UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2012/2013

COURSE NAME	:	KINEMATICS MECHANISMS
COURSE CODE	:	BDC 4043
PROGRAMME	:	BACHELOR OF MECHANICAL ENGINEERING WITH HONOURS
DATE	:	JUNE 2013
DURATION	:	3 HOURS
INSTRUCTIONS	:	ANSWER ALL QUESTIONS

THIS PAPER CONSIST OF FIVE (5) PAGES

Q1 The cam follower can be classified according to the shape, motion or position. Draw the kinematics diagrams of cam followers according to:

(a) the shape of the follower

(5 marks)

(b) the motion of the follower

(3 marks)

(c) the position of the follower

(2 marks)

Q2 A cam is used to lift boxes from lower conveyor to upper conveyor repeatedly. The illustration of the mechanism is shown in **FIGURE Q2**.
The follower sequence in one cycle is the following:

> Rise 5 cm in 1.0s
> Dwell for 0.3s
> Fall 2.5 cm in 0.9s
> Dwell for 0.6s
> Fall 2.5 cm in 0.9s

(a) Calculate the time for a full cycle.

(2 marks)

(b) Calculate the required rotational speed of the cam (in RPM).

(3 marks)

(c) Determine the cam rotation in each interval.

(2 marks)

(d) Plot the displacement diagram of the cam.

(3 marks)

Q3 A simplified kinematics mechanism is shown in **FIGURE Q3**. The link BC is a variable link with point C is a slider join. The link AB is a crank link.

(a) Draw the position of this mechanism when the crank AB rotates 2 seconds from the initial position as shown in **FIGURE Q3**.

(5 marks)

(b) By using graphical method, find the velocity of all moving links. In your illustration you have to indicate clearly the direction of the vectors.

(5 marks)

(c) By using analytical vector method, find the velocity of all moving links.

(10 marks)

(d) By using analytical vector method, find the acceleration of all moving links.

(15 marks)

Q4 A simplified mechanism is shown in **FIGURE Q4.**

(a) By using graphical approach (either instantaneous center of velocity or relative velocity), find the velocity of point B, C and D

(5 marks)

(b) By using graphical approach find the acceleration of point B, C and D

(15 marks)

(c) Do an analytical vector approach to find the acceleration of point D.

(15 marks)

Q5 A mechanism is shown in **FIGURE Q5.** The coordinate data is listed below

	X (mm)	Y (mm)
A	81404	25033
B	44371	39167
C	7902	45598
D	22085	33696
E	57036	4368

Investigate the motion path of point A. You have to draw at least 4 different position of the crank CD.

(10 marks)

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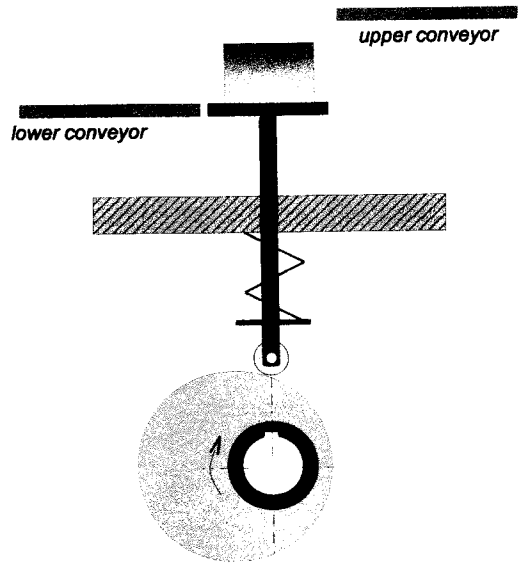

