



Benha University
Faculty of Education

Subject: Static (1)
Time: 2 hours
Class: 1st Year Students,
term1 (Jan 2022) Final Exam

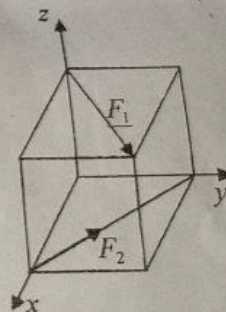
Answer the following questions:

Q1. a) If AB is a straight line, C is a point on it such that $\lambda \underline{AC} = \mu \underline{CB}$, prove that $\lambda \underline{oA} + \mu \underline{oB} = (\lambda + \mu) \underline{oC}$ where o is an any point.

b) For any three vectors $\underline{A}, \underline{B}, \underline{C}$, prove that $\underline{A} \wedge (\underline{B} \wedge \underline{C}) = (\underline{A} \cdot \underline{C})\underline{B} - (\underline{A} \cdot \underline{B})\underline{C}$.

Q2. a) If the algebraic sum for the moment about the points $(0,0), (1,0), (0,2)$ are $10, 5, 20 \text{ Nm}$. Find the magnitude, the direction and the line of the resultant force.

b) In the following figure, the two forces F effects on the cubic with side length a . Find the equivalent wrench for the following forces.



Q3. a) Find the center of mass for a solid circular cone with height h and base radius a .

b) Find the center of mass for the area which is bounded by the two curves $y^2 = 4ax, x^2 = 4ay$.

$$\frac{x^2}{a^2} + \frac{y^2}{a^2} = \frac{y^2}{a^2} + \frac{x^2}{a^2}$$

Q4. Find the center of mass for the volume which results from the rotation of the area bounded by the curve $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and the y -axis about the x -axis.

GOOD LUCK,

Dr. Ahmed Megahed

$$(\underline{A} \cdot \underline{C})\underline{B} + (\underline{A} \cdot \underline{B})\underline{C} - (\underline{B} \cdot \underline{A})\underline{C} - \underline{B}$$