Monthly Progressive Test

Class: XI

Subject: PCMB

Test Booklet No.: MPT06 | Test Date: 0 3 1 0 2 0 2 4

Time: 120 mins | Full Marks: 200

Solutions

Physics

1. Ⓓ

G is universal gravitational constant

2. Ⓐ

$F \propto \frac{1}{d^2}$

$\frac{F_{new}}{F} = \frac{d^2}{4d^2}$

$F_{new} = \frac{F}{4}$

Decreased by 75%

3. Ⓑ

It follows $F = \frac{G m_1 . m_2}{x^2}$

4. Ⓐ

$$F_{new} = \frac{G\left(\frac{m_1}{2}\right)\left(\frac{m_2}{2}\right)}{\left(\frac{d}{2}\right)^2}$$

$$= \frac{G m_1 . m_2}{d^2}$$

5. Ⓑ

$H = wt \Rightarrow 100 = 25 \times t$

$\Rightarrow t = 4s$

$y = \frac{1}{2} st^2 = 5 \times 16 = 80$ m

$\therefore$ 100 – 80 = 20 m from ground

6. Ⓐ

$$mg' = mg\left(1 - \frac{2h}{R}\right) = mg\left(1 - \frac{d}{R}\right)$$

h : d = 1 : 2

7. Ⓑ

$GM = gR^2$

$G.\,2M = 4g_pR^2$

$\therefore\ 2g_p = g$

8. Ⓑ

$MR^2 = MK^2 \Rightarrow K = R$

9. Ⓐ

$$I = \int (dm)R^2 = R^2 \int dm = MR^2$$

10. Ⓒ

$I_x = I_y \quad \therefore \quad 2I_x = I = MR^2$

$$I_x = \frac{MR^2}{2}$$

11. Ⓒ

$$MK^2 = \frac{MR^2 2}{2} \;\Rightarrow\; K = \frac{R}{\sqrt{2}}$$

12. Ⓓ

Apply parallel axis theorem $I_T = MR^2 + MR^2 = 2MR^2$

13. Ⓐ

14. Ⓐ

15. Ⓐ

$\theta_1 = \frac{1}{2} \times 4 \times 10^2 = 200$ rad.

$\omega = \propto t = 4 \times 10 = 40$ rad / s

$\theta_2 = \omega t = 40 \times 10 = 400$ rad

$\theta_3 = 200$ rad

$\theta = \theta_1 + \theta_2 + \theta_3 = 800$ rad.

16. Ⓐ

$R = \frac{2(4)(3)}{10} = 2.4$ m

17. Ⓓ

u is not supplied.

18. Ⓐ

$u\cos\theta = 1$ m/s $\quad u\sin\theta = 2$ m/s.

Apply $y = x\tan\theta - \frac{1}{2}.g.\frac{x^2}{(u\cos\theta)^2}$

19. Ⓐ

20. Ⓑ

$\vec{v} = (3\hat{i} + 4\hat{j}) + (0.1\hat{i} + 0.3\hat{j}) \times (10)$

$= 4\hat{i} + 7\hat{j}$

$\upsilon = \sqrt{16 + 49} = \sqrt{65}$ m / s.

21. Ⓐ

$\frac{1}{2} \cdot \left(\frac{I_1 . I_2}{I_1 + I_2}\right)(\omega_1 - \omega_2)^2$

$I_1 = I_2 = I$

22. Ⓑ

$$\frac{K_1}{K_2} = \frac{\cancel{\frac{1}{2}}\left(\frac{2}{5}\cancel{MR^2}\right)(\omega^2)}{\cancel{\frac{1}{2}}\left(\frac{\cancel{MR^2}}{2}\right)4\,\omega^2}$$

