103 學年度四技二專第一次聯合模擬考試
土木與建築群　專業科目(一)　詳解

103-1-06-4

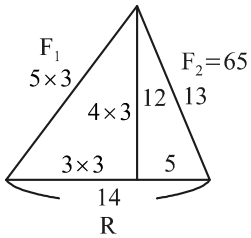
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
D	A	C	D	B	B	C	B	D	A	C	B	B	A	D	A	C	D	D	A
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
B	D	A	C	D	C	B	C	C	D	B	B	A	A	D	A	B	D	D	C

第一部分：工程力學

2. $\because F_{2x}=F_{1x}=25\times\frac{4}{5}=20$

$F_{1y}+F_{2y}=(25\times\frac{3}{5})+(20\times\frac{12}{5})=63\ N$

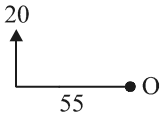
3. $\therefore R=65\times\frac{14}{13}=70\ N$



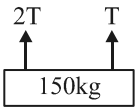
4. $\uparrow R=25+10-15=20(\uparrow)$

$\circlearrowleft \Sigma M_o=(15\times80)-(10\times10)=20\times a$

$\therefore a=55$ (在 O 點左側)

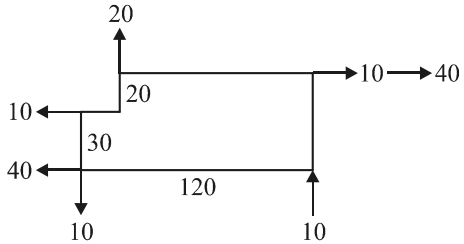


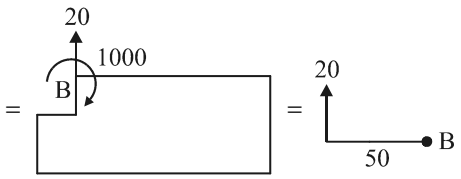
5. $\therefore 3T=150$ ，$\therefore T=50$ kgf



6. $\circlearrowleft$合力偶$=(10\times20)+40\times(20+30)-(10\times120)=1000\circlearrowleft$

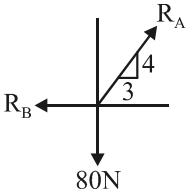
$\uparrow$ 20 N 在 B 點左側 50 cm 可得力矩 1000$\circlearrowleft$





7. $\therefore R_A=80\times\frac{5}{4}=100\ N$

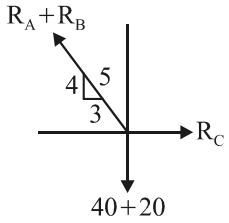
$R_B=80\times\frac{3}{4}=60\ N$



8. ①先取兩球爲一整體

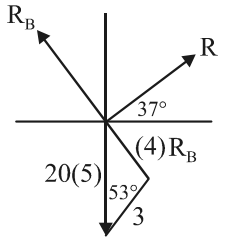
$\therefore R_A+R_B=60\times\frac{5}{4}=75\ N$

$\Rightarrow R_A=75-R_B=75-16=59\ N$

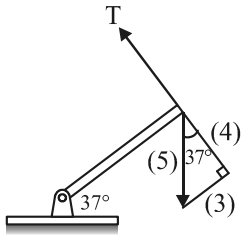


②再取 W_1 上球

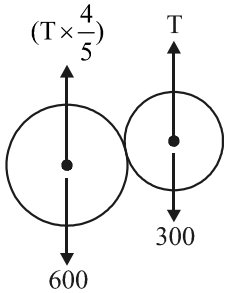
$\therefore R_B=20\times\frac{4}{5}-=16\ N$



9. $\therefore T=800\times\frac{4}{5}=640\ N$



10. $(T\times\frac{4}{5})+T=600+300$ ，$\therefore T=\frac{900}{1.8}=500\ N$



11. ① $d=\sqrt{(10-3)^2+(3-9)^2+(-2-4)^2}=11$

② $F_x = 550\times\dfrac{(10-3)}{11} = 350\ N$

12. $\because \cos^2\theta_x + \cos^2\theta_y + \cos^2\theta_z = 1$

$\therefore \cos^2 60° + \cos^2 45° + \cos^2\theta_z = \dfrac{1}{4} + \dfrac{1}{2} + \cos^2\theta_z = 1$

$\therefore \cos^2\theta_z = \dfrac{1}{4}$ ，$\therefore \theta_z = 60°$

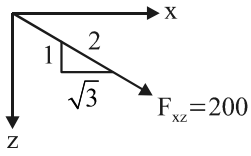
13. ①先求 $F_{xz} = 400\times\cos 60° = 200$

$F_y = 400\times\cos 30° = 200\sqrt{3}\ N$

②再由 xz 平面

$\therefore F_x = 200\times\dfrac{\sqrt{3}}{2} = 100\sqrt{3}\ N$

$F_z = 200\times\dfrac{1}{2} = 100\ N$



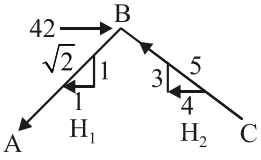
14. ①取 B 節點，由 k 桁架特性

$H_1 = 42\times\dfrac{3}{7} = 18$

$\therefore AB = 18\times\dfrac{\sqrt{2}}{1} = 18\sqrt{2}$ (拉)

