113 學年度科技校院四年制與專科學校二年制

統一入學測驗公告答案

考科代碼：4-01-1

類　　別：機械群

考　　科：專業科目(一)機件原理、機械力學

題號	答案	題號	答案	題號	答案	題號	答案	題號	答案	題號	答案
1	B	11	A	21	A	31	B	41		51	
2	B	12	D	22	A	32	A	42		52	
3	D	13	D	23	D	33	D	43		53	
4	C	14	C	24	D	34	A	44		54	
5	D	15	A	25	B	35	C	45		55	
6	B	16	B	26	C	36	B	46		56	
7	A	17	C	27	B	37	D	47		57	
8	C	18	C	28	B	38	C	48		58	
9	B	19	A	29	A	39	D	49		59	
10	A	20	B	30	D	40	C	50		60	

1. (B)∵ $P=\frac{3}{2}N-2$ 為拘束運動鏈，當 N＝4，P＝4 則 $P=\frac{3}{2}N-2$ 成立

   當 N＝4＋2＝6，P＝4＋3＝7 則 $P=\frac{3}{2}N-2$

   當 N＝6＋2＝8，P＝7＋3＝10 則 $P=\frac{3}{2}N-2\cdots\cdots$

   即連桿數目 N 從 4 件開始設計，每增加 2 件連桿數，則其對偶數 P 增加 3 個均為拘束運動鏈。

2. (B) (1)差動螺旋導程 $L=L_1-L_2=5-3=2(mm)$

   (2)∵ $F\times 2\pi R\times 1=W\times L \quad \Rightarrow R=\frac{4000\times 2}{10\times 2\pi\times 1}=\frac{400}{\pi}(mm)$

3. (D)螺帽下方加裝一螺旋彈簧墊圈，此鎖緊裝置歸類為：摩擦鎖緊裝置。

4. (C)錐形彈簧壓縮時，小圈部分變形較小並縮進大圈內。

   (1)彈簧支持負載時，能有效伸縮之圈數稱為有效圈數；

   (2)螺旋彈簧之彈簧指數愈小，則表示彈簧愈不容易變形；

   (3)蝸旋扭轉(動力)彈簧可使鑽床進刀把手在鑽完孔後能自動回彈。

5. (D)對合式滑動軸承又稱剖面滑動軸承，可承受較大負載與衝擊，磨損時可調整且安裝拆卸方便。

6. (B)360 rpm。

   (1)∵ $n_{低}=\frac{1}{4}n_{高}$ ；

   (2)∵ $(N_{主})^2=n_{高}\times n_{低}=\frac{1}{4}(n_{高})^2 \quad \Rightarrow n_{高}=\sqrt{4\times(180)^2}=360(rpm)$

7. (A)兩個鏈輪的節圓直徑與轉速比成反比為 1：4。

8. (C)$\sqrt{2}$ 。

$\because 75^\circ = 45^\circ + \beta \quad \Rightarrow \beta = 30^\circ$

$\because \dfrac{N_B}{N_A} = \dfrac{\sin\alpha}{\sin\beta} = \dfrac{\sin 45^\circ}{\sin 30^\circ} = \sqrt{2}$

9. (B)160rpm。

(1)$\because i_{max} = \dfrac{N_A}{N_B} = \dfrac{D_B}{D_A} = \dfrac{16}{8} = \dfrac{2}{1} \quad \Rightarrow N_{B(min)} = \dfrac{1}{2} \times 100 = 50(rpm)$

(2)$\because i_{min} = \dfrac{N_A}{N_B} = \dfrac{D_B}{D_A} = \dfrac{8}{16} = \dfrac{1}{2} \quad \Rightarrow N_{B(max)} = 2 \times 100 = 200(rpm)$

(3)$\Rightarrow N_B = 50(rpm) \sim 200(rpm)$

10. (A)300rpm。

(1)$\because C = \dfrac{M(T_A + T_B)}{2} \quad \Rightarrow 200 = \dfrac{5(20 + T_B)}{2} \quad \Rightarrow T_B = 60$齒

(2)$\because N_A = \dfrac{T_B}{T_A} \times N_B = \dfrac{60}{20} \times 100 = 300(rpm)$

