Faculty of Engineering and Technology
Department of Mechanical and Mechatronics Engineering
First Examination – Spring 2019

ENME 232: Dynamics

Date of Examination: 2/4/2019

Student ID: _____

Time duration: 90 minutes

Total Marks: 100

This exam contains 7 pages (including this cover page) and 3 problems. Check to see if any pages are missing. Enter your Student ID number on the top of this page, and at the bottom of every page, in case the pages become separated.

You may *not* use your books, notes, equation sheets, or any other reference on this exam. You can use your own calculator only. Borrowing calculators is not allowed.

You are required to show your work on each problem on this exam.

Do not write in the table below.

| Problem	ABET SO	Points	Score
1	(a)	35	
2	(e)	30	
3	(e)	35	
	Total	100	

1) A 3 lb collar C may slide without friction along a horizontal rod. It is attached to three springs, each of constant $k = 24$ lb/ft, and 0.5 ft unstretched length. Knowing that the collar is released from rest in the position shown, determine its speed when spring DC is vertical.
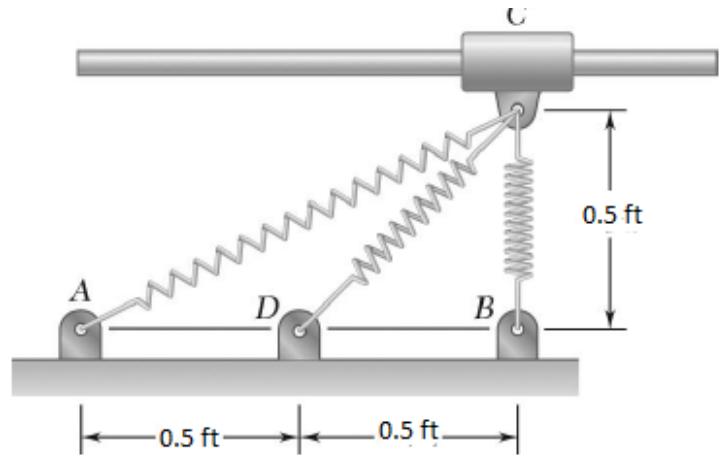
35 marks

2) Block A starts from rest at $t = 0$ and moves downward with a constant acceleration of 3 ft/s^2. Knowing that block B moves up with a constant velocity of 3 ft/s, determine the time when the velocity of block C is zero, and the displacement of the three blocks when this occurs.
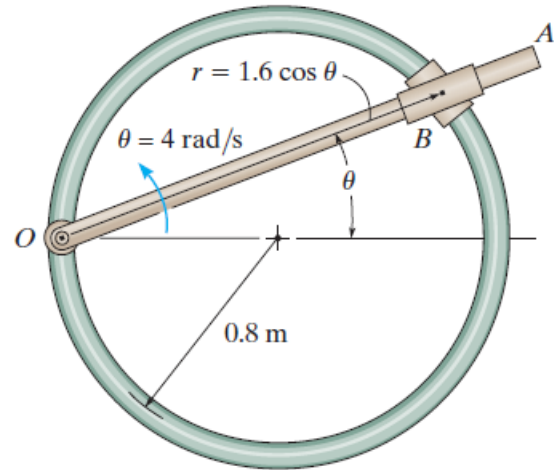
Clearly label your coordinate system(s).
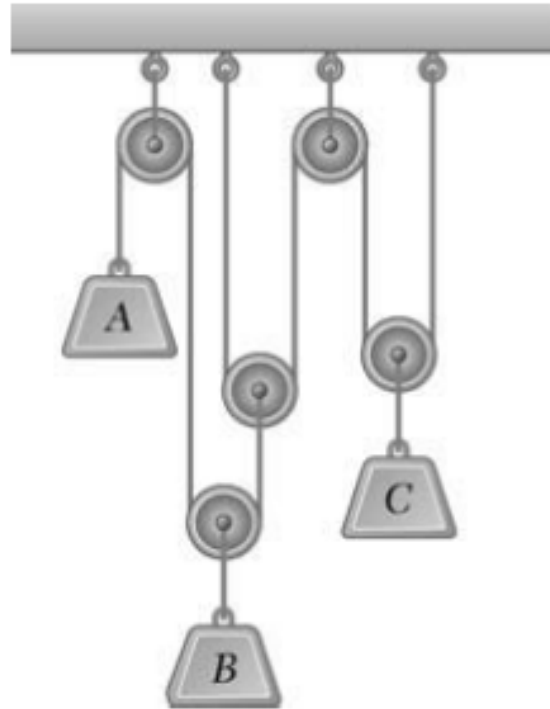
30 marks

3) Rod OA rotates counterclockwise at a constant angular rate $\dot{\theta} = 4\ rad/s$. The double collar B is pin-connected together such that one collar slides over the rotating rod and the other slides over the circular rod described by the equation $r = 1.6\cos\theta\ m$. If both collars have a mass of $0.5\ kg$ together, determine the normal force which the circular rod exerts on one of the collars and the force that OA exerts on the other collar at the instant $\theta = 45^\circ$. Motion is in the horizontal plane.
Draw the necessary free body diagram(s) and clearly label your coordinate system(s).

35 marks