

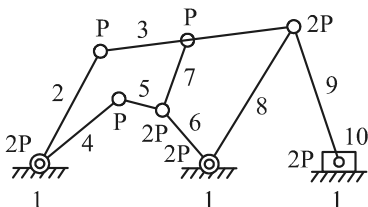
107 學年度四技二專第一次聯合模擬考試 機械群 專業科目(一) 詳解

107-1-01-4

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
B	C	A	D	D	B	C	B	C	B	A	D	D	D	A	C	C	B	B	C
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
A	A	C	D	D	B	C	B	C	C	D	A	C	B	A	D	B	A	D	C

第一部分：機件原理

- (B) 虎鉗僅能產生預期的運動，屬於機構
- (C) 牛頭鉋床之溜座、虎鉗、橫向進給台都做純滑動接觸
- (A) 平板凸輪與其從動件的接觸對偶關係，屬於高對
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$N = 10$ 、 $P = 13$ 代入 $P = \frac{3}{2}N - 2$ 成立，屬於拘束鏈

- (D) 滾珠螺紋在軸與孔設計成螺旋狀，其截面為圓弧線的槽，槽中裝入滾珠

6. (A) $M = \frac{W}{F} = \frac{2\pi R}{L} \times \eta = \frac{2\pi R}{2P} \times 60\% = \frac{3\pi R}{5P}$

(B) $M = \frac{W}{F} = \frac{\cos 10^\circ}{\sin 10^\circ} = \cot 10^\circ$

(C) $M = \frac{W}{F} = \frac{\cos 45^\circ}{\sin 45^\circ} = 1$

(D) 由 $M = \frac{W}{F}$ 可知， M 愈大， F 愈小

- (C) 1.5 表示節距 1.5 mm

8. $\frac{W}{F} = \frac{2\pi R}{L_1 - L_2}$ ， $\frac{6280}{F} = \frac{2\pi \times 200}{2.5 - 1.75}$ ， $F = 3.75$ N

9. $\tan \theta = \frac{L}{\pi D} = \frac{2 \times 3}{32 \times \pi} = \frac{3}{16\pi}$

- (B) 固定螺釘頭部其中一種型式為有槽無頭之型式，其頭部刻有凹槽，全部長度均有螺紋，以配合螺絲起子使用，主要用於受力較小之機件的接合

- (B) 螺帽上開數條槽孔並配合安裝開口銷是堡形螺帽之使用方式，並非用於鎖緊螺帽

(C) 鎖緊螺帽屬於摩擦鎖緊裝置

(D) 兩個螺帽鎖緊時，則較厚的螺帽宜在上

- (A) 螺旋彈簧鎖緊墊圈防止螺帽鬆動時，應使墊圈旋向與螺桿相反

(B) 普通墊圈由鈹金衝壓製成，其斷面為矩形

(C) 齒形鎖緊墊圈又稱為梅花墊圈

- (D) 路易氏鍵一般使用兩組切線鍵，互成 120° ，可傳送兩個方向之動力

- $D = 40$ mm = 0.04 m

(1) $P = F \times V = F \times \frac{\pi DN}{60}$

$20\pi \times 10^3 = F \times \frac{\pi \times 0.04 \times 600}{60}$ ， $\therefore F = 50000$ N

(2) $\tau = \frac{F}{W \times L} = \frac{50000}{10 \times 40} = 125$ MPa

- (A) 開口銷於使用時需將其末端彎曲

- (C) 鍋爐的安全閥彈簧其功用是產生作用力

- (C) 鑽床之進刀把手使用蝸旋扭轉彈簧，鑽完孔後把手能自動回彈

- 第一組 $K_1 = 8 + 12 = 20$ N/cm

第二組 $K_2 = 15 + 20 + 25 = 60$ N/cm

第三組 $K_3 = 12 + 12 + 18 + 18 = 60$ N/cm

串聯： $\frac{1}{K_{\text{總}}} = \frac{1}{K_1} + \frac{1}{K_2} + \frac{1}{K_3} = \frac{1}{20} + \frac{1}{60} + \frac{1}{60} = \frac{1}{12}$