FIGURE Q2

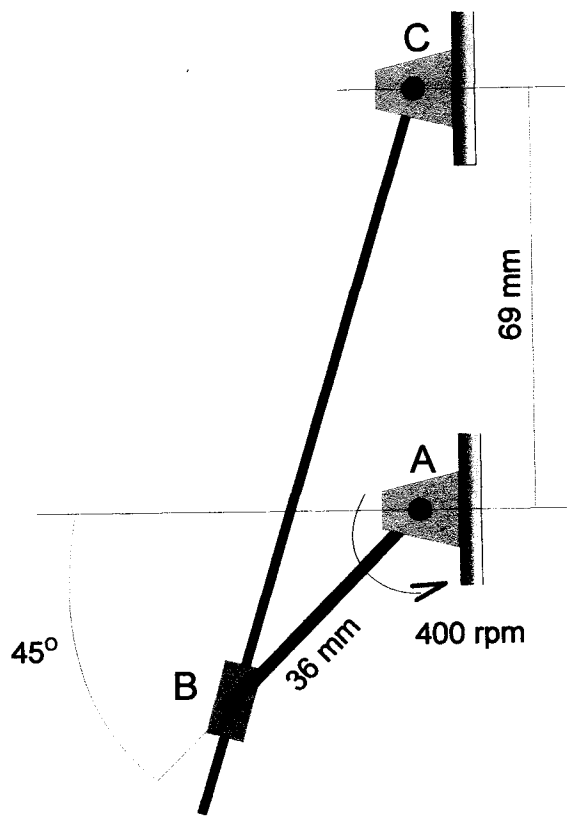

FIGURE Q3

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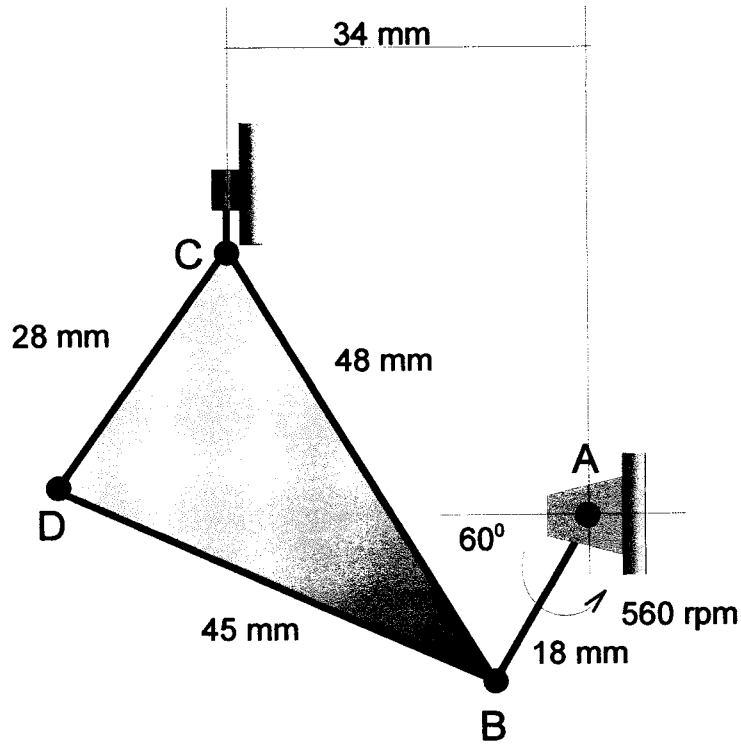

FIGURE Q4

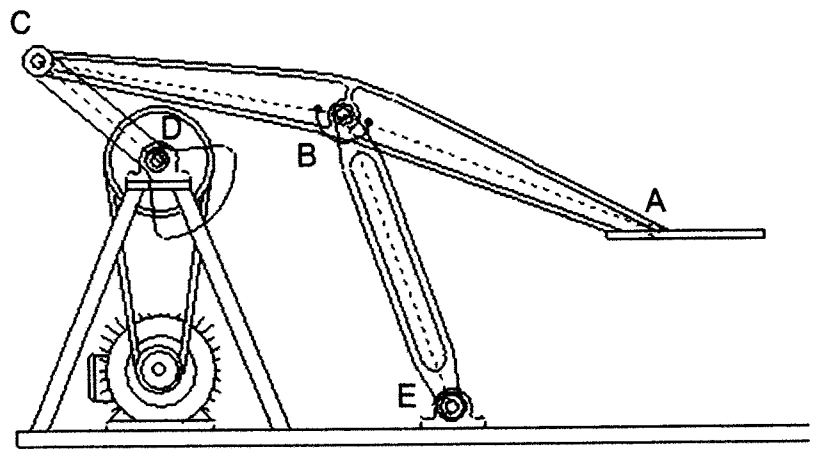

FIGURE Q5

- END OF QUESTIONS -