

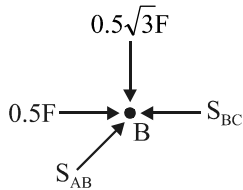
106 學年度四技二專第二次聯合模擬考試 土木與建築群 專業科目(一) 詳解

106-2-06-4

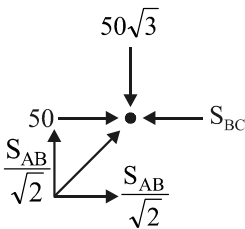
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	C	D	A	C	B	A	B	D	B	D	C	D	C	B	D	A	B	B	C
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
A	C	C	B	A	C	B	C	D	A	D	D	C	A	A	A	B	D	B	D

第一部分：工程力學

- (B) 拘束向量產生變形效應
(C) 速率為純量
(D) 1 牛頓是指 1 kg 之物體產生 1 m/sec² 加速度所需之力
- 共點力系平衡



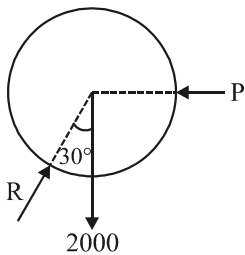
分解



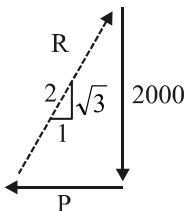
$$\Sigma F_y = 0, S_{AB} = 50\sqrt{6}$$

$$\Sigma F_x = 0, 50 + \frac{S_{AB}}{\sqrt{2}} = S_{BC}, S_{BC} = 50(\sqrt{3} + 1)$$

3.



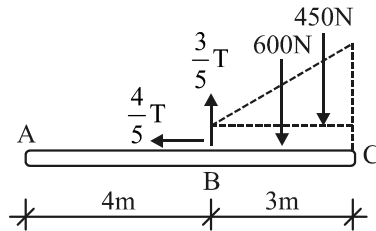
力的多邊形為



$$\text{所以 } \frac{R}{P} = \frac{2}{1}$$

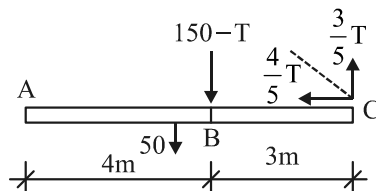
- 合力 $R = 6(\leftarrow)$, $\Sigma M_D = 0$, $6 \cdot x = 8 \times 8 - 4 \times 4$
 $x = 8$, 離 D 處 8 m, 所以經過 A

- 取梁之自由體圖



$$\Sigma M_A = 0, 0.6T \times 4 = 600 \times 5.5 + 450 \times 6, T = 2500 \text{ N}$$

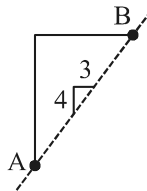
- 取梁之自由體圖



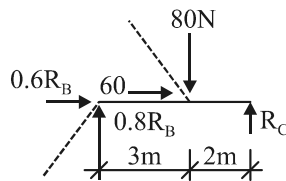
$$\Sigma M_A = 0$$

$$50 \times 3.5 + (150 - T) \times 4 = 0.6T \times 7, T = 94.5 \text{ N}$$

- 取自由體圖, AB 梁二力桿件



所以 BC 梁



$$\Sigma M_B = 0, R_C = 48$$

$$\Sigma F_y = 0, 0.8 R_B + 48 = 80, R_B = 40$$

$$R_{Bx} = 24 \text{ N} (\rightarrow), R_{By} = 32 \text{ N} (\uparrow), \therefore R_A = R_B = 40 \text{ N}$$

- 空間非共點平行力系, 平衡方程式數 3 個

$$9. f_x = 130 \times \frac{4}{13} = 40 \text{ N}, f_y = 130 \times \frac{3}{13} = 30 \text{ N}$$

$$f_z = 130 \times \frac{12}{13} = 120 \text{ N}$$

- 分解 $60\sqrt{3}$, $f_x = 60\sqrt{3} \times \frac{2}{\sqrt{12}} = 60 \text{ N}$

$$f_y = -60 \text{ N}, f_z = 60 \text{ N}$$

$$\therefore \Sigma F_x = 60 \text{ N}, \Sigma F_y = 0, \Sigma F_z = 60 \text{ N}$$

$$R = \sqrt{60^2 + 0^2 + 60^2} = 84.9 \text{ N}$$

11. $\Sigma M_A = 0$, 得 $R_F = 100 \text{ kgf}$ (\uparrow)

$$R_{Ay} = 10 \text{ kgf} (\downarrow), R_{Ax} = 60 \text{ kgf} (\leftarrow)$$

$$R_A = \sqrt{10^2 + 60^2} = 60.8 \text{ kgf}, \text{ 零桿有 } S_{BH} = 0$$

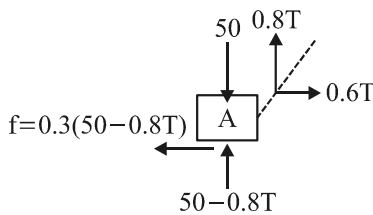
由節點 A, 得 $S_{AH} = 50 \text{ kgf}$ (拉力)