$= \frac{4}{5} \cdot \frac{1}{4} = \frac{1}{5}.$

23. Ⓑ

$I_1 \cdot \omega_1 = (2I_1)\,\omega_2$

$\omega_2 = \dfrac{\omega_1}{2}.$

$K_1 = \dfrac{1}{2} . I_1 . \omega_1^2$

$K_2 = \dfrac{1}{2}(2I_1)\dfrac{\omega_1^2}{4}$

$= \dfrac{1}{2} . \left(\dfrac{1}{2} I_1 \,\omega_1^2\right)$

$= \dfrac{1}{2} . K_1$

24. Ⓐ

As $\vec{L} = \vec{r} \times (m\vec{v})$

25. Ⓑ

Apply $a = \dfrac{g\sin\theta}{\left(1+\dfrac{K^2}{R^2}\right)} = \dfrac{g\sin\theta}{\left(1+\dfrac{1}{2}\right)}$

$= \dfrac{2}{3} . 10 . \sin\theta$

$I = \dfrac{MR^2}{2} = K^2 M$

$\dfrac{1}{2} = \left(\dfrac{K^2}{R^2}\right)$

$mg \sin\theta - f = ma$

$-f = m(a - g\sin\theta)$

$= \left(\dfrac{1}{2}\right)\left(\dfrac{20}{3}\sin\theta - 10\sin\theta\right)$

$-f = \sin\theta\left(\dfrac{10}{3} - 5\right) = \dfrac{5}{3}\sin\theta$

Put $\theta = 45°$

$= (+)\dfrac{5}{3\sqrt{2}}$

Chemistry

26. Ⓐ

Enthalpy of vapourization (ΔH_{ray}) = 8400 J (mole)$^{-1}$

Boiling point (T_b) = – 173°C

$$= -173 + 273 = 100 \text{ K}$$

Entropy of vapourization (ΔS_{vap}) $= \dfrac{\Delta H_{vap}}{T_B}$

$$= \frac{8400}{100\,\text{K}} \text{ J (mol)}^{-1}$$

$$= 84 \text{ J(mol)}^{-1} \text{ (K)}^{-1}$$

27. Ⓓ

$$N_2(g) + 2O_2(g) \longrightarrow 2NO_2(g);\ \Delta H = +X\text{ K J.} \longrightarrow (1)$$

$$2NO(g) + O_2(g) \longrightarrow 2NO_2(g), \Delta H = X\ Y\text{ K J.} \longrightarrow (2)$$

Reversing eq (2)

$$2NO_2(g) \longrightarrow 2NO(g) + O_2(g); \Delta H = -Y\text{ K J.} \longrightarrow (3)$$

$$\text{eq(1) } N_2(g) + 2O_2(g) \longrightarrow 2NO_2(g); \Delta H = +X\text{ K J.}$$

$$+ \quad N_2(g) + O_2(g) \longrightarrow 2NO(g);\ \Delta H = (X - Y)\text{ K J}$$

or $\dfrac{1}{2}N_2(g) + \dfrac{1}{2}O_2 \longrightarrow NO(g)\ \Delta H =$ **0.5 (X – Y) K J**

28. Ⓒ

Sublimation means the conversion of solid into vapour by applying heat to the system. In case of vapour, intermolecular force of attraction is the lowest. Hence, entropy change in this process is the highest.

29. Ⓒ

Molar heat capacity of a gas at constant 'T' & 'P' is infinity.

Molar heat capacity $= \dfrac{\Delta H}{\Delta T}$

at constant temperature $\Delta T = 0$

$\therefore$ Molar heat capacity $= \dfrac{\Delta H}{O}$

$$= \propto$$

30. Ⓑ

Work done (W) = – 2.303 × nRT $\log_{10}\left(\frac{V_2}{V_1}\right)$

= – 2.303 × 5 × 0.0821 × 300 $\log_{10}\left(\frac{60}{6}\right)$ 2 atn.

= – 283.65 Litre atn.

= – 283.65 × 101.32J (1 L atn = 101.32 J]

= – 28735.82 J

= – 28.73 KJ

31. Ⓑ

In $C(s) + O_2(g) \longrightarrow CO_2(g)$; C is solid

In $N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$; 2 mole NH_3 is formed

In $CO(g) + \frac{1}{2}O_2(g) \longrightarrow CO_2(g)$; CO(g) is a compound

So correct option is: $\frac{1}{2}H_2(g) + \frac{1}{2}F_2(g) \longrightarrow HF(g)$

Enthalpy of formation $\Delta_f H$ is defined as the formation of one mole of a compound from its elements in then most stable states of aggregate (reference states).

