 350 mm is attached. This rod CE slides in a slot in a trunnion at D. The end E is connected to a link EF with length 300 mm. Slider F moves in a horizontal line with a vertical offset of 300 mm to the baseline OG.

For the mechanism in the position shown,

a. Draw the velocity diagram

(25 marks)

b. Write expressions for the following

i. Velocity of F,

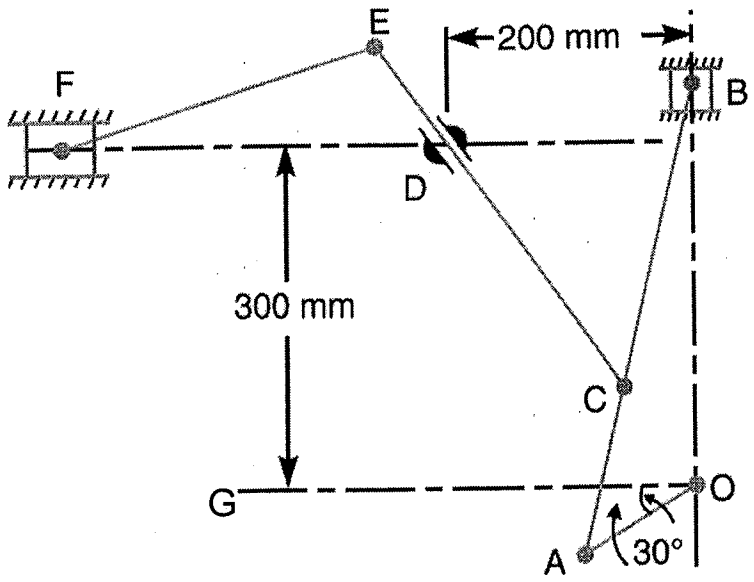
(25 marks)

ii. Velocity of sliding of CE in the trunnion, and

(25 marks)

iii. Angular velocity of CE.

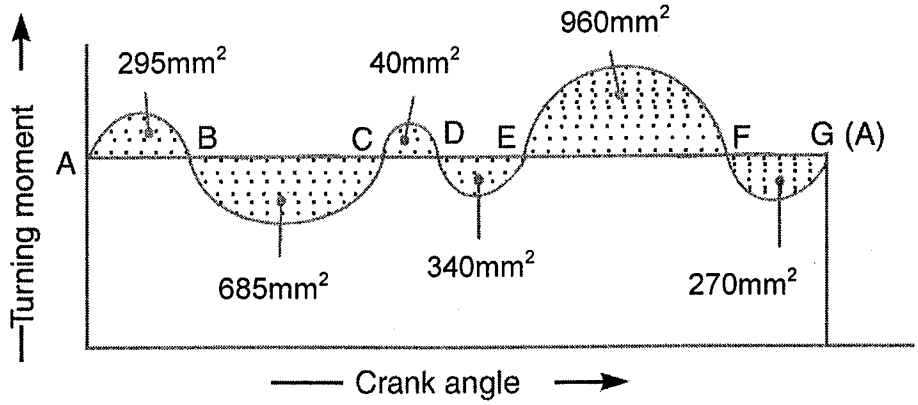
(25 marks)



FigQ03

4. The turning moment diagram for a petrol engine is shown in FigQ04. The turning moment diagram repeats itself at every half revolution of the engine. The areas above and below the mean turning moment line is shown in the FigQ04 below. The rotating parts have a mass of 36 kg and the radius of gyration is 150 mm. Determine the coefficient of fluctuation of speed when the engine runs at 1800r.p.m.

(100 marks)



FigQ04