由節點 F, 得 $S_{DF} = 100 \text{ kgf}$ (壓力)

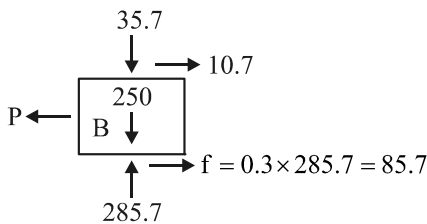
12. 桁架零桿有 S_{GH} 、 S_{IH} 、 S_{DE} 、 S_{EF} 、 S_{FG} 、 S_{AI} 共 6 根

13. 桁架零桿有 S_{IH} 、 S_{BI} 、 S_{IC} 、 S_{IG} , 共 4 根

14. 取 A 自由體圖

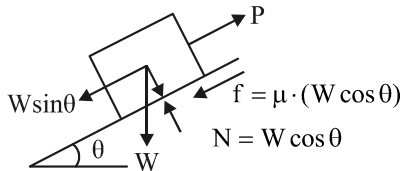


得 $T = 17.9 \text{ N}$



所以 P 至少 96.4 N (\leftarrow) 才能移動 B 物體

15.



$$\therefore W \sin \theta + \mu W \cos \theta = P$$

$$W(\sin \theta + \mu \cos \theta) = P, W = \frac{P}{(\sin \theta + \mu \cos \theta)}$$

16. $I_{\text{頂}} = I_G + A \cdot d^2 = \frac{bh^3}{36} + \frac{bh}{2} \cdot \left(\frac{2h}{3}\right)^2 = \frac{bh^3}{4}$

$$I_{\text{底}} = \frac{bh^3}{12}$$

$$K_{\text{頂}} = \sqrt{\frac{I_{\text{頂}}}{A}} = \sqrt{\frac{\frac{bh^3}{4}}{\frac{bh}{2}}} = \sqrt{\frac{h^2}{2}} = \frac{h}{\sqrt{2}}$$

$$K_{\text{底}} = \sqrt{\frac{I_{\text{底}}}{A}} = \sqrt{\frac{\frac{bh^3}{12}}{\frac{bh}{2}}} = \sqrt{\frac{h^2}{6}} = \frac{h}{\sqrt{6}}$$

17. $\bar{x} = \frac{\pi r \cdot r + \frac{\pi r}{2} (2r + \frac{2r}{\pi})}{(\frac{3\pi r}{2})} = \frac{2r}{3\pi} (2\pi + 1)$

$$\bar{y} = \frac{(\pi r \cdot \frac{2r}{\pi}) + \frac{\pi r}{2} (r - \frac{2r}{\pi})}{(\frac{3\pi r}{2})} = \frac{r^2 + \frac{\pi r^2}{2}}{(\frac{3\pi r}{2})} = \frac{r(\pi + 2)}{3\pi}$$

18. $\delta_{BC} = \frac{3P\ell}{AE}$ 縮短

19. 修正正式為

$$\epsilon_x = \frac{\delta_x}{L} = \frac{\frac{PL}{AE}}{L} = \frac{P}{AE} = \frac{60 \times 10^3}{60 \times 2 \times 10^6} = 0.0005$$

$$\epsilon_y = \epsilon_z = -\mu \cdot \epsilon_x = -0.0001$$

$$\epsilon_v = \epsilon_x + \epsilon_y + \epsilon_z = 0.0003$$

20. $\epsilon_x = \frac{\delta_x}{\ell} = \frac{-1.2 \times 10^{-3}}{4} = -0.3 \times 10^{-3}$

因為在水中, $\therefore \epsilon_x = \epsilon_y = \epsilon_z = -0.3 \times 10^{-3}$

第二部分：工程材料

21. (A) 比重為無因次純量

22. (C) 費開針總重 300 g

23. (C) 第三型卜特蘭水泥的含量大小為

$$C_3S > C_2S > C_3A > C_4AF$$

24. 空隙率 = $\frac{2.65 \times 1000 - 1600}{2.65 \times 1000} \times 100\% = 39.6\%$

25. (A) 每澆置 100 m³ 或樓地板面積達 450 m² 必須取樣一次

27. 冬天要使用速凝劑, 氯化鈣

28. (C) 鑽心試驗為破壞試驗

29. (D) F.M. 為零, 表示所有粒料均通過 #100 篩

30. (A) 凝灰岩為水成岩

32. 普通磚分三級是依據磚的吸水率、抗壓強度來區分

34. (A) 水晶玻璃是指鉛玻璃

35. (A) 兩片玻璃中間夾一層聚乙烯縮丁醛樹脂, 藉由高溫高壓作用, 稱為膠合玻璃

36. (A) 克氏露口杯用來測定閃火點

37. 針入度為 25 °C, 5 秒貫入 0.8 cm, 針入度為 80

39. $3 \times 2.5 \times 0.7 \times 2 \text{ 支} + 3 \times 2.5 \times 0.3 \times 1 \text{ 支} = 12.75 \text{ 才}$

40. (D) 木材浸入水中與空氣隔離, 不會腐朽