Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
300 level 1st Semester Examination –Jan. /Feb. 2016
SCT366-2 Mechanics of Machines

Uva Wellassa University

All symbols have their usual meaning, unless defined.
Scientific Calculators are allowed.
Duration:02hour
Number of questions:04
Mark allocation:100 marks

1.

a. State Aronhold Kennedy's theorem. (5 marks)

b. Locate all the instantaneous centres of the slider crank mechanism shown in Figure 01. The lengths of crank OB and connecting rod AB are 100 mm and 400 mm respectively.If the crank rotates clockwise with an angular velocity of 10 rad/s, find,

i. Velocity of the slider A,and
ii. Angular velocity of the connecting rod AB. (20 marks)

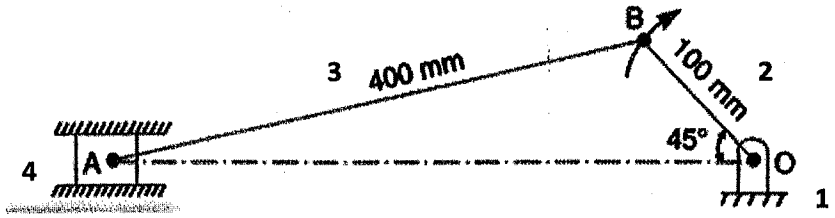

Figure 01

2.

a. Show that the maximum fluctuation of energy of the flywheel, $\Delta E = mR^2\omega^2 C_S$.
(5 marks)

b. The turning moment diagram for a multicylinder engine has been drawn to a scale 1 mm = 600 N-m vertically and 1 mm = 3° horizontally. The intercepted areas between theoutput torque curve and the mean resistance line, taken in order from one end, are as follows : + 52, – 124, + 92, – 140, + 85, – 72 and + 107 mm^2, when the engine is running at a speedof 600 r.p.m. If the total fluctuation of speed is not to exceed ± 1.5% of the mean, find the necessarymass of the flywheel of radius 0.5 m.
(20 marks)

3. In a four bar chain ABCD, AD is fixed and is 150 mm long. The crank AB is 40mm long and rotates at 120 r.p.m. clockwise, while the link CD = 80 mm oscillates about D. BC andAD are of equal length and angle BAD = 60° (Figure 03).

a. Find the velocity of point B on link AB, V_B. (5 marks)

b. Draw velocity diagram using calculated V_B value. (10 marks)

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c. Find the angular velocity of link CD. (10 marks)

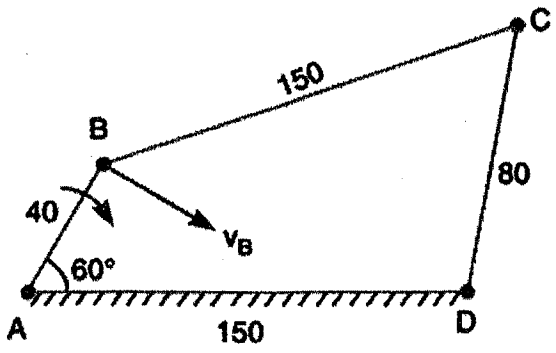

Figure 03

4.

a. Draw and name three types of belt. (6 marks)

b. Give the relation between the tight side tension (T_1) and slack side tension (T_2), in terms of the coefficient of friction (μ) and the angle of contact (θ).

(4 marks)

c. Find the power transmitted by a belt running over a pulley of 600 mm diameter at 200 r.p.m. The coefficient of friction between the belt and the pulley is 0.25, angle of lap160° and maximum tension in the belt is 2500 N.

(15 marks)