32. Ⓒ

Methane is a non-polar molecule and dipole moment is zero. All the carbon atoms in $H_2C = CH — CH = CH_2$ are sp^2 hybridized. Hence, S. character of all carbon atoms is equal to 33.33%.

33. Ⓓ

$$C_2H_2(g) + \frac{5}{2}O_2(g) \longrightarrow 2CO_2(g) + H_2O(g); \Delta H_1 = -1301\,KJ \quad \text{... eq (1)}$$

$$H_2(g) + \frac{1}{2}O_2(g) \longrightarrow H_2O(l); \ \Delta H_2 = -286\,KJ \quad \text{... eq (2)}$$

$$2C(g) + 2O_2(g) \longrightarrow 2CO_2(g); \Delta H_3 = -787\,KJ \quad \text{... eq (3)}$$

Reversing eq (1) According to Law of Lavoisier's & Laplace's Law

$$2CO_2(g) \longrightarrow C_2H_2(g) + \frac{5}{2}O_2(g); \Delta H_1 = +1301\,KJ \quad \text{... eq (4)}$$

Adding eq (2), 3 & (4) $\quad 2C(g) + H_2(g) \longrightarrow C_2H_2(g); \Delta H = +228\,KJ$

34. Ⓓ

$$H_2(g) + I_2(g) \longrightarrow 2HI\ ;\ \Delta H = +12.40\ K\ Cal$$

So, heat of formation of HI is:

$$\frac{1}{2}H_2(g) + \frac{1}{2}I_2(g) \longrightarrow HI\ ;\ \Delta H = \frac{1}{2} \times 12.40\ K\ Cal$$
$$= 6.20\ K\ Cal$$

35. Ⓐ

Endothermic reaction can be made favourable by increasing temperature.

36. Ⓐ

Refractive index $(\mu) = \frac{\sin i}{\sin r}$ is a unit less quantity

Molarity has unit moles $(L)^{-1}$

Normality has unit g-eqn $(L)^{-1}$

Heat has unit cal or J.

37. Ⓓ

(I) All extensive properties depend on temperature – wrong statement

(II) Mole fraction is an unitless quantity – correct statement

(III) Volume of an ideal gas does not suffer any change with the change in temperature – wrong statement

$PV = nRT$

$\Rightarrow V = \frac{nRT}{P}$

So, $V \propto T$

38. Ⓑ

Assertion: Density is an intensive property – This is correct

Reason: Density changes with the change in temperature of the system – This is also correct, but it is not the correct explanation of assertion

39. Ⓑ

We know, $\Delta G = \Delta H - T\Delta S$

$= -15\ KJ\ (mole)^{-1} - 1000\ \{(-4205\ K^{-1}(mole)^{-1}\}$

$= -15000\ J(mole)^{-1} + 1000 \times 420$

$= +405000\ J(mole)^{-1}$

$= +405\ KJ\ (mole)^{-1}$

40. Ⓐ

$\Delta H = 21\ KJ\ (mole)^{-1} = 21000\ J(mole)^{-1}$

$\Delta S = 105\ KJ\ (mole)^{-1}(K)^{-1}$

$T = ?$

At equilibrium, $\Delta G = 0$

$\therefore\ \Delta G = \Delta H - T\Delta S$

$\Rightarrow\ 0 = \Delta H - T\Delta S$

$\Rightarrow\ T = \dfrac{\Delta H}{\Delta S}$

$\Rightarrow\ T = \dfrac{21000}{105} = 200\ K$

41. Ⓐ

Higher the radius of anion, higher is the ion-dipole interaction between the anion and $\delta^{\oplus}$ part of water molecule. Hence, water solubility becomes higher.

