ANSWERS

1.1.(a)	1.2. (d)	1.3.(c)	1.4.(c)	1.5.(c)	1.6.(a)	1.7.(c)	1.8.(d)	1.9. (b)	1.10.(c)
1.11.(c)	1.12. (c)	1.13.(c)	1.14.(b)	1.15.(a)	1.16.(b)	1.17.(a)	1.18.(d)	1.19. (b)	1.20.(d)
1.21.(c)	1.22. (d)	1.23.(b)	1.24.(a)	1.25.(b)					
2.1.(c)	2.2.(a)	2.3.(c)	2.4. (b)	2.5.(b)	2.6.(d)	2.7 (a)	2.8.(b)	2.9.(b)	2.10.(a)
2.11.(b)	2.12.(a)	2.13.(d)	2.14. (b)	2.15.(c)	2.16.(a)	2.17. (b)	2.18.(c)	2.19.(a)	2.20.(c)
2.21.(d)	2.22.(b)	2.23.(b)	2.24. (a)	2.25.(a)					

EXPLANATIONS

10. $\tan\phi_w = \frac{\gamma'}{\gamma_{sat}}\left(\frac{1}{F_d}\tan\phi'\right)$

$= \frac{10}{20}\left(\frac{1}{1.5}\tan 30\right)$

or $\phi_w = 10.89°$

11. $S = c + \sigma' \tan\phi$

$= 10 + (150)\tan 30$

$= 96.6$ kPa

12. $k = C_v m_v \gamma_w$

$T_v = \frac{\pi}{4}(v)^2 = \frac{C_v t}{h^2}$

$\therefore \quad t_1 = \frac{h_1^2 v_1^2}{k_1} m_v \gamma_w$

and $t_2 = \frac{h_2^2 v_2^2}{k_2} m_v \gamma_w$

$\therefore \quad \frac{t_1}{t_2} = \left(\frac{h^2}{h}\right)^2 \times \left(\frac{v_2}{v_1}\right)^2 \left(\frac{k_1}{k_2}\right)\left(\frac{m_{v_2}}{m_{v_1}}\right)^2$

$= \frac{1}{4} \times 1 \times \frac{1}{10} \times 4 = \frac{1}{10}$

$t_2 = \frac{t_1}{10} = \frac{10}{10} = 1$ year

13. Given $\sigma_1 = 60, \sigma_3 = 20$

Now $\sigma_1 = \sigma_3 N_\phi + 2c\sqrt{N_\phi}$

where $c = 0$

$\therefore \quad \frac{\sigma_1}{\sigma_3} = N\phi = \frac{60}{20} = 3$

$\therefore \quad \tan\left(45 + \frac{\phi}{2}\right) = \sqrt{3} = 1.732$

or $45 + \frac{\phi}{2} = 60$

or $\frac{\phi}{2} = 60 - 45$

$\therefore \quad \phi = 30°$

14. $k = \frac{aL}{At}\log_e\left(\frac{n_1}{n_2}\right)$

where, $a = \frac{\pi}{4}(.5)^2 = 0.196$

$A = \frac{\pi}{4}(20)^2 = 78.54$

$L = 20$ cm

$t = 3 \times 60 \times 60$

$\therefore \quad k = \frac{196 \times 20}{7.054 \times 60 \times 3 \times 60}\log\left(\frac{1}{35}\right)$

$= 4.86 \times 10^{-6}$ cm/sec

15. $\frac{y_2}{y_1} = \frac{1}{2}\left[-1 + \sqrt{1 + 8F_1^2}\right] = 3.77$

$\therefore \quad \frac{y_1}{y_2} = -\frac{1}{2}\left[-1 + \sqrt{1 + 8F_1^2}\right]$

$F_2 = 0.41$

17. Rain = Rainfall–Rainoff

$= 0.8 \times 6 - \frac{256000}{8.6 \times 10^6}$

$= 0.304$