

淡江大學八十九學年度碩士班招生考試試題

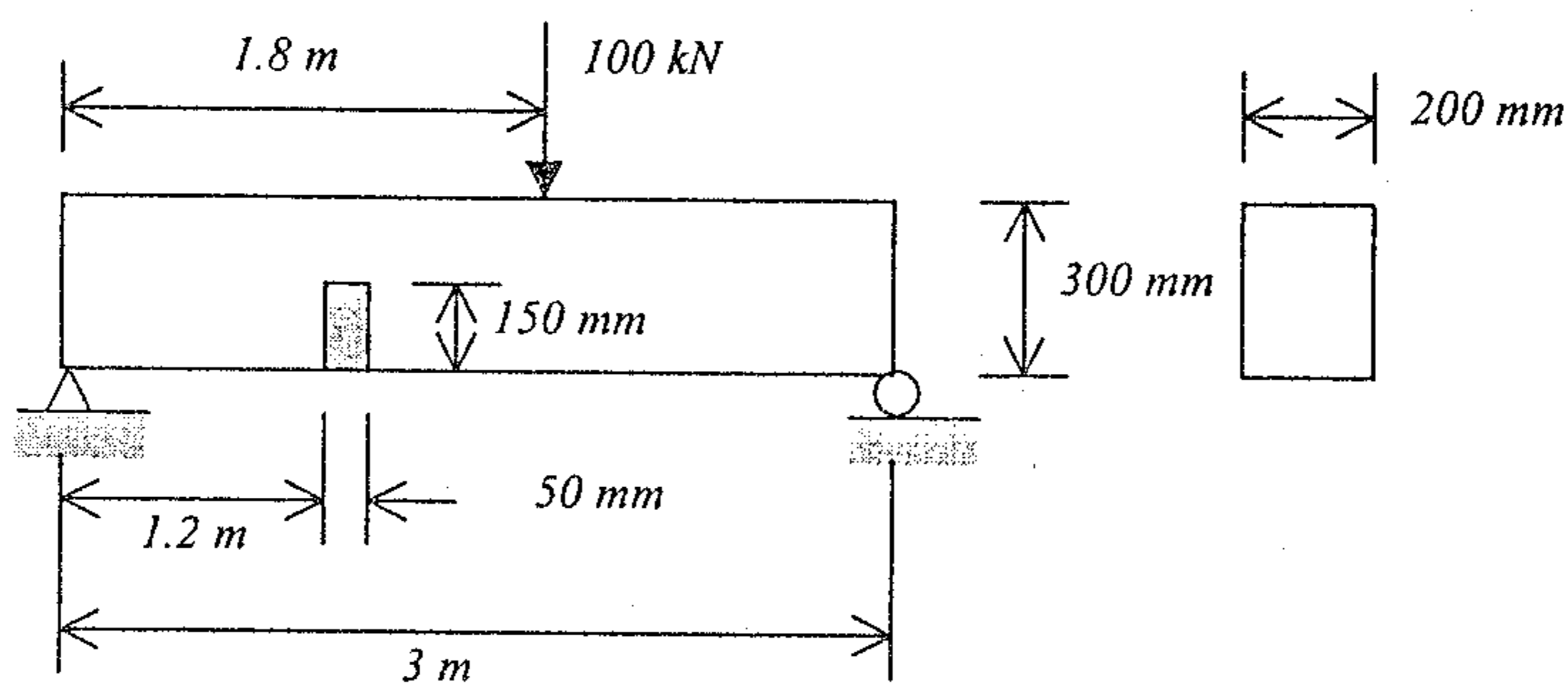
系別：土木工程學系

科目：工程力學(含靜力學、材料力學、動力學)

