

# *King Fahd University of Petroleum & Minerals*

## Department of Civil and Environmental Engineering

### CE 201 – Statics

**Semester:** 122  
**Examination:** First Major  
**Date (Day):** February 26, 2013 (Tuesday)  
**Time:** 07:00 – 09:00 p.m.

<b>Section</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>Instructor</b>	Al-Malack	Al-Malack	Schowdhury	Al-Attas	Al-Shayea	Hussein	Arifuzzaman	Al-Attas
<b>Time</b>	07:00	08:00	09:00	09:00	10:00	11:00	13:10	10:00
<b>Tick</b>								

<b>Student's Name</b> :
<b>Student's ID</b> :

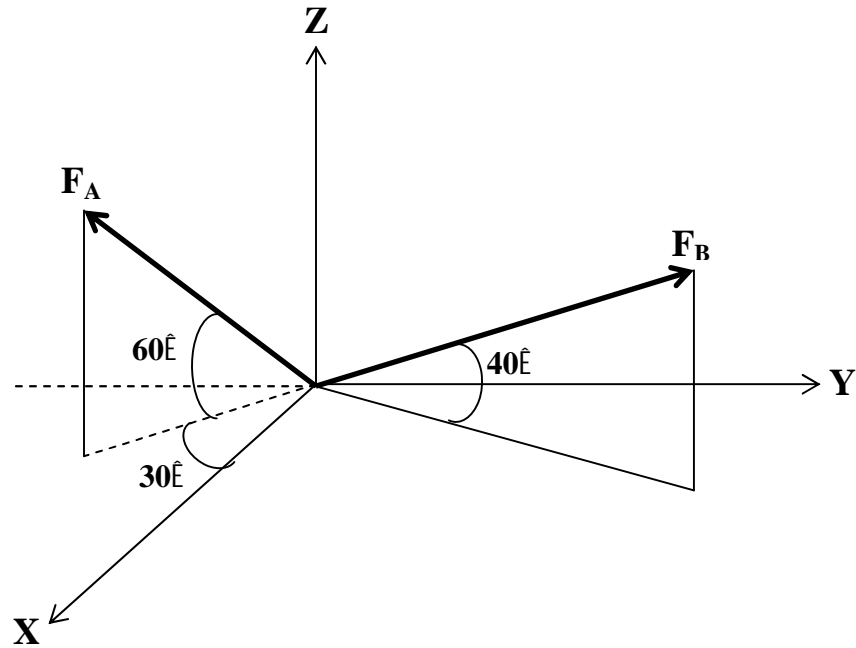
<b>Problem</b>	<b>Assigned Grade</b>	<b>Earned Grade</b>
<b>1</b>	<b>25 (Points)</b>	
<b>2</b>	<b>25 (Points)</b>	
<b>3</b>	<b>25 (Points)</b>	
<b>4</b>	<b>25 (Points)</b>	
<b>Total</b>	<b>100 (Points)</b>	

*Good Luck*

**Problem 1 (20 Points)**

Express forces  $\vec{F}_A$  and  $\vec{F}_B$  in Cartesian vector forms, knowing that:

- Magnitude of  $\vec{F}_A = |F_A| = 120$  N
- $\vec{F}_A + \vec{F}_B = 80\mathbf{i} + 30\mathbf{j} + (?)\mathbf{k}$



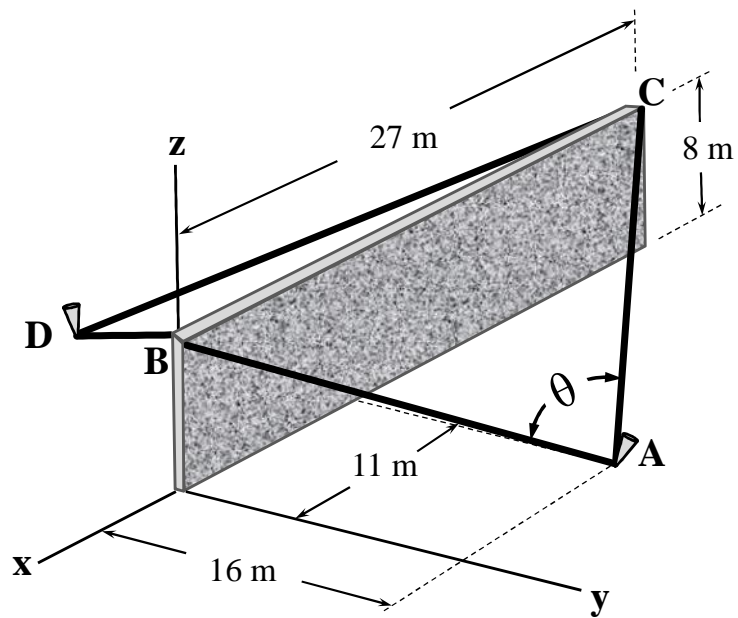


### Problem 2 (25 Points)

A wall section of concrete is temporarily held by the four (4) cables (AB, AC, DB and DC) as shown in the figure below. Knowing that the tension is 840 N in cable AB ( $T_{AB}$ ) and 1200 N in cable AC ( $T_{AC}$ ), determine the following:

(10 Points) (1) The angle between  $T_{AB}$  and  $T_{AC}$  using the **DOT PRODUCT**.

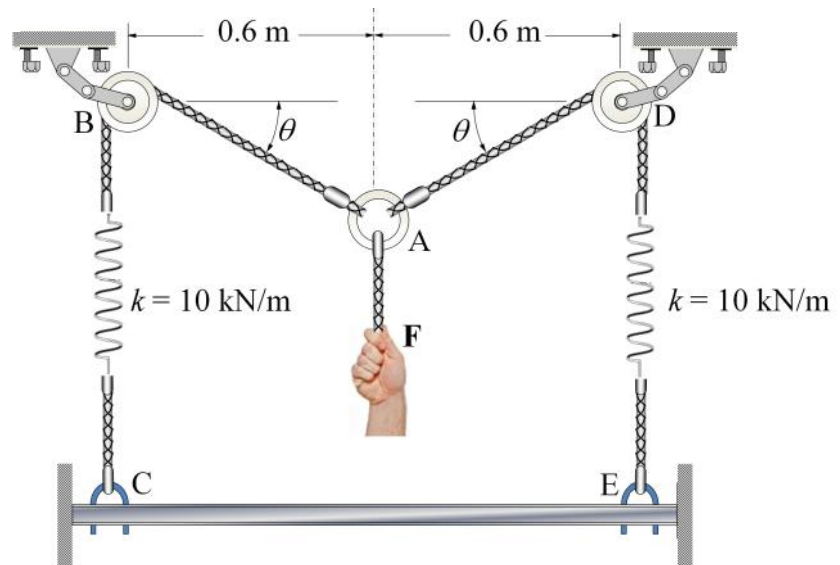
(15 Points) (2) The magnitude of the projection of  $T_{AC}$  along the line BC using the **DOT PRODUCT**.





**Problem 3 (25 Points)**

The springs shown below were originally unstretched when  $\theta = 0$ , and are connected using cables passing through smooth pulleys at B and D. Determine the magnitude of the force  $\mathbf{F}$  that must be applied to maintain **equilibrium** at  $\theta = 25^\circ$ .





**Problem 4 (25 Points)**

The 100-kg box, shown in the figure below, is supported by three cables (OB, OC and OD) and spring OA. Determine the tensions developed in cables OB, OC and OD. The spring OA has an un-stretched length of 0.8 m and a stiffness  $k_{OA} = 1.2 \text{ kN/m}$ . Cable OC lies in the x-z plane and spring OA lies on the y-axis.

