

# *King Fahd University of Petroleum & Minerals*

## **Department of Civil Engineering**

### **CE 201 – Static**

**Semester:** 111  
**Examination:** First Major  
**Date (Day):** October 11, 2011 (Tuesday)  
**Time:** 07:00 – 09:00 p.m.

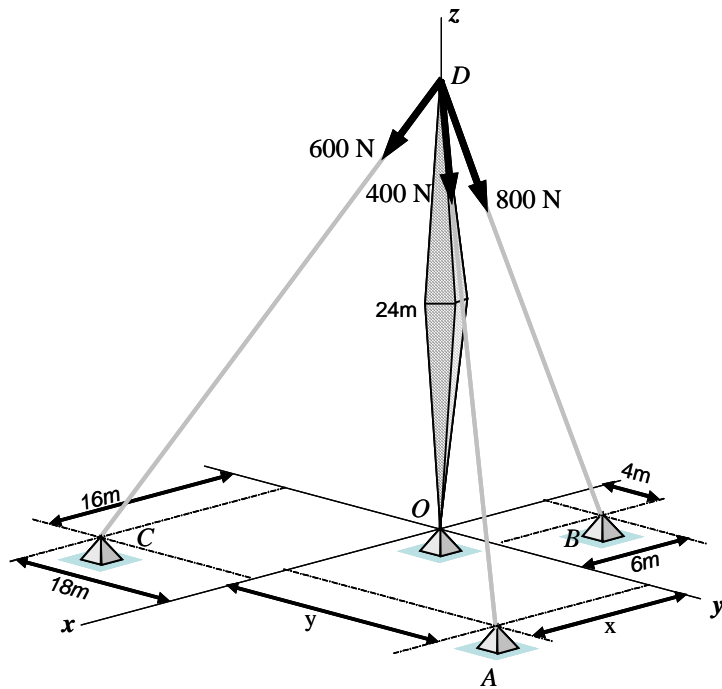
| Section    | 1 & 6               | 2 & 5               | 3       | 4 & 13              | 7         | 8      | 9      | 10       | 11     | 12          |
|------------|---------------------|---------------------|---------|---------------------|-----------|--------|--------|----------|--------|-------------|
| Instructor | Tayyib              | Mandil              | Qahtani | Hussein             | Chowdhary | Qadhib | Amoudi | Shamshad | Malack | Arifulzaman |
| Time       | 07:00<br>&<br>10:00 | 08:00<br>&<br>10:00 | 09:00   | 08:00<br>&<br>07:00 | 10:00     | 11:00  | 11:00  | 13:10    | 07:00  | 09:00       |
| Tick       |                     |                     |         |                     |           |        |        |          |        |             |

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

*Good Luck*

### Problem 1 (25 Points)

The 24-meter tower shown in the figure below is held in place by three cables. The force of each cable acting on the tower is as shown in the figure. If the resultant force  $\mathbf{F}_R = \{321.66\mathbf{i} - 16.82\mathbf{j} - 1466.71\mathbf{k}\}$  N, determine the coordinates  $(x, y, z)$  of point A.

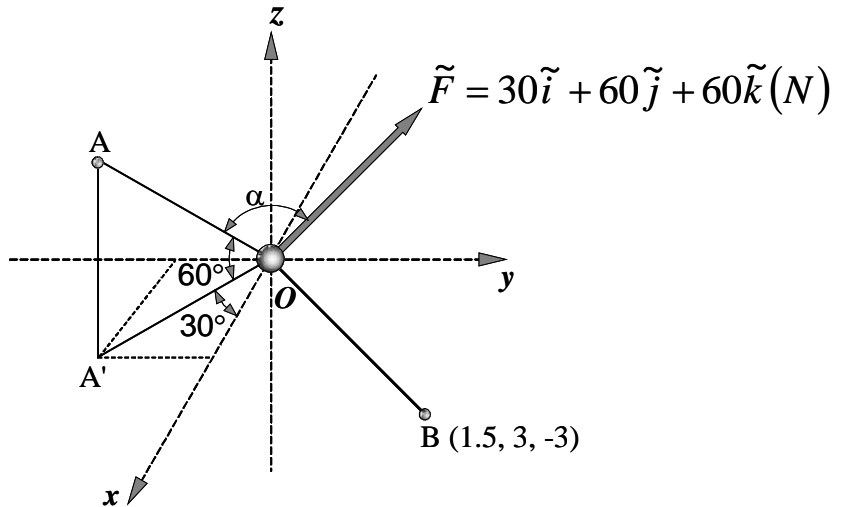


## Problem 2 (25 Points)

In the figure shown below:

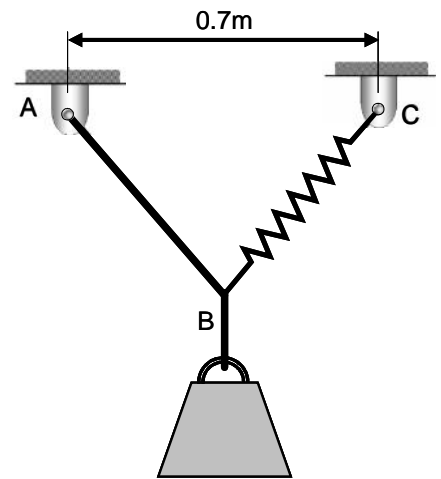
15% A) Find angle ( $\alpha$ ) between force ( $\mathbf{F}$ ) and line (OA).

10% B) Find the projection of force ( $\mathbf{F}$ ) on line (OB). [Express your answer in Cartesian vector form].



### Problem 3 (25 Points)

A 50-kg mass is suspended using Cable BA and Spring BC. The spring was unstretched before applying the load. The length of Cable BA is 0.5 m and the spring has a stiffness of  $k_{BC} = 7560$  N/m. After applying the load, the spring length increased to 0.45 m. **Determine the unstretched length of the spring.**



### Problem 4 (25 Points)

The figure below consists of four (4) cables EA, EB, EC, and ED joined together at E. Cable ED passes over a small frictionless pulley at D and is used to apply the 3.0 kN force needed to place the container (G) in the position shown. If the tension in cable (EA) is 5.0 kN, determine the mass (m) of container (G).