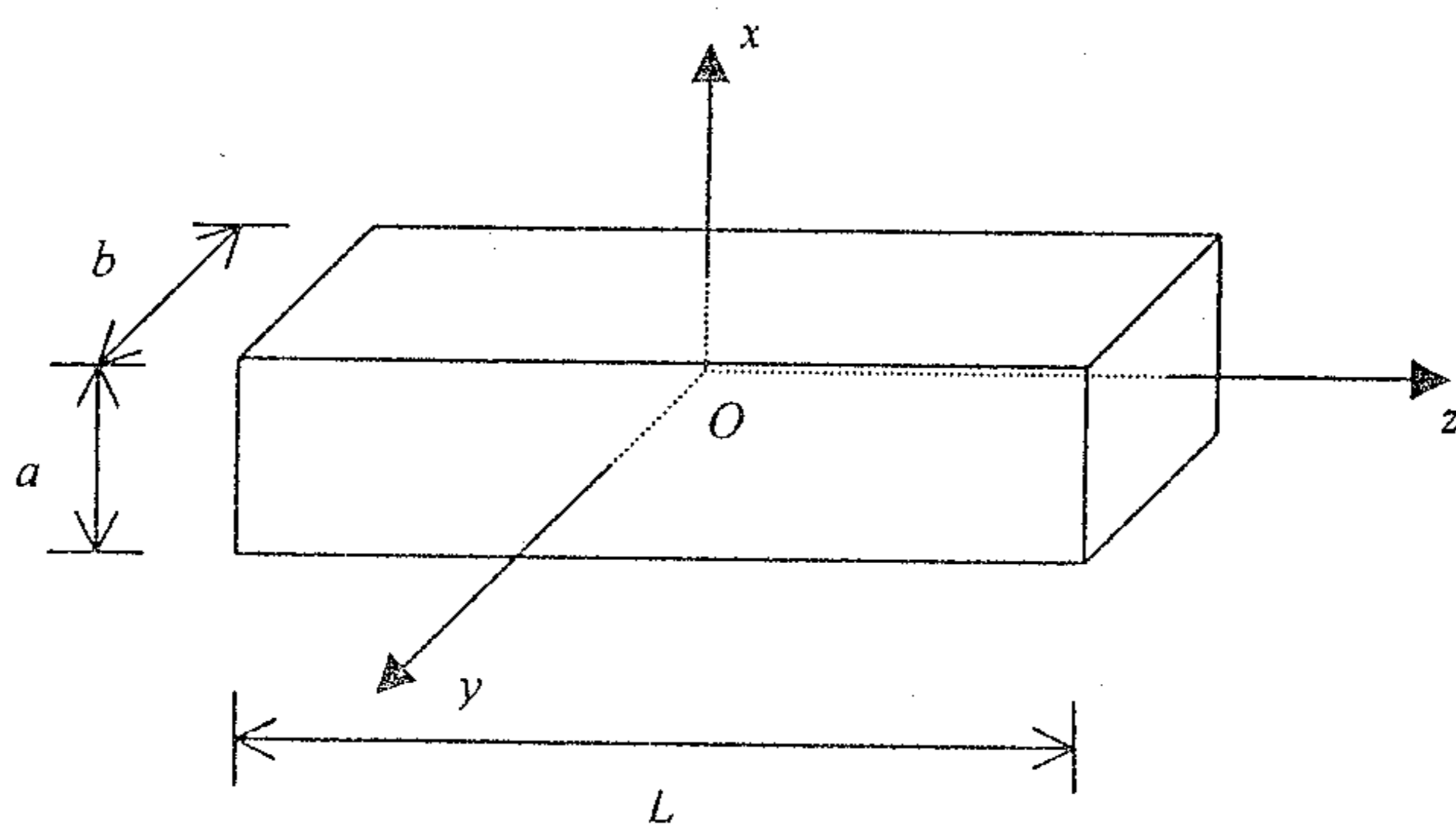
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1. A solid beam having a 200 mm by 300 mm cross section is loaded as shown in the figure. From this beam isolate a segment of 50 mm by 150 mm by 200 mm shown shaded in the figure. Then on a free-body diagram of this segment indicate the location, magnitude, and sense of all resultant forces acting on it caused by the bending and shearing stresses. (25%)



2. Determine the mass moment of inertia I_y and I_z for the given rectangular cylinder of mass m and length L with respect to y and z axes, where point O is the centroid of the given cylinder. (Derive the formulae from the basic definition of mass moment of inertia) (20%)



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3. (a) State briefly the definitions of the *plane stress* and *plane strain*. (10%)
(b) Based on the definitions given in (a), derive the Hooke's law for plane stress. (15%)
4. (a) Using the example of a prismatic bar subjected to a constant axial force, derive the corresponding strain energy and complementary strain energy. (10%)
(b) A vertical load P is supported by a statically indeterminate truss ABCD, as shown in the figure. All bars have the same axial rigidity, EA . Determine the strain energy U of the truss in terms of the vertical displacement δ_D of joint D , and determine the displacement δ_D by strain energy method. (20%)

