

模块一 1.2 习题答案

1.2.1 答案: $F_{1x} = -F_1 \cos 30^\circ = -200 \times 0.866 = -173.2 \text{ N}$

$$F_{1y} = -F_1 \sin 30^\circ = -200 \times 0.5 = -100 \text{ N}$$

$$F_{2x} = 0$$

$$F_{2y} = F_2 = -150 \text{ N}$$

$$F_{3x} = F_3 \cos 20^\circ = 200 \times 0.9397 = 187.94 \text{ N}$$

$$F_{3y} = F_3 \sin 20^\circ = 200 \times 0.3420 = 68.40 \text{ N}$$

$$F_{4x} = -F_4 \sin 30^\circ = -250 \times 0.5 = -125 \text{ N}$$

$$F_{4y} = F_4 \cos 30^\circ = 250 \times 0.866 = 216.5 \text{ N}$$

1.2.2 答案: $T_X = 0$ $T_Y = 2(T_1 \sin 30^\circ + T_2 \sin 50^\circ) = 2(700 \times 0.5 + 600 \times 0.262) = 1014.4 \text{ N}$
 $T = 1014.4 \text{ N}(\uparrow)$

1.2.3 答案: $N_{AB} = 32.4 \text{ kN}$ $N_{AC} = 45.85 \text{ kN}$

1.2.4 答案: $R_B = 14.14 \text{ kN}(\swarrow)$ $R_{AX} = 10 \text{ kN}(\rightarrow)$ $R_{AY} = 10 \text{ kN}(\uparrow)$

1.2.5 答案: $N_{BC} = 5 \text{ kN}(\text{压力})$ $R_{AX} = 4.33 \text{ kN}(\leftarrow)$ $R_{AY} = 2.5 \text{ kN}(\uparrow)$

1.2.6 答案: $N_{BC} = 100 \text{ N}(\text{拉力})$ $N_{AB} = 122.8 \text{ N}(\text{拉力})$ $W = 136.8 \text{ N}$

1.2.7 答案: $N_{AC} = 35.86 \text{ kN}(\text{压力})$ $N_{AB} = 9.28 \text{ kN}(\text{拉力})$

1.2.8 答案: $N_{AC} = 136.6 \text{ kN}(\text{拉力})$ $N_{AB} = 242.9 \text{ kN}(\text{压力})$

1.2.9 答案: (a) $N_{AC} = 1.15 \text{ F}(\text{压力})$ $N_{AB} = 0.577 \text{ F}(\text{拉力})$

(b) $N_{AC} = 1.15 \text{ F}(\text{拉力})$ $N_{AB} = 0.577 \text{ F}(\text{压力})$

(c) $N_{AC} = 0.866 \text{ F}(\text{压力})$ $N_{AB} = 0.5 \text{ F}(\text{拉力})$

(d) $N_{AC} = 0.577 \text{ F}(\text{拉力})$ $N_{AB} = 0.577 \text{ F}(\text{拉力})$

1.2.10 答案: $N_D = \frac{Fl}{2h}$ (压力)

1.2.11 答案: $T = 173.2 \text{ kN}(\text{拉力})$ $N_A = 13.4 \text{ kN}(\text{压力})$

1.2.12 答案: $N_{AB} = 1 \text{ kN}$ $N_{BC} = 1 \text{ kN}$ $N_{BD} = 1.414 \text{ kN}$ $N_{DE} = 1.575 \text{ kN}$ $N_{FD} = 1.15 \text{ kN}$

1.2.13 答案: (a) $m_0(P) = Pl$ (b) $m_0(P) = 0$ (c) $m_0(P) = Pl \sin \alpha$

(d) $m_0(P) = -Pa$ (e) $m_0(P) = P(l+r)$ (f) $m_0(P) = Pl \frac{\sin \beta}{\cos \alpha}$

1.2.14 答案: (1) $m_0(F) = -0.3 \text{ kN} \cdot \text{m}$ (2) $F_X = 0.577 \text{ kN}(\rightarrow)$

(3) $F_{\min} = 0.5 \text{ kN}(\text{方向垂直于 } OA \text{ 杆})$ (4) 在 OA 杆上距 O 点 0.25 m 处

1.2.15 答案: $m_A(F) = -164 \text{ kN} \cdot \text{m}(\text{顺时针方向转})$

1.2.16 答案: $m = -56.25 \text{ N} \cdot \text{m}(\text{逆时针转})$

1.2.17 答案: (1) $R_A = 2.71 \text{ kN}(\uparrow)$ (2) $R_B = 3.9 \text{ kN}(\swarrow)$ (3) $R_A = 2.5 \text{ kN}(\swarrow)$

1.2.18 答案: (a) $R_A = P/3(\downarrow)$ $R_B = P/3(\uparrow)$ (b) $R_A = P(\uparrow)$ $R_B = P(\downarrow)$

