BIRZEIT UNIVERSITY

Faculty of Engineering and Technology
Department of Mechanical and Mechatronics Engineering
Second Examination – Summer 2018

ENME 232: Dynamics

Date of Examination: 5/8/2018

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 to the right.

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

1) The missile at A takes off from rest and rises vertically to B. During this period, its fuel runs out in 8 s. If the acceleration varies with time as shown, determine the missile's height h_B and speed v_B. If by internal controls the missile is then suddenly pointed at 45° as shown, and allowed to travel in free flight, determine the maximum hight attained h_C, and the range R to where it crashes at D.

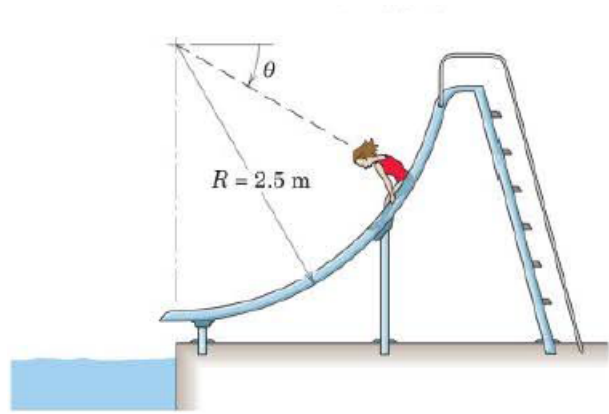Clearly label your coordinate system(s).
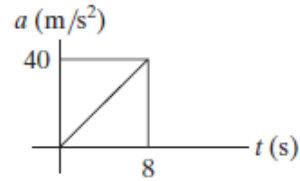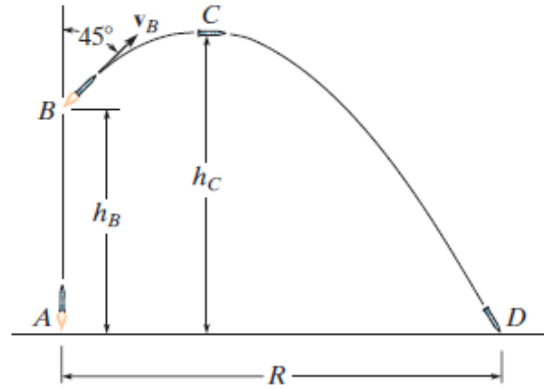
35 marks

2) The 1.2 kg slider is released from rest in position A and slides without friction along the vertical-plane guide shown. Determine the speed v_B of the slider as it passes position B and the maximum deflection of the spring. Draw the necessary free body diagram(s) and clearly label your coordinate system(s).
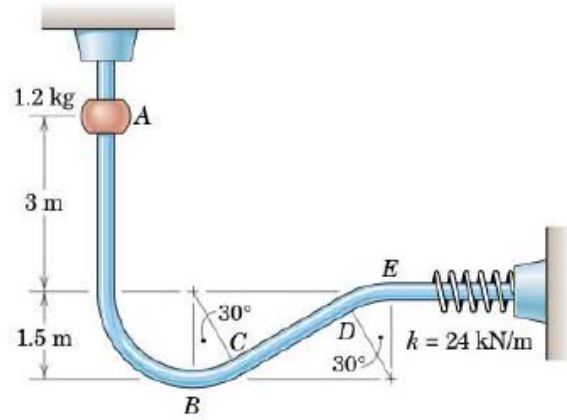
35 marks

3) Beginning from rest when $\theta = 20^{o}$, a 35 kg child slides with negligible friction down the sliding board which is in the shape of a 2.5 m circular arc. Determine the tangential acceleration and the speed of the child, and the normal force exerted on her when $\theta = 30^{o}$ and when $\theta = 90^{o}$.

Draw the necessary free body diagram(s) and clearly label your coordinate system(s).

$R = 2.5\,\mathrm{m}$

35 marks