42. Ⓒ

Molar mass of $Na_2CO_3 = [(23 \times 2) + 12 + (16 \times 3)]$

$= 106$

0.53 gm Na_2CO_3 produces $= \dfrac{22.4 \times 0.53}{106} = 0.112\ L\ CO_2$ at STP

0.53 gm Na_2CO_3 produces $= \dfrac{6.02 \times 10^{23} \times 0.53}{106}$

$= 3.01 \times 10^{21}$ water molecules

43. Ⓑ

The electronic configuration of the atom is $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$

So, 5 unpaired electrons are there in 3d orbital

Now, $\mu = \sqrt{15}$ BM means that there are 3 unpaired electrons

So, the atom has released 4 electrons (2 from 4s and 2 from 3d)

44. Ⓐ

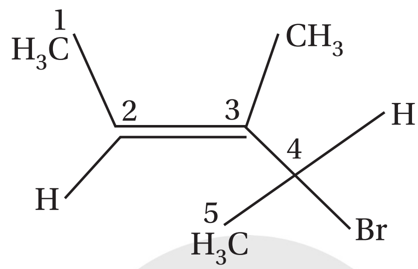
In C_2H_6 only one bond is between two carbon atoms and double bond is in case of C_2H_4 and triple bond is in case of C_2H_2. In C_2H_6 only one bond in between two carbon atoms, double bond in can of C_2H_4, and triple bond in case of C_2H_2. So, the correct order of carbon-carbon bond length. $C_2H_6 > C_2H_4 > C_2H_2$

45. Ⓓ

In H_2O_2 molecule, there is only one bond between two oxygen atoms hence the extent of lone pair-lone pair repulsion is much higher than that in oxygen molecule. So, oxygen – oxygen bond length in H_2O_2 is much higher than O_2.

In ClF_3 molecule, two lone pairs of chlorine are placed at equatorial positions. Two fluorine atoms are placed at axial position while one at equatorial position. BF_3 is planar and NH_3 is pyramidal.

46. Ⓓ



4-Bromo–3–methylpent–2–ene

Note: While naming the compound, alkene gets priority over the functional group, Br and numbering starts from alkene side.

47. Ⓐ

$H_2C = CHCH_2C \equiv CH$ Pent–1–ene–4–yne

4-Nitrotoluene

$H_3CCOCH_2CH_2CHO$ 4-Ketopentanal

48. Ⓐ

2, 2, 4, 4 – tetramethyl pentane $H_3CC(CH_3)_2CH_2C(CH_3)_2CH_3$

contains 6 primary carbon atoms, 2 quaternary carbon atoms and one secondary carbon atom.

49. Ⓑ

$$\overset{1}{CH_2} = \overset{2}{CH} - \underset{\displaystyle CH_3}{\overset{3}{CH}} - \overset{4}{CH_3}$$

(3–methyl–1–butene)

(alkene gets priority)

50. Ⓓ

$\Delta H = \Delta E + (\Delta n_g)RT$

$\therefore\ (\Delta H - \Delta E) = (\Delta n_g)RT$

Now, according to the given equation,

$\Delta n = (12 - 15) = -3.$

$\therefore\ (\Delta H - \Delta E) = (-3)\,(8.314)\,(300)$

$= -\,7482.6$ Joule $= -\,7.4826$ kJ

Mathematics

51. Ⓒ

$$\left(1+\cos\frac{\pi}{8}\right)\left(1-\cos\frac{\pi}{8}\right)\left(1+\cos\frac{3\pi}{8}\right)\left(1-\cos\frac{3\pi}{8}\right)$$

$$=\left(1-\cos^2\frac{\pi}{8}\right)\left(1-\cos^2\frac{3\pi}{8}\right)$$

$$=\sin^2\frac{\pi}{8}\times\sin^2\frac{3\pi}{8}$$

$$=\sin^2\frac{\pi}{8}\times\cos^2\frac{\pi}{8}$$

$$=\frac{1}{4}\left(2\sin\frac{\pi}{8}\cos\frac{\pi}{8}\right)^2$$

$$=\frac{1}{4}.\left(\sin\frac{\pi}{4}\right)^2$$

$$=\frac{1}{4}\times\frac{1}{2}$$

$$=\frac{1}{8}$$

52. Ⓐ

$|\,z\,| \geq 3\ ;\ \left|z+\frac{1}{z}\right|$

$$|z|=\left|\left(z+\frac{1}{z}\right)-\frac{1}{z}\right| \leq \left|z+\frac{1}{z}\right|+\frac{1}{|z|}$$

