科目名稱	材料力學	類組代碼	D37
		科目碼	D3793

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全部單選題，每題 10 分，答錯不倒扣。

1. A simply supported beam is loaded through the attached bracket BDE, as shown in Fig. 1. The reaction force at support C is:
   (A) 3P/7 (B) 4P/7 (C) 5P/7 (D) 6P/7 (E) None of the above

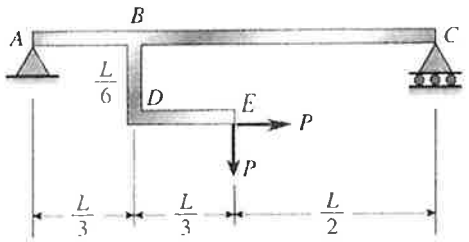

Fig.1

2. Continuing from Problem 1, the magnitude of the maximum bending moment in beam ABC is:
   (A) 4PL/21 (B) 5PL/21 (C) 5PL/12 (D) 5PL/14 (E) None of the above

3. A nonprismatic bar has an internal cylindrical hole of diameter $d/2$ in Segment 1 (see Fig. 2). Assume that Young's modulus E is constant. For the loadings shown in Fig.2, the internal axial forces N_1 and N_2 in Segment 1 and Segment 2 are:
   (A) $N_1 = \mathrm{P}/2$ and $N_2 = \mathrm{P}/2$ (B) $N_1 = \mathrm{P}/2$ and $N_2 = -\mathrm{P}/2$
   (C) $N_1 = -\mathrm{P}/2$ and $N_2 = \mathrm{P}/2$ (D) $N_1 = 3\mathrm{P}/2$ and $N_2 = -\mathrm{P}/2$ (E) None of the above

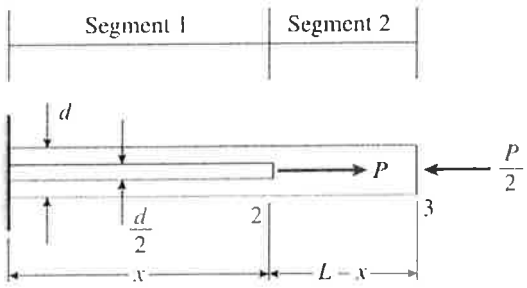

Fig. 2

4. Continuing from Problem 3, if the axial displacement at end 3 is $4\mathrm{PL}/\mathrm{E}(\pi d^2)$, the length of the hollow segment is:
   (A) $x = 3L/7$ (B) $x = 4L/7$ (C) $x = 6L/7$ (D) $x = 9L/7$ (E) None of the above

5. A prismatic bar AB of length L, cross-sectional area A, Young's modulus E, and total weight W hangs vertically under its own weight, as shown in Fig. 3. The elongation of the entire bar is:
   (A) $2WL/EA$ (B) $WL/2EA$ (C) WL/EA (D) $WL/4EA$ (E) None of the above

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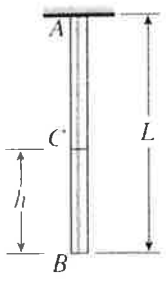

Fig.3

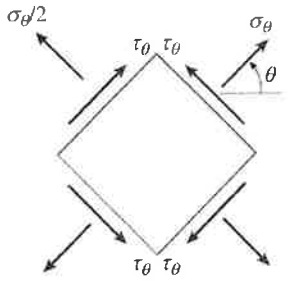

Fig. 4

6. Continuing from Problem 5, the internal axial force at section C, located a distance h from end B, is:

(A) $N = WL/h$ (B) $N = Wh/L$ (C) $N = W(L-h)/h$ (D) $N = W(L-h)/L$

(E) None of the above

7. A plane stress element in a bar subjected to uniaxial stress (at $\theta = 0^o$) is shown in Fig. 4. The shear stress τ_θ and maximum shear stress τ_{max} are :

(A) $\tau_\theta = -\frac{1}{\sqrt{2}}\sigma_\theta$ and $\tau_{max} = \frac{3}{4}\sigma_\theta$ (B) $\tau_\theta = \frac{1}{\sqrt{2}}\sigma_\theta$ and $\tau_{max} = \frac{3}{2}\sigma_\theta$

(C) $\tau_\theta = -\frac{1}{2\sqrt{2}}\sigma_\theta$ and $\tau_{max} = \frac{3}{4}\sigma_\theta$ (D) $\tau_\theta = \frac{1}{2\sqrt{2}}\sigma_\theta$ and $\tau_{max} = \frac{3}{2}\sigma_\theta$

(E) None of the above

8. A composite bar is made of two different metals with Young's moduli E_1 and E_2, as shown in Fig. 5. The two parts of the bar have the same cross-sectional dimensions. The bar is compressed by forces P acting through rigid end plates. The line of action of the forces P has an eccentricity e. If each part of the bar is uniformly stressed in compression, the eccentricity e is :

(A) $e = \frac{b(E_2-E_1)}{(E_1+E_2)}$ (B) $e = \frac{b(E_2+E_1)}{(E_1-E_2)}$ (C) $e = \frac{b(E_2-E_1)}{2(E_1+E_2)}$ (D) $e = \frac{b(E_2+E_1)}{2(E_1-E_2)}$

(E) None of the above

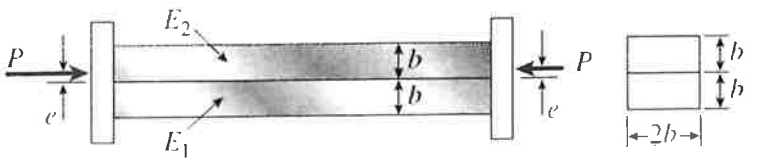

Fig. 5

 背面有題，請繼續作答。

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9. For beam AB, with flexural rigidity EI and section modulus S, carrying a triangularly distributed load of maximum intensity q_o, as shown in Fig.6, the maximum tensile stress in beam AB is :

(A) $\frac{q_oL^2}{3\sqrt{3}S}$ (B) $\frac{q_oL^2}{6\sqrt{3}S}$ (C) $\frac{q_oL^2}{9\sqrt{3}S}$ (D) $\frac{q_oL^2}{9S}$ (E) None of the above

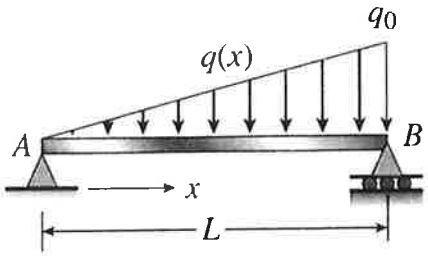

Fig. 6

10. Continuing from Problem 9, the deflection $v(x)$ is:

(A) $v(x) = \frac{q_o}{360LEI}(3x^5 + 20L^2x^3 - 15x^4L)$

(B) $v(x) = \frac{q_o}{120LEI}(x^5 - 5Lx^4 + 10L^2x^3 - 10L^3x^2)$

(C) $v(x) = \frac{q_o}{120LEI}(x^5 - 5Lx^4 + 20L^2x^3 - 16L^5)$

(D) $v(x) = \frac{q_o}{360LEI}(-3x^5 + 10L^2x^3 - 7L^4x)$

(E) None of the above