$K_{\text{總}} = 12$ N/cm

- (B) 超越式離合器僅用於單方向傳遞扭矩

- (C) 無油軸承僅適用於輕負荷之傳動

第二部分：機械力學

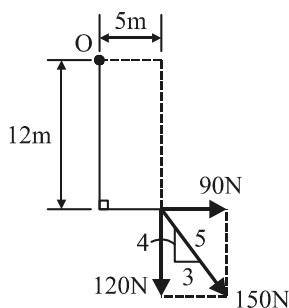
- (A) 彎曲是內效應

- (A) 力不可單獨存在

- 力偶、重量、速度、加速度、力、彎矩為向量
時間、溫度、功、面積為純量

- 合力不一定大於或小於各分力

- (1) 先將 $F = 150$ N 力分解為水平、垂直分力，如下圖所示

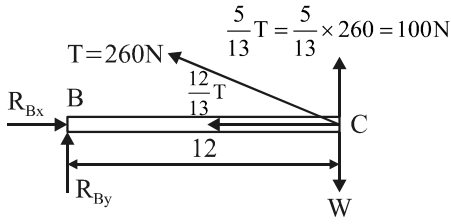


$F_x = 150 \times \frac{3}{5} = 90$ N(\rightarrow)， $F_y = 150 \times \frac{4}{5} = 120$ N(\downarrow)

- (2) 對 O 點力矩 M_o ：

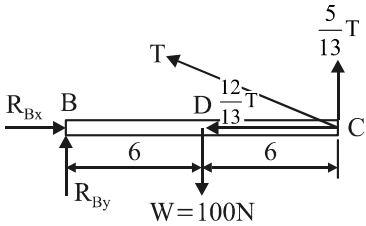
$\curvearrowright M_o = 90 \times 12 - 120 \times 5 = 480$ N·m (逆時針)

- 當在 C 點時：



$$\Sigma M_B = 0, 260 \times \frac{5}{13} \times 12 - W \times 12 = 0, W = 100 \text{ N}$$

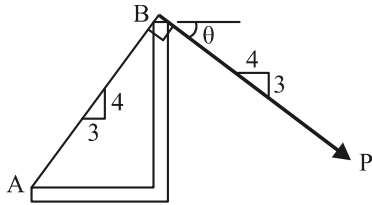
當移至 D 點時：



$$\Sigma M_B = 0, T \times \frac{5}{13} \times 12 - 100 \times 6 = 0, T = 130 \text{ N}$$

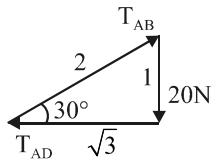
27. $\Sigma M_A = 0, 300 \times 250 = F_B \times 50, F_B = 1500 \text{ N}$

28. $\tan \theta = \frac{3}{4}, \theta = 37^\circ$

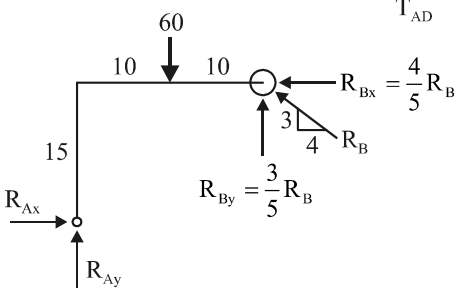


29. $\frac{20}{1} = \frac{T_{AB}}{2} = \frac{T_{AD}}{\sqrt{3}}, T_{AB} = 40 \text{ N}$

$$T_{AD} = 20\sqrt{3} = 34.64 \text{ N}$$



30.