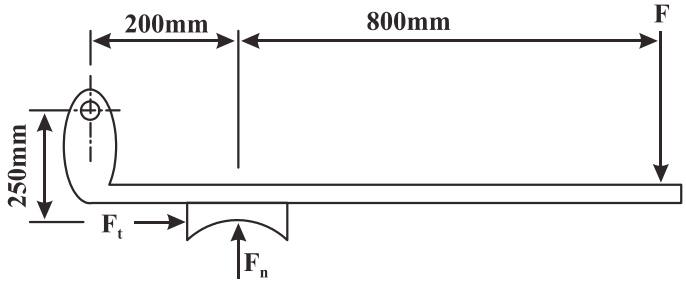
11. (A)1.6π (kW)。

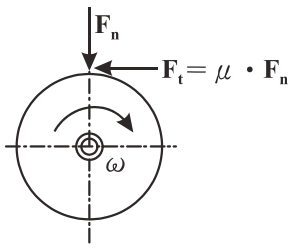
(1)$\because \Sigma M_o = 0$

$\Rightarrow F_t \times 250 + F_n \times 200 - 1000 \times (200 + 800) = 0$

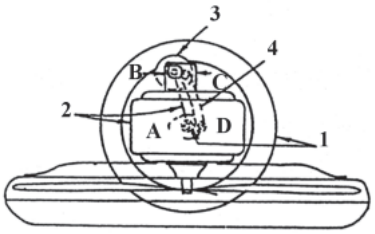
$\Rightarrow F_t = \dfrac{1000 \times 1000}{250 + \dfrac{200}{0.2}} = 800(N)$

(2)$\because \underline{P} = F_t \times \pi DN = \dfrac{800}{1000} \times \pi \times \dfrac{200}{1000} \times \dfrac{600}{60} = 1.6\pi(kW)$





12. (D)風扇搖擺頭屬於雙搖桿機構。

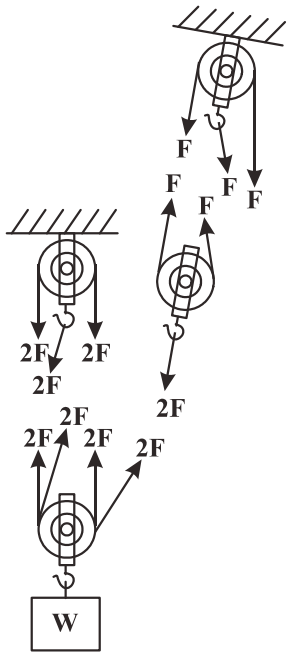


風扇搖擺頭

13. (D)簡諧運動。蘇格蘭軛機構屬於雙滑塊連趕機構應用，為簡諧運動模擬機構。

14. (C)等徑凸輪屬於確動型凸輪。

15. (A)150(N)。$\because W=8F \quad \Rightarrow F=\frac{W}{8}=\frac{1200}{8}=150(N)$



16. (B)3 秒。$\because t=\frac{18}{6}=3$秒

17. (C)$600/\pi$ (rpm)。

(1)$\because V=\pi DN_B \quad \Rightarrow N_B=\frac{200}{\pi\times 1}=\frac{200}{\pi}(rpm)$

(2)$\because \frac{N_A}{N_B}=\frac{T_B}{T_A}=\frac{3}{1} \quad \Rightarrow N_A=3\times(\frac{200}{\pi})=\frac{600}{\pi}(rpm)$

18. (C)蒸汽火車的動力產生與傳遞，使用多組汽缸與活塞，當某一個活塞正位於汽缸的死點位置時，其他汽缸推動活塞產生動力克服了死點位置。

19. (A)15ω。

(1)$\because N_B=N_C$

$\Rightarrow e_{C/G}=\dfrac{N_G}{N_C}=\dfrac{32\times1}{16\times60}=\dfrac{1}{30}$

$\Rightarrow N_C=30\times\omega=30\omega=N_B$

(2)$\because e_{B/A}=\dfrac{N_A}{N_B}=\dfrac{T_B}{T_A}=\dfrac{20}{40}=\dfrac{1}{2}$

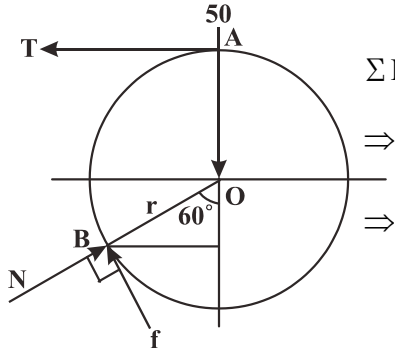
$\Rightarrow N_A=\dfrac{1}{2}\times N_B=\dfrac{1}{2}\times(30\omega)=15\omega$

20. (B)4。

$\because \dfrac{\sigma_C}{\tau}=\dfrac{\dfrac{4T}{D\times H\times L}}{\dfrac{2T}{D\times W\times L}}=\dfrac{2W}{H}=\dfrac{2\times12}{6}=4$

21. (A)向量的定義。

22.