$\Rightarrow |z| - \frac{1}{|z|} \le \left|z + \frac{1}{z}\right|$

$\Rightarrow \left|z + \frac{1}{z}\right| \ge |z| - \frac{1}{|z|} = 3 - \frac{1}{3} = \frac{8}{3}$

Least value $= \frac{8}{3}$.

53. Ⓒ

$f(x) = |3 - x| + 7 \ \ge \ 7$

$f_{\min} = 7$

54. Ⓐ

${}^{m+n}P_2 = 90$ and ${}^{m-n}P_2 = 30,$

$\frac{(m+n)!}{(m+n-2)!} = 90, \ \ \frac{(m-n)!}{(m-n-2)!} = 30$

$\Rightarrow \ (m+n)(m+n-1) = 90 \ \Rightarrow \ m+n = 10$

$(m-n)(m-n-1) = 30 \ \Rightarrow \ m-n = 6$

$m = 8, n = 2$

55. Ⓐ

$\frac{11!}{\underset{(M)}{2!}\ \underset{(A)}{2!}\ \underset{(T)}{2!}}$

56. Ⓐ

ATQ, ${}^{15}C_{r-1} = {}^{15}C_{2r+4}$

$\Rightarrow r-1 = 2r+4$	$r-1+2r+4 = 15$
$\Rightarrow r = -5$	$\Rightarrow r = 4$
(not possible)	

57. Ⓐ

Let the terms be, $a, ar, ar^2, \ldots\ldots\ldots ar^8$

$$t_5 = ar^4 = 2$$

Product $= a \times ar \times ar^2 \times \ldots\ldots\ldots \times ar^8$

$= a^9 r^{36} = (ar^4)^9 = 2^9 = 512$ (Ans.)

58. Ⓐ

$$n+7=4n-2 \Rightarrow n=3 \quad \Big| \quad n+7+4n-2=35 \Rightarrow 5n+5=35 \Rightarrow 5n=30 \Rightarrow n=6$$

$n=3, 6$ = (A) is true.

R : is also true and correct explanation of A.

59. Ⓐ

$$\frac{x-1}{x-2}-2 > 0$$

$$\Rightarrow \frac{x-1-2x-4}{x-2} > 0$$

$$\Rightarrow \frac{x-3}{x-2} < 0 \Rightarrow xt(2,3)$$

A is true

R is true and R is the correct explanation of A.

60. Ⓑ

$n = 13, k = 4$

Number of terms $= {}^{n+k-1}C_{k-1}$

$= {}^{13+4-1}C_{4-1}$

$= {}^{16}C_3$

$= 560$

61. Ⓓ

Number of terms $=\left(\frac{56}{2}+1\right)$

$= 29$

62. Ⓒ

Number of terms $=\frac{56}{2}=28$

63. Ⓑ

$\tan\alpha + 2\tan 2\alpha + 4\tan 4\alpha + 8\cot 8\alpha$

$= \cot\alpha + (\tan\alpha - \cot\alpha) + 2\tan 2\alpha + 4\tan 4\alpha + 8\cot 8\alpha$

