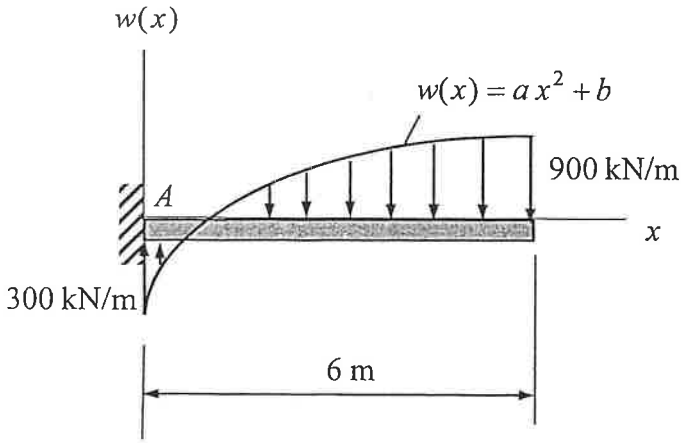
臺灣綜合大學系統109學年度學士班轉學生聯合招生考試試題

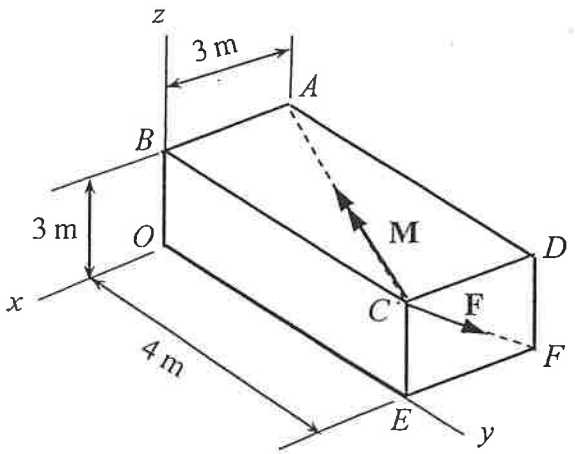
科目名稱	應用力學	類組代碼	D37
		科目碼	D3791

※本項考試依簡章規定所有考科均「不可」使用計算機。　　本科試題共計 2 頁

1. A cantilever beam is subjected to a distributed load as shown. Compute the reaction force and moment at support A. (25%)



2. A force **F** of magnitude 14.1 N and a couple moment **M** of 20 N.m are applied to corner C of the block shown below. (1) Replace the given force-couple system with an equivalent force-couple system applied at corner O. (2) Compute the moment $\mathbf{M}_{BD}$ produced by the force **F** about the diagonal line BD. Express the moment at a Cartesian vector form. (30%) **(=15%+15%)**



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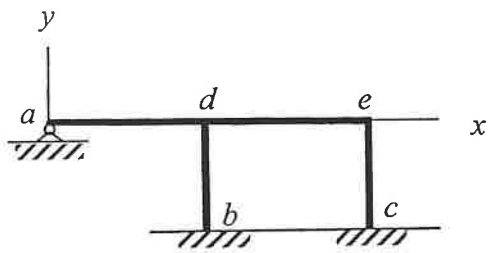
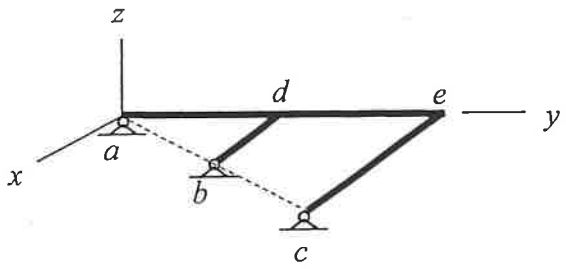
3. (1) Explain what is a **two-force member** and draw the diagram of a typical two-force member? (2) Prove that the resultant forces at the two ends of a two-force member must have the same magnitude but opposite in direction, and (3) prove that these two resultant forces must be collinear. (25%) **(=9%+8%+8%)**

4. For the structures given below, please draw the free-body diagram and determine whether it is stable or unstable. If it is unstable, state the reason using equilibrium condition. If it is stable, determine the support redundancy. (20%)

   (a) A two-dimensional frame *abcde* shown below is supported by a hinge at *a* and two fixed ends at *b* and *c*. **(7%)**



   (b) A three-dimensional frame *abcde* shown below is supported by three ball-and-socket joints at points *a*, *b* and *c*, which are all located on the x-y plane. **(7%)**



   (c) A two-member structure *abc* is connected by a pin at c and supported by hinges at *a* and *b*. Neglect the thickness of the members. **(6%)**