(c) $R_A = 0.471P(\swarrow)$ $R_B = 0.471P(\swarrow)$ (d) $R_A = P(\uparrow)$ $R_B = P(\downarrow)$

1.2.19 答案: $R_A = 2 \text{ kN}(\downarrow)$ $R_B = 2 \text{ kN}(\uparrow)$

1.2.20 答案: $R_A = 0.75 \text{ kN}(\rightarrow)$ $R_B = 0.75 \text{ kN}(\leftarrow)$

1. 2. 21 答案: $R_{AX} = 25 \text{ kN}(\rightarrow)$ $R_{AY} = -43.3 \text{ kN}(\downarrow)$ $m = -3080 \text{ kN} \cdot \text{mm}(\text{顺时钟转})$

1. 2. 22 答案: $R_{AX} = 72.2 \text{ N}(\rightarrow)$ $R_{AY} = -125 \text{ N}(\downarrow)$

$$R_{BX} = -72.2 \text{ N}(\leftarrow) \quad R_{BY} = 125 \text{ N}(\uparrow)$$

$$R_{CX} = -125 \text{ N}(\leftarrow) \quad R_{CY} = 93.75 \text{ N}(\uparrow)$$

$$R_{DX} = 125 \text{ kN}(\rightarrow) \quad R_{DY} = -93.75 \text{ N}(\downarrow)$$

$$R_{EX} = -125 \text{ kN}(\leftarrow) \quad R_{EY} = 93.75 \text{ N}(\uparrow)$$

1. 2. 23 答案: $R = 280 \text{ kN}(\downarrow)$ $M_O = -33 \text{ kN} \cdot \text{m}(\text{顺时钟转})$

1. 2. 24 答案:

$$(a) R_{Ax} = -20(\text{kN})(\leftarrow); R_{Ay} = 28.8(\text{kN})(\uparrow); R_{By} = 25.9(\text{kN})(\uparrow)$$

$$(b) R_{Ax} = 7.07(\text{kN})(\rightarrow); R_{Ay} = 12.07(\text{kN})(\rightarrow); m_A = 38.28(\text{kN} \cdot \text{m})(\curvearrowright)$$

$$(c) R_{Ax} = 3(\text{kN})(\rightarrow); R_{Ay} = 1.875(\text{kN})(\uparrow); R_{By} = 0.125(\text{kN})(\uparrow)$$

1. 2. 25 答案: $R_{Ax} = 16.67(\text{kN})(\rightarrow); R_{Ay} = 16.67(\text{kN})(\uparrow); R_{By} = 26.66(\text{kN})(\uparrow);$

$$R_{Cx} = -16.67(\text{kN})(\leftarrow); R_{Cy} = 16.67(\text{kN})(\uparrow);$$

1. 2. 26 答案: $R_{Ax} = 3(\text{kN})(\rightarrow); R_{Ay} = 5(\text{kN})(\uparrow); R_{By} = -1(\text{kN})(\downarrow)$

$$R_{Ax} = -3(\text{kN})(\leftarrow); R_{Ay} = -0.25(\text{kN})(\downarrow); R_{By} = 4.25(\text{kN})(\uparrow)$$

1. 2. 27 答案: $R_{Ax} = -12(\text{kN})(\leftarrow); R_{Ay} = 45(\text{kN})(\uparrow); m_A = 27.8(\text{kN} \cdot \text{m})(\curvearrowright)$

1. 2. 28 答案: $R_{Ax} = -1.7(\text{kN})(\leftarrow); R_{Ay} = 12(\text{kN})(\uparrow); R_{By} = 11(\text{kN})(\uparrow)$

1. 2. 29 答案: $R_{Ax} = 0(\text{kN}); R_{Ay} = 17(\text{kN})(\uparrow); m_A = 33(\text{kN} \cdot \text{m})(\curvearrowright)$

1. 2. 30 答案: (a) $R_{Ax} = 0(\text{kN}); R_{Ay} = 113.3(\text{kN})(\uparrow); R_{By} = 86.7(\text{kN})(\uparrow)$

$$(b) R_{Ax} = 0(\text{kN}); R_{Ay} = 19.3(\text{kN})(\uparrow); R_{By} = 10.7(\text{kN})(\uparrow)$$

$$(c) R_{Bx} = 0(\text{kN}); R_{By} = 16(\text{kN})(\uparrow); m_A = 49(\text{kN} \cdot \text{m})(\curvearrowright)$$

$$(d) R_{Ax} = 0(\text{kN}); R_{Ay} = 20(\text{kN})(\uparrow); m_A = 40(\text{kN} \cdot \text{m})(\curvearrowright)$$

$$(e) R_{Ax} = 0(\text{kN}); R_{Ay} = 5.8(\text{kN})(\uparrow); R_{By} = 89.2(\text{kN})(\uparrow)$$

$$(f) R_{Ax} = 0(\text{kN}); R_{Ay} = 3.5(\text{kN})(\uparrow); R_{By} = 9.5(\text{kN})(\uparrow)$$