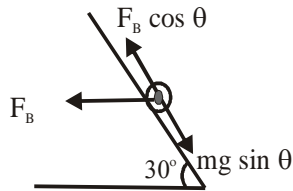


1) Answer: Option (1)

$$R = \frac{V}{I}, \frac{\theta}{I} = 5000, \frac{\theta}{V} = 20$$

$$R = \frac{\theta/I}{\theta/V} = 250 \Omega$$

2) Answer : Option (3)



$$F_B \cos \theta = mg \sin \theta$$

$$Il B \cos \theta = mg \sin \theta$$

$$I = \frac{mg \tan \theta}{lB}$$

$$I = 11.3A$$

3) Answer : Option (2)

$$\text{Power} = \frac{1}{2} \frac{V_0^2}{Z} \cos \phi$$

$$\cos \phi = \frac{R}{Z}$$

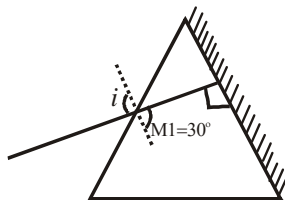
$$Z = \sqrt{(X_c - X_c)^2 + R^2}$$

$$= 56 \Omega$$

$$P = 0.79 \text{ w}$$

4) Answer : Option (2)

5) Answer : Option (4)



$$M_1 = 30^\circ, M_2 = 0$$

$$\sin i = \mu \sin 30^\circ = \sqrt{2} \times \frac{1}{2}$$

$$\sin i = \frac{1}{\sqrt{2}} \quad i = 45$$

6) Answer : Option (4)

Direction of propagation  $\rightarrow \vec{E} \times \vec{B}$

7) Answer : Option (4)

$$V_1 = \frac{uf}{u.f} = -24cm$$

$$V_2 = \frac{uf}{u.f} = -60cm$$

$$\text{displacement of image} = V_2 - V_1 = -36cm$$

8) Answer : Option (3)

$$E = \frac{1}{2} Li^2$$

$$L = \frac{2E}{i^2} = 13.84$$

9) Answer : Option (2)

$$a = \frac{F}{m} = \frac{eE}{m}$$

$$V = \left( V_0 + \frac{eE_0 t}{m} \right)$$

$$\lambda = \frac{h}{mv} = \frac{h}{mv_0}$$

$$\lambda = \frac{\lambda_0}{\left( 1 + \frac{eE_0 t}{mv_0} \right)}$$

10) Answer : Option (2)

$$h\nu_c = h\nu_{th} + \frac{1}{2} mV^2$$

$$\frac{1}{2} mV_1^2 = 2h\nu_0 - h\nu_0 = h\nu_0$$

$$\frac{1}{2} mV_2^2 = 5h\nu_0 - h\nu_0 = 4h\nu_0$$

$$\frac{V_1^2}{V_2^2} = \frac{1}{4} \quad \frac{V_1}{V_2} = \frac{1}{2}$$

11) Answer : Option (2)

$$N_0 = 600 \quad N_f = 450$$

$$N = N_0 - N_f \quad t_m = 10$$

$$\frac{N}{N_0} = \left( \frac{1}{2} \right)^{t/T} \quad \left( \frac{1}{2} \right)^2 = \left( \frac{1}{2} \right)^{t/10}$$

$$t = 20 \text{ min}$$

**another method**

$$600 \xrightarrow{10 \text{ min}} 300 \xrightarrow{10 \text{ min}} 150$$

$$\text{total} = 10 + 10 = 20 \text{ min}$$

time

12) Answer : Option (4)

$$E_{total} = -K.t$$

$$\frac{K.t}{E_{total}} = \frac{1}{-1}$$

13) Answer : Option (4)

14) Answer : Option (4)

$$\theta \propto \frac{1}{d}, \frac{\theta_1}{\theta_2} = \frac{d_2}{d_1} \quad d_2 = 1.9 \text{ mm}$$

15) Answer : Option (1)

$$MP = \frac{f_0}{f_e}$$

$$R.P = \frac{d}{1.22\lambda}$$

16) Answer : Option (1)

$$P = \sigma AT^4, \quad T \propto \frac{1}{\lambda_m^4}$$

$$\frac{P_2}{P_1} = \frac{\lambda_{m_1}}{\lambda_{m_2}}$$

$$\left(\frac{\lambda_0}{\lambda_0}\right)^4 = \frac{nP}{P} = \frac{256}{81}$$

$$n = \frac{256}{81}$$

17) Answer : Option (2)

$$\frac{F_1}{F_2} = \left(\frac{A_1}{A_2}\right)^2 = \frac{1}{9}$$

$$F_2 = 9F_1$$

18) Answer : Option (1)

$$\frac{dQ}{dt} \propto F_v V_T \quad V_T \propto R^2 \quad F_v \propto V_T R$$

$$\frac{dQ}{dt} \propto R^5$$

19) Answer : Option (4)

$$\Delta U = \Delta Q - \Delta W$$

$$Q = 225.72 J$$

$$W = P\Delta V = 169$$

$$\Delta U = 208.8$$

20) Answer : Option (4)