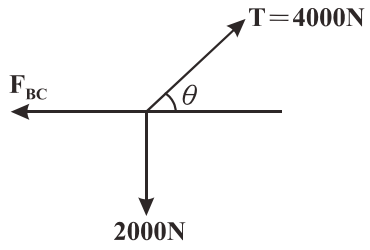


$\Sigma M_B=0$

$\Rightarrow T\times(r+\dfrac{r}{2})=50\times\dfrac{\sqrt{3}}{2}r$

$\Rightarrow T=\dfrac{50}{\sqrt{3}}=28.85$

23.



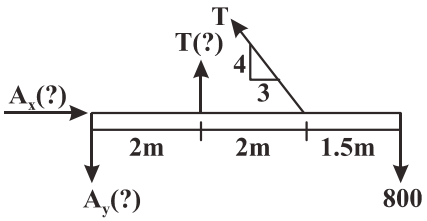
(1)$\Sigma F_y=0 \quad \Rightarrow 4000\sin\theta-2000=0$

$\Rightarrow \sin\theta=\dfrac{1}{2} \quad \Rightarrow \theta=30^\circ$

$\therefore y=1.5\sin30^\circ=0.75$

(2)$\Sigma F_x=0 \quad \Rightarrow F_{BC}=4000\times\dfrac{\sqrt{3}}{2}=2000\sqrt{3}=3464$

24.



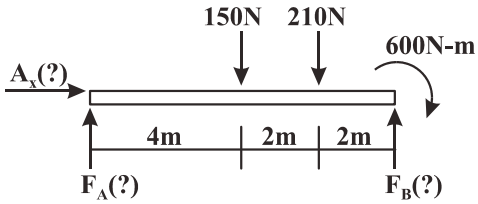
(1) $\Sigma M_A = 0 \quad \Rightarrow T \times 2 + \frac{4}{5} T \times 4 - 800 \times 5.5 = 0 \quad \Rightarrow T = 846$

(2) $\Sigma F_x = 0 \quad \Rightarrow A_x - \frac{3}{5} T = 0 \quad \Rightarrow A_x = 507$

(3) $\Sigma F_y = 0 \quad \Rightarrow A_y - T - \frac{4}{5} T + 800 = 0 \quad \Rightarrow A_y = 723$

$\therefore R_A = \sqrt{507^2 + 723^2} = 883$

25.

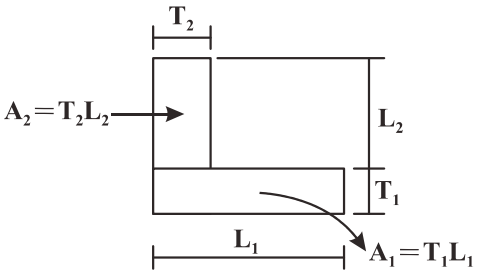


(1) $\Sigma M_A = 0 \quad \Rightarrow F_B \times 8 - 150 \times 4 - 210 \times 6 - 600 = 0$

$\Rightarrow F_B = 307.5$

(2) $\Sigma F_y = 0 \quad \Rightarrow F_A = 150 + 210 - 307.5 = 52.5$

26.



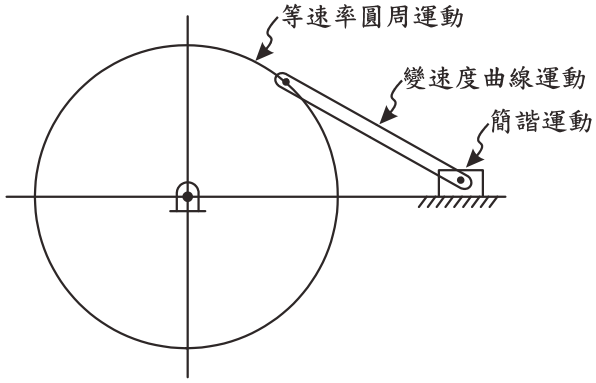
(1) $\bar{x} A = \Sigma A_i x_i$

$$\Rightarrow \bar{x} = \frac{T_1 L_1 \times \frac{L_1}{2} + T_2 L_2 \times \frac{T_2}{2}}{T_1 L_1 + T_2 L_2}$$

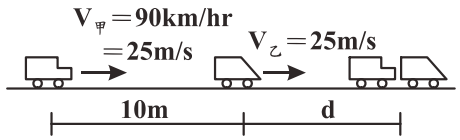
(2) $\bar{y} A = \Sigma A_i y_i$

$$\Rightarrow \bar{y} = \frac{T_1 L_1 \times \frac{T_1}{2} + T_2 L_2 (\frac{L_2}{2} + T_1)}{T_1 L_1 + T_2 L_2}$$

27.



