AMME 1550 DYNAMICS 1
ASSIGNMENT 3

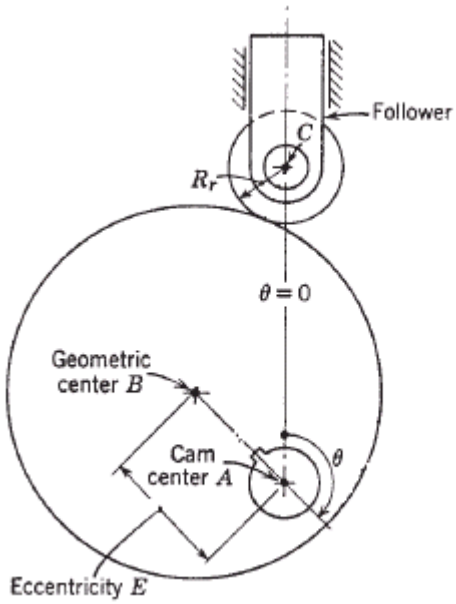
This assignment should take about 10 hours of work to complete.
Sign and attach a plagiarism compliance sheet to the assignment.
Carefully read the assignment submission requirements and make sure you document any assumptions made in modeling the problems.

Question 1.

An eccentric circle cam drives a translating roller follower of radius R_r as shown in Figure below. This circle has an eccentricity of E and a diameter of D and rotates at a constant angular velocity of **180 rpm**.

For a student number # # # # # # a b c

E= (25+a) mm, D = (100+b) mm, R_r = (15+c) mm



Write a spread sheet or a computer program, e.g. Matlab, to tabulate and plot the characteristics of the follower motion for one complete revolution of the cam, starting from its lowest position.

For the tables and plots the angular displacement increments is 5^o.
Values must be within 1% of the true value to be correct.

Question 2.

X = (3000 + a*100) ,
M = (75 + c) Kg
Cd = 0.5 (skydiver) (Area 0.4m^2)
Cd = 1.2 (parachute) (Area 40m^2)

A sky diver, weighing M Kg, jumps from a moving aircraft at X meters above the ground. He/She initially free-falls for a period of seconds then deploys a parachute to to allow him/her to land at a safe speed of under 6 m/s.

The sky diver uses a spread-eagle position during freefall that maximises their drag coefficient , Cd. (Cd based on frontal area of 0.5m^2)

Full parachute deployment takes 5 seconds and during this period the drag coefficient of the parachute can be assumed to vary linearly between 0 and the final value needed for a safe descent speed.

Using whatever numerical techniques appropriate determine a velocity versus time graph of his/her descent. Estimate the amount of free fall time that would be possible that would still allow full deployment of the parachute and a safe landing.

Ignore any initial horizontal velocity of the aircraft and wind or atmospheric turbulence conditions.