國立成功大學

113學年度碩士班招生考試試題

編　號：95

系　所：土木工程學系

科　目：結構學

日　期：0201

節　次：第 2 節

備　註：可使用計算機

編號： 95

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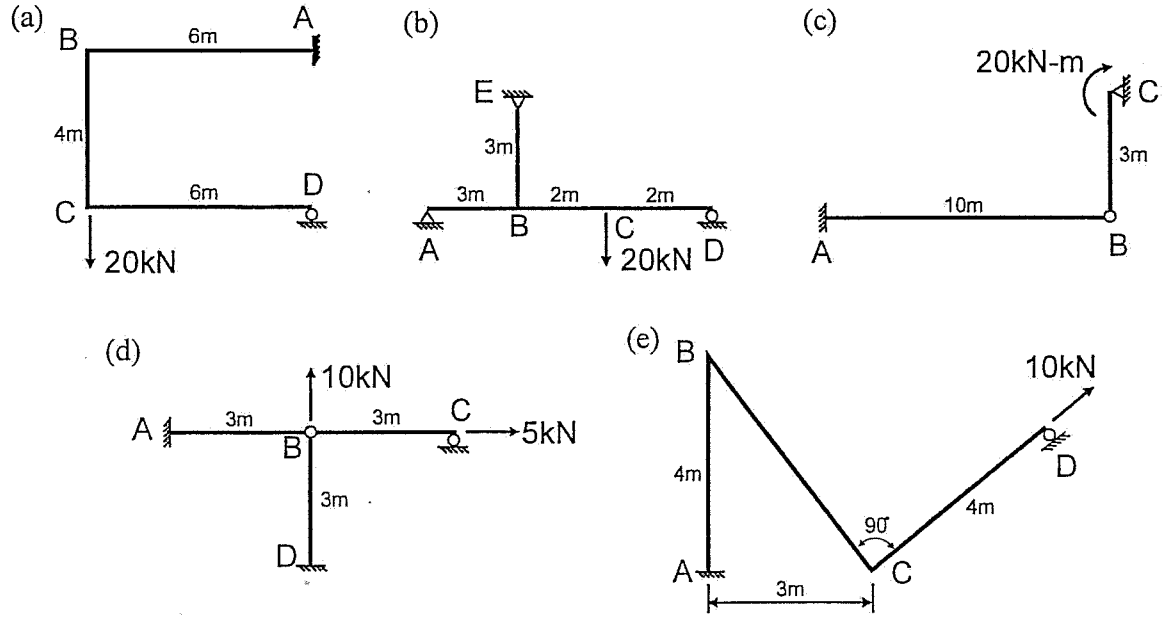
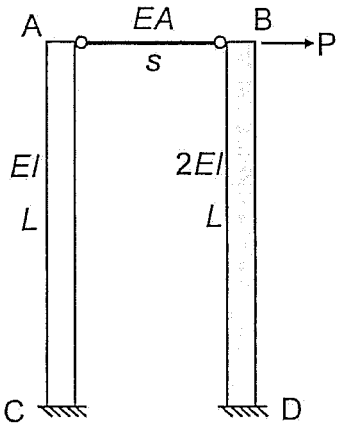
※ 考生請注意：本試題可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Draw the bending moment diagrams for the following structures. Draw positive moment on the compression side of each element, assuming all elements are axially rigid. (7% each, 5% for correct moment diagram shape and 2% for correct peak values)



2. Calculate the horizontal displacement at point B in the following structure, assuming that elements AC and BD are axially rigid and have a length of L. The flexural stiffness of elements AC and BD are EI and $2EI$, respectively. Points A and B are connected by a truss element, which has a length of s, Young's modulus of E, and cross-sectional area of A. Use E, I, A, L, and s to express your answer. (15%)



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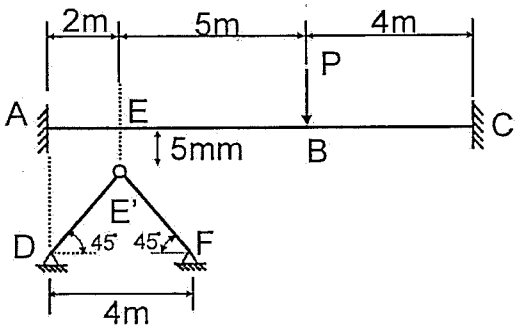
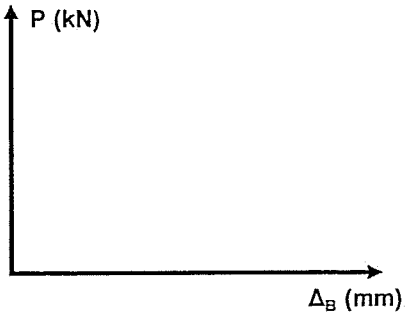
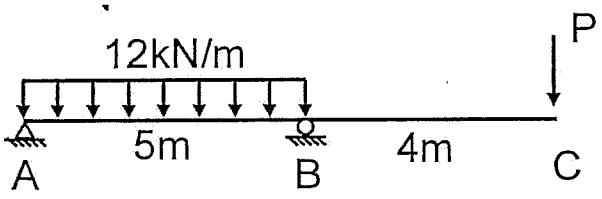
3. Considering a fixed-to-fixed beam AC with a length of 11 m and a concentrated load of P acting at point B, and a truss structure composed by elements DE' and FE' below the beam AC. The distances between Points E and E' is 5mm. When the value of P (kN) increases, the beam at Point E would contact with the Point E' on the truss system. Draw the relationships between the value of P and vertical displacement of B (Δ_B, mm, positive in downward direction) up to 30 mm. Mark the slops and coordinates at the turning points on your plot. For all elements, Young's modulus $E = 200$ GPa, moment of inertia $I = 150\times10^6$ mm^4, cross-sectional area $A = 500$ mm^2. Assuming that the beam AC is axially rigid, no friction force developed at the contact points between the beam and the truss, and only center lines of all elements are considered. (20%)





4. Consider a beam AC shown below, determine the value of P so that the vertical displacement at Point C equals to 0. Young's modulus = E, moment of inertia = I, cross-sectional area = A (10%)



5. Compute the horizontal displacement at Point C. For all elements, E = 200 GPa, I=180×10^6 mm^4, considering (a) all elements are axially rigid and (b) all elements have cross-sectional area A=600 mm^2. (20%)