28.



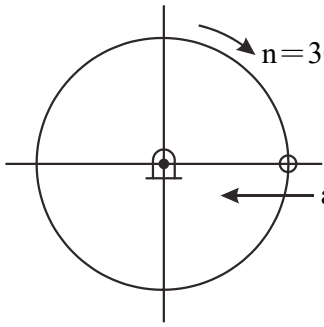
$S=V_1t+\frac{1}{2}at^2$

甲 $\Rightarrow 10+d=25t+\frac{1}{2}\times 5\times t^2\cdots\cdots(1)$

乙 $\Rightarrow d=25t\cdots\cdots(2)$

(2)代入(1) $\Rightarrow 10=\frac{1}{2}\times 5\times t^2 \Rightarrow t=2$ 秒

29.



$n=30rpm \Rightarrow \omega=\frac{30}{60}\times 2\pi=\pi\,(rad/s)$

$a_n=r\omega^2=\frac{15}{\pi}\times(\pi)^2=15\pi$

$=\frac{15\pi}{10}\times g=1.5\pi g$

30. (1)$F_1-7500=750\times 1 \Rightarrow F_1=8250N$

(2)$2500-F_2=250\times 1 \Rightarrow F_2=2250N$

(3)$T=(F_1-F_2)\times r=(8250-2250)\times 0.3=1800(N-m)$

31. (B)光滑面僅會滑動且最快。

32. (1)$\frac{1}{2}mV^2=\frac{1}{2}\times 0.5\times 1^2=0.25(N-m)$

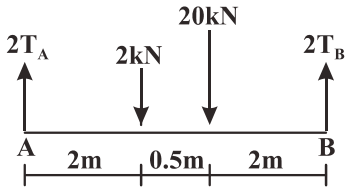
(2)$0.25\times 0.81=0.2025(N-m)$

(3)$\frac{1}{2}kx^2=\frac{1}{2}\times 450\times x^2=0.2025$

$\Rightarrow x=0.03m=30(mm)$

33. (D)在比例限內 $\Rightarrow \mu = \left| \frac{\in_{橫}}{\in_{縱}} \right|$

34.



(1) $\Sigma M_B = 0 \Rightarrow 2T_A \times 4.5 - 2 \times 2.5 - 20 \times 2 = 0 \Rightarrow T_A = 5kN$

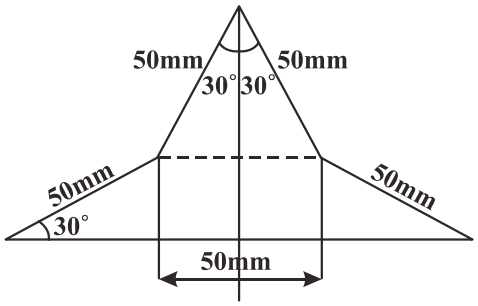
(2) $\Sigma F_y = 0 \Rightarrow 2T_A + 2T_B - 2 - 20 = 0 \Rightarrow T_B = 6kN$

(3) $\delta = \frac{PL}{EA} = \frac{5000 \times 2000}{(200 \times 10^3) \times 100} = 0.5mm$

35. $n = \frac{\sigma_{yp}}{\sigma} \Rightarrow 3 = \frac{360}{\sigma} \Rightarrow \sigma = 120(MPa)$

$A = \frac{P}{\sigma} = \frac{6000}{120} = 50(mm^2)$

36.



$F = \tau \times A = 300 \times 3 \times (50 \times 8) = 360000(N) = 360(kN)$

37. $I = \frac{bh^3}{12} \Rightarrow 2 \times 2^3 = 16$

38. (1) $\bar{y} A = \Sigma A_i y_i \Rightarrow \bar{y} = \frac{20 \times 5 + 20 \times 11}{20 + 20} = 8$

(2) $\sigma = \frac{M_y}{\bar{I}} \Rightarrow \frac{\sigma_t}{\sigma_c} = \frac{8}{4} = 2$

40. $\phi_A = \frac{TL}{GJ} = \frac{32TL}{G\pi d^4}$

$$\phi_B = \frac{T \times \frac{L}{2}}{G \times \frac{\pi d^4}{32}} + \frac{T \times \frac{L}{2}}{G \times \frac{\pi}{32}[d^4 - (\frac{d}{2})^4]} = \frac{32TL}{G\pi d^4} \times \frac{31}{30}$$