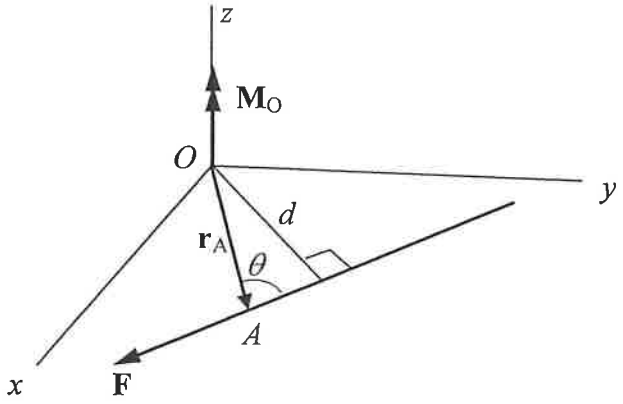
臺灣綜合大學系統108學年度學士班轉學生聯合招生考試試題

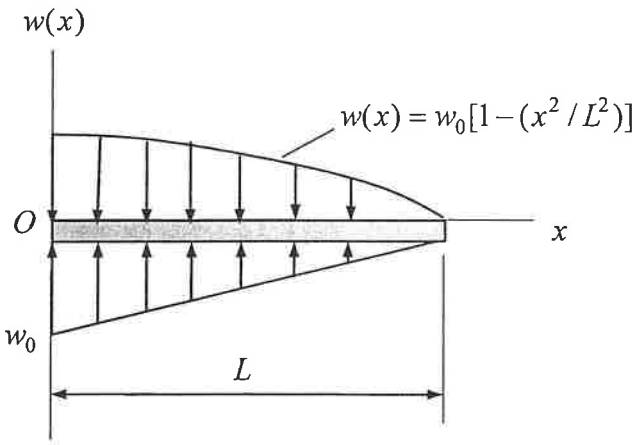
科目名稱	應用力學	類組代碼	D37
		科目碼	D3791

※本項考試依簡章規定各考科均「不可以」使用計算機　　本科試題共計 2 頁

1. As shown in the figure, use the basic **definition of vector cross-product** and prove that the moment vector $\mathbf{M}_O$ produced by force **F** about the point O can be computed by the vector equation $\mathbf{M}_O = \mathbf{r}_A \times \mathbf{F}$. In the figure, point A is an arbitrary point on the line of action of force **F**, $\mathbf{r}_A$ is position vector from O to A, d is the shortest distance between line of action of the force and point O. (25%)



2. A cantilever beam is subjected to two distributed loads as shown. Replace the distributed loads by a resultant force and couple moment acting at point O. (25%)



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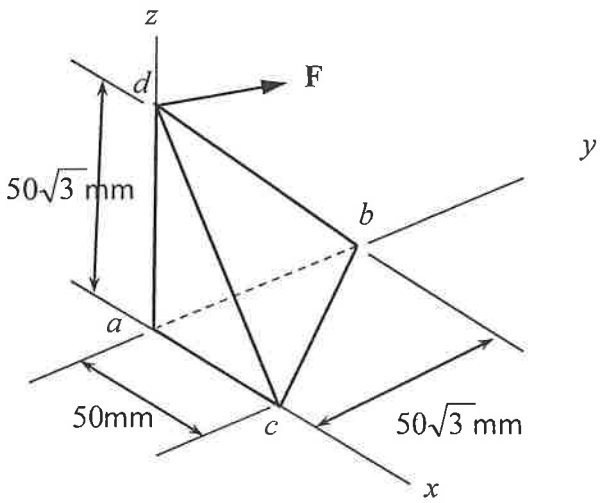
3. A force **F** of a magnitude 100 N acts on the top of the tetrahedron *abcd* as shown. Let the direction angles of vector **F** be $\alpha = 60°$, $\beta = 60°$, $\gamma = 45°$. Use the 3D vector formula to determine the magnitude of the moment about the *b*-*c* axis. In addition, determine the shortest distance between *b*-*c* axis and the line of action of the force F ? (25%)



4. Use the **method of virtual displacement** and determine the required magnitude of force *P* to maintain the equilibrium of linkage at $\theta = 60°$. The weight of each link is *W*. Point A is a hinge, point B is a pin and point C is a roller. (25%)