Angular momentum is conserved

$$KE \propto \frac{1}{I}$$

$$K_A > K_B > K_C$$

21) Answer : Option (4)

$$\frac{K.E_{rot}}{K.E_{total}} = \frac{K}{K+1}$$

$$\frac{K.E_{tran}}{K.E_{total}} = \frac{1}{K+1} = \frac{1}{\frac{2}{5}+1} = \frac{5}{7}$$

22) Answer : Option (3)

23) Answer : Option (3)

$$g = \frac{Gm_e}{r^2} \theta$$

24) Answer : Option (3)

$$Z = (\vec{M}_2 - \vec{M}_1) \times \vec{F}$$

$$\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 2 & -1 \\ 4 & 5 & -6 \end{vmatrix}$$

$$= -7\hat{i} - 4\hat{j} - 8\hat{k}$$

25) Answer : Option (3)

Reading of screw gauge

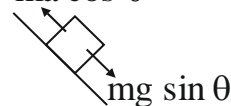
$$= MSR + VSR \times LC + \text{Zero error}$$

$$= 0.5 + 25 \times 0.001 + 0.004$$

$$= 0.529 \text{ cm.}$$

26) Answer : Option (3)

$$ma \cos \theta$$



$$a = g \tan \theta$$

$$ma \cos \theta = mg \sin \theta$$

27) Answer : Option (4)

$$\text{Distance} = 9 \text{ m, } \langle \text{speed} \rangle = 3 \text{ m/s}$$

$$\text{Displacement} = 3 \text{ m } \langle \text{velocity} \rangle = 1 \text{ m/s}$$

28) Answer : Option (4)

$$V = 2f(l_2 - l_1) = 339.2 \text{ m/s}$$

29) Answer : Option (2)

$$F = \frac{\theta^2}{2AE_0}$$

F doesn't depend on distance between plate

30) Answer : Option (2)

$$t = \sqrt{\frac{2h}{a}} = \frac{qe}{m}$$

$$t = \sqrt{\frac{2hm}{qE}}$$

$$t \propto \sqrt{m}$$

$$m_p > m_e$$

31) Answer : Option (4)

$$a = \omega^2 x$$

$$\omega^2 = 4$$

$$\omega = 2$$

$$T = \pi \text{ sec}$$

32) Answer : Option (2)

$$I = \frac{nE}{nr} = \frac{E}{r} = \text{const}$$

33) Answer : Option (4)

orange - 3, yellow - 4, violet - 7, silver - 10%

34) Answer : Option (2)

$$I = \frac{E}{nR + R} \rightarrow \text{series} \text{---} \textcircled{1}$$

$$10I = \frac{E}{\frac{R}{n} + R} \text{ parallel} \text{---} \textcircled{2}$$

$$\textcircled{2} \div \textcircled{1}$$

$$n = 10$$

35) Answer : Option (4)

$$V_{esc} = V_{\mu ms}$$

$$11.2 \times 10^3 = \sqrt{\frac{3KT}{m}}$$

$$T = 8.360 \times 10^4$$

36) Answer : Option (2)

$$V \propto T$$

$$W = \mu R \Delta T$$

$$\Delta Q = \mu C_p \Delta T$$

$$C_p = \frac{5}{2} R \quad \frac{W}{Q} = \frac{\mu R \Delta T}{\mu \frac{5}{2} R \Delta T} = \frac{2}{5}$$

37) Answer : Option (2)

$$f_{oop} = f_{cop}$$

$$\frac{V}{2loop} = \frac{3V}{4loop}$$

$$loop = \frac{2}{3} \times 20 = 13.3 \text{ cm}$$

38) Answer : Option (2)

$$\eta = \frac{T_1 - T_2}{T_1} \times 100$$

$$\eta = \frac{100}{373} \times 100 = 26.8\%$$

39) Answer : Option (4)

$$e = \frac{|V_2 - V_1|}{|u_2 - u_1|}$$

$$\frac{V}{u} - o = \frac{1}{V - o} = \frac{1}{4}$$

$$e = 0.25$$

40) Answer : Option (3)

$$V_A = \sqrt{5gR}$$

$$mgh = \frac{1}{2} m V_A^2$$

$$R = \frac{D}{2}$$

$$h = \frac{1}{2} \frac{V_A^2}{g}$$

$$h = \frac{5D}{4}$$

41) Answer : Option (2)

$$W = \text{loss in K.E} = \frac{1}{2} I \omega^2$$

$$I_C > I_B > I_A$$

$$W_C > W_B > W_A$$

42) Answer : Option (3)

Coefficient of sliding friction is dimension less

43) Answer : Option (4)

$$\overline{AB} + \overline{AB}$$

44) Answer : Option (3)

$$V_c = I_B R_B + V_{BE}$$

$$20 = I_B (500 \times 10^3) + 0$$

$$I_B = 40 \mu A$$

$$V_{CC} = I_C R_C + V_{CE}$$

$$I_C = 5 \text{ mA}$$

$$\beta = \frac{I_C}{I_B} = 125$$

45) Answer : Option (3)

affects the over all V - I characteristics