$= \cot\alpha + (2\tan 2\alpha - 2\cot 2\alpha) + 4\tan 4\alpha + 8\cot 8\alpha$

$= \cot\alpha + (4\tan 4\alpha - 4\cot 4\alpha) + 8\cot 8\alpha$

$= \cot\alpha + (\cancel{8\cot 8\alpha} - \cancel{8\cot 8\alpha})$

$= \cot\alpha.$

64. Ⓓ

$z^{\frac{1}{3}} = p + iq$

$z = (p + iq)^3 = (p^3 - 3pq^2) + i(3p^2q - q^3)$

$x - iy = (p^3 - 3pq^2) + i(3p^2q - q^3)$

$\frac{x}{p} = p^2 - 3q^2, \frac{y}{q} = q^2 - 3p^2$

$\frac{x}{p} + \frac{y}{q} = -2p^2 - 2q^2$

$\Rightarrow \frac{\frac{x}{p} + \frac{y}{q}}{(p^2 + q^2)} = -2$

65. Ⓒ

$ab = a.ar^{n-1} = a^2.\, r^{n-1}$

$P = a \times ar \times ar^2 \times \ldots \times ar^{n-1}$

$= a^n\, r^{\frac{n(n-1)}{2}}$

$P^2 = (a^{2n}\,.\, r^{n(n-1)}$

$= (ab)^n$

66. Ⓐ

$A \cup B = \{1, 2, 3, 4, 5\} \cup \{2, 4, 6\}$

$= \{1, 2, 3, 4, 5, 6\}$

$(A \cup B) \cap C = \{1, 2, 3, 4, 5, 6\} \cap \{3, 4, 6\}$

$= \{3, 4, 6\}$

67. Ⓑ

$f(x) = 9 - 7\sin x$

$-1 \leq \sin x \leq 1$

$7 \geq -7\sin x \geq -7$

$\Rightarrow\ 9+7 \ \geq\ 9-7\sin x \ \geq\ 9-7$

$\Rightarrow\ 16 \ \geq\ 9-7\sin x \ \geq\ 2$

$\Rightarrow$ Range = [2, 16]

68. Ⓒ

$$\frac{2\sin\left(\frac{A+B}{2}\right).\cos\left(\frac{A-B}{2}\right)}{2\cos\left(\frac{A+B}{2}\right).\cos\left(\frac{A-B}{2}\right)}=\frac{a}{b}$$

$$\Rightarrow\ \tan\left(\frac{A+B}{2}\right)=\frac{a}{b}$$

$$\cos(A+B)=\frac{1-\tan^2\left(\frac{A+B}{2}\right)}{1+\tan^2\left(\frac{A+B}{2}\right)}$$

$$=\frac{1-\frac{a^2}{b^2}}{1+\frac{a^2}{b^2}}$$

$$=\frac{b^2-a^2}{b^2+a^2}$$

69. Ⓐ

$|2+i|\,|2+2i||2+3i|\ldots|2+9i|=|x+iy|$

$\Rightarrow\ \sqrt{5}.\sqrt{8}.\sqrt{13}\ldots\sqrt{85}=\sqrt{x^2+y^2}$

$\Rightarrow\ 5.8.13\ldots85.=x^2+y^2.$

70. Ⓐ

$(a+b)+(c+d)=2,$

$M=(a+b)(c+d)\ >\ 0$ ($\because$ a, b, c, d are positive real numbers)

Again, $\frac{(a+b)+(c+d)}{2}\geq\sqrt{(a+b)(c+d}$

$\Rightarrow\ \frac{\not{2}}{\not{2}}\geq\sqrt{M}$

$\Rightarrow\ \sqrt{M}\leq 1$

$\Rightarrow\ M\ \leq\ 1$

$M\in(0,1]$

71. Ⓐ

α

$\beta = r\alpha$

$\gamma = r^2\alpha$

$\delta = r^3\alpha$

$\alpha + \beta = 1 \ldots (1) \;=\; \alpha + r\alpha = 1 \;=\; \alpha(1 + r) = 1 \ldots (5)$

$\alpha\beta = p \ldots (2)$

$\gamma + \delta = 4 \ldots (3) \;\Rightarrow\; r^2\alpha + r^3\alpha = 4 \;\Rightarrow\; r^2\alpha\,(1 + \gamma) = 4 \ldots (6)$

$\gamma\delta = q \ldots (4)$

From (5) and (6)