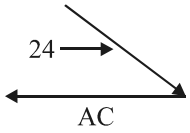
$H_2 = 42\times\dfrac{4}{7} = 24$

$\therefore BC = 24\times\dfrac{5}{4} = 30$ (壓)

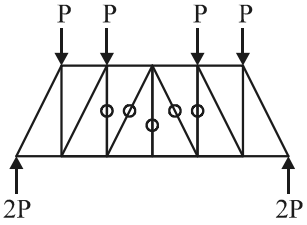


②再取 C 節點， $AC = 24$ (拉)

$CD = 0$ ， $AD = 0$

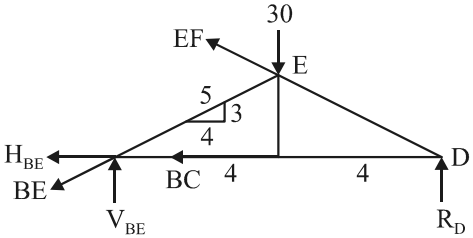


15.

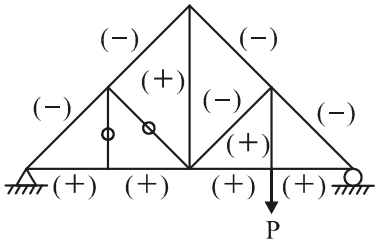


16. ① $\sum M_D = 0$ ， $(30\times 4) - (V_{BE}\times 8) = 0$ ，$\therefore V_{BE} = 15$

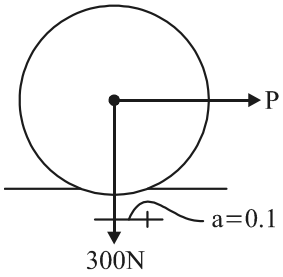
② $\therefore BE = 15\times\dfrac{5}{3} = 25$ (壓)



17. 壓力桿共 5 支，拉力桿共 6 支，零桿共 2 支



18. $P\times r = w\times e$ ，$\therefore P\times 30 = 300\times 0.1$ ，$\therefore P = 1\ N$

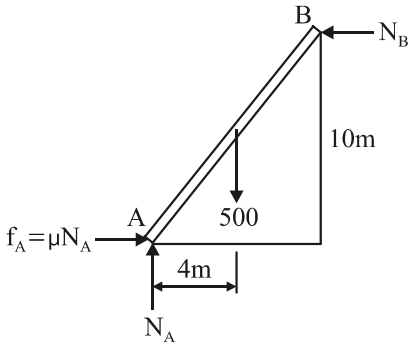


19. ① $\circlearrowleft \sum M_A = 0$ ， $(500\times 4) = N_B\times 10$ ，$\therefore N_B = 200\ N$

② $\sum F_y = 0$ ， $N_A = 500$

③ $\sum F_x = 0$ ， $f_A = \mu N_A = N_B$

$\therefore \mu\times 500 = 200$ ，$\therefore \mu = 0.4$



20. ①先分解 B 物 300 N

$\begin{cases}\text{沿斜面下滑力 } F' = 300\times\sin 37° = 180\\ \text{垂直斜面正壓力 } N_1 = 300\times\cos 37° = 240\end{cases}$

② $f = \mu(N_1 + N_2) = 0.25(240 + 800) = 260$

③ $\swarrow \sum F = (P + 180) - 260 \geq 0$ ，A 與 B 成一整體開始一起向左下運動

$\therefore P \geq 260 - 180 = 80\ N$

第二部分：工程材料

22. 長期加載下，內應力的損失(減少)稱爲鬆弛
變形量的產生稱爲塑性(降伏)

23. 吸音率 $= 1 - \dfrac{e_1}{e} = 1$ 時， $e_1 = 0$ ， $e_2 + e_3 + e_4 = e$

24. 高鋁水泥爲早強水泥的一種，第一天即可使用，又稱爲「一天水泥」

25. 閃凝是 C_3A 含量太多

29. 均一級配指粒料全由同一號粒料組成，是一種不良級配

32. 細粒料的比重瓶試驗： $A = 400$ 、 $B = 708$

$\therefore G = \dfrac{500}{A - B + 500} = \dfrac{500}{192} = 2.6$

33. 高性能混凝土(H.P.C)是添加卜作嵐材料與強塑劑(S.P劑)

35. 石英岩是由砂岩變質而成

36. 花崗岩爲含 SiO_2 達 66%以上的酸性岩

37. 花崗岩在 300°C 表面開始變色，800°C 完全崩解剝落，石灰岩的耐火性較花崗岩稍高些，在 500°C 開始變色，850°C 分解成生石灰

39. 2 種磚抗壓強度爲 20 Mpa(200 kg/cm^2)以上