(1) $\Sigma M_A = 0, \frac{3}{5}R_B \times 20 + \frac{4}{5}R_B \times 15 - 60 \times 10 = 0$

$$\therefore R_B = 25 \text{ N}, \text{ 故 } R_{Bx} = 20 \text{ N}, R_{By} = 15 \text{ N}$$

(2) $\Sigma F_x = 0, R_{Ax} - R_{Bx} = 0, \therefore R_{Ax} = R_{Bx} = 20 \text{ N}$

$$\Sigma F_y = 0, R_{Ay} + R_{By} - 60 = 0$$

$$\therefore R_{Ay} = 60 - 15 = 45 \text{ N}$$

31. (D) 力偶作用平面須在同一平面或平行面上

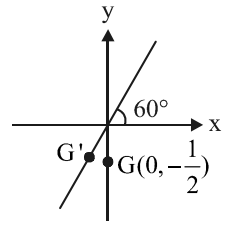
32. (A) 重心不一定在物體的內部

33. $G_y = \frac{0 - 4 \cdot \frac{1}{4} \pi (2 \cdot 3)^2}{\frac{1}{4} \pi \cdot (2 \cdot 9)^2 - \frac{1}{4} \pi (2 \cdot 3)^2} = \frac{-4 \cdot \frac{1}{4} \pi \cdot 36}{\frac{1}{4} \pi (18^2 - 6^2)} = -\frac{1}{2}$

$$G'_x = -\frac{1}{2} \times \cos 60^\circ = -\frac{1}{4}$$

$$G'_y = -\frac{1}{2} \times \sin 60^\circ = -\frac{\sqrt{3}}{4}$$

$$G' = \left(-\frac{1}{4}, -\frac{\sqrt{3}}{4}\right)$$



34. 一般物體重心位置之求法，是應用力矩原理

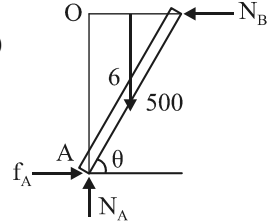
36. $\Sigma M_O = 0$

$$f_A \times 6 \sin \theta = 500 \times \frac{1}{2} \times 6 \times \cos \theta$$

$$\mu \cdot 500 \times 6 \cdot \sin \theta$$

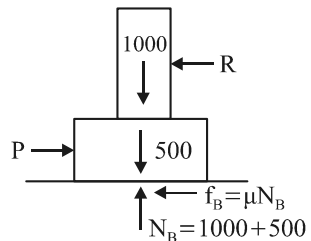
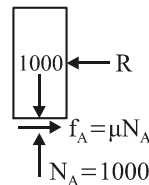
$$= 500 \times \frac{1}{2} \times 6 \times \cos \theta$$

$$\frac{\sin \theta}{\cos \theta} = \frac{1}{2} \times \frac{1}{\mu} = 2, \tan \theta = 2$$



37. A

A、B



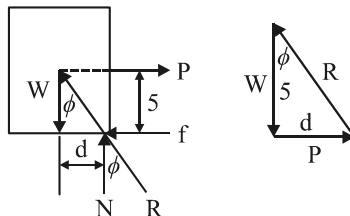
取 A 自由體圖 $R = f_A = 0.25 \times 1000 = 250 \text{ N}$

取 A、B 整體自由體圖

$$\Sigma F_x = 0, P - R - f_B = 0$$

$$P - 250 - 0.25 \times (1000 + 500) = 0, P = 625 \text{ N}$$

38. $\mu = \tan \phi = \frac{d}{5}, 0.3 = \frac{d}{5}, d = 1.5 \text{ cm}$



39. $V = 324 \times \frac{1000}{3600} = 90 \text{ m/sec}$

$$V = V_0 + at, 90 = 0 + 0.6 \times t, t = 150 \text{ sec}$$

40. (1) a 物體由斜面下滑

$$s = V_0 t + \frac{1}{2} at^2, \frac{h}{\sin \theta} = 0 + \frac{1}{2} (g \cdot \sin \theta) \cdot t_a^2$$

$$t_a^2 = \frac{2h}{g \sin^2 \theta}, t_a = \frac{1}{\sin \theta} \sqrt{\frac{2h}{g}}$$

(2) b 物體作自由落體, $h = \frac{1}{2} gt_b^2, t_b = \sqrt{\frac{2h}{g}}$

$$(3) \frac{t_a}{t_b} = \frac{\frac{1}{\sin \theta} \sqrt{\frac{2h}{g}}}{\sqrt{\frac{2h}{g}}} = \frac{1}{\sin \theta}$$