$r^2\left(\frac{1}{1+r}\right)\times(1+r) = 4$

$\Rightarrow\; r^2 = 4$

$\Rightarrow\; r = \pm 2$ and $\alpha = -1$ when $r = -2$

$p = r\alpha^2 = (-2).(-1)^2 = -2$

$q = r^5\alpha^2 = (-2)^5.(-1)^2 = -32$

when $r = 2,\; \alpha = \frac{1}{3}$

$$\left.\begin{aligned} p &= 2\left(\frac{1}{3}\right)^2 = \frac{2}{9} \\ q &= (2)^5\left(\frac{1}{3}\right)^2 = \frac{32}{9} \end{aligned}\right\} \text{which are not integral values}$$

72. Ⓐ

x^9 in $(1 + 9x + 27x^2 + 27x^3)^6$

Coefficient of x^9 in $((1 + 3x)^3)^6$

,, ,, x^9 in $(1 + 3x)^{18}$

$= {}^{18}C_9 3^9$

73. Ⓐ

B G B G B G B G B G $\rightarrow$ $5!\times 5!$

G B G B G B G B G B $\rightarrow$ $5!\times 5!$

By addition rule,

No of ways = $5!\times 5!+5!\times 5!$

$$=2(5!)^2$$

74. Ⓑ

$$|3x-1||\,1<3$$

$$\Rightarrow |3x-1| < 2$$

$$\Rightarrow -2 < (3x-1) < 2$$

$$\Rightarrow -1 < 3x < 3$$

$$\Rightarrow -\frac{1}{3} < x < 1$$

75. Ⓓ

Re of $(1-\cos\theta+2\text{i}\sin\theta)^{-1}$

$$= \text{Re of } \frac{1}{(1-\cos\theta+2\sin\theta)}$$

$$= \text{Re of } \frac{(1-\cos\theta+2i\sin\theta)}{(1-\cos\theta)^2+4\sin^2\theta}$$

$$= \text{Re of } \frac{(1-\cos\theta)+2i\sin\theta}{1+\cos^2\theta-2\cos\theta+4\sin^2\theta}$$

$$= \text{Re of } \frac{(1-\cos\theta)+2i\sin\theta}{1+\cos^2\theta-2\cos\theta+4(1-\cos^2\theta)}$$

$$= \text{Re of } \frac{(1-\cos\theta)+(2i\sin\theta)}{(1-\cos\theta)(3\cos\theta+5)}$$

$$= \frac{1}{5+3\cos\theta}$$

Biology

76. Ⓒ

Porphyrin ring

Electron transfer active sites of chlorophyll are all on the porphyrin ring

77. Ⓐ

Chloroplast, peroxisome, mitochondria

Each organelle has a unique transport mechanism for the cycle's intermediates

78. Ⓒ

Vacuole

79. Ⓑ

400 nm and 700 nm

Photoactive radiation

80. Ⓐ

Open in the night

CAM plants grow in dry regions. Hence stomata remains closed at daytime to check transpiration

81. Ⓒ

O_2 and is called photooxidation

82. Ⓓ

Both A and B

Point C is a general answer, not exclusive to photosynthesis.

83. Ⓑ

Green

Green light is poorly absorbed by chlorophyll

84. Ⓐ

Both A and R are true and R is the correct explanation of A

85. Ⓓ

A is false but R is true

Dark reaction is independent of light as it requires the assimilatory power generated during the light dependent phase. The presence or absence of light has no impact on it.

86. Ⓐ

RuBisCO

87. Ⓑ

12

88. Ⓑ

12

89. Ⓐ

6

90. Ⓓ

Inorganic chemicals

They derive energy from the simple inorganic chemicals found in their surroundings

91. Ⓓ

Both A and B

92. Ⓑ

Suberin

Suberin checks loss of water by transpiration

93. Ⓓ

Dicot stem

94. Ⓓ

III & IV

95. Ⓓ

Dry and cornified skin

96. Ⓑ

Chlorophyll b, carotenoids, xanthophyll

They transfer energy to the reaction centre

97. Ⓐ

Photooxidation

98. Ⓐ

O_2

The reaction shows photolysis of water

99. Ⓒ

Inverted stomatal cycle

100. Ⓓ

All of the above