Monthly Progressive Test (Solution)

Class: XII

Subject: PCMB

Academic Excellence Programme
TECHNO ACE

Test Booklet No.: MPT07 **Test Date: 22112024**

Physics

1. Ⓐ

$$\Rightarrow \frac{I_1}{I_2} = \frac{a^2}{b^2} = \frac{4}{1} \qquad \Rightarrow \frac{a}{b} = \frac{2}{1}$$

2. Ⓒ

$$\Rightarrow I_1 = I_2 = I \qquad \therefore I_0 = I_1 + I_2 + 2\sqrt{I_1 \cdot I_2} = 2I_0 + 2I_0 = 4I \qquad \therefore I = \frac{I_0}{4}$$

3. Ⓒ

$B \propto$ wave length

$$\frac{B_1}{B_2} = \frac{\lambda_1}{\lambda_2} = \frac{5000}{6000} = \frac{5}{6}$$

$$B_1 = 1 \text{ mm} \qquad \therefore B_2 = \frac{6}{5} = 1.2 \text{ mm}$$

4. Ⓐ

$B = 0.4$ mm

$$B_w = \frac{B}{\mu_w} = \frac{0.4}{4/3} = 0.3 \text{ mm}$$

5. Ⓒ

$= 600 \times 10^{-9}$ m

$$\theta = 0.1^\circ = \frac{(0.1)\pi}{180} \text{ rad}$$

Using formula $\theta = \dfrac{\lambda}{d}$

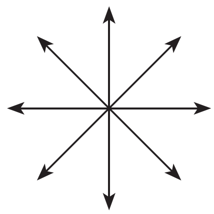
$$d = \frac{600 \times 10^{-9} \times 180}{0.1 \times \pi} = 3.44 \times 10^{-4} \text{ m} = 0.03 \text{ mm}$$

6. Ⓑ

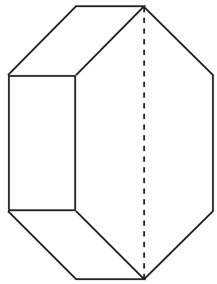
$$\sin\theta = \frac{\lambda}{d} \qquad \theta = 30^\circ; \quad \lambda = 500 \times 10^{-9} \text{ m}$$

$$d = 2\lambda = 1000 \times 10^{-9} \text{ m} = 10^{-6} \text{ m} = 10^{-4} \text{ cm} = 10 \times 10^{-5} \text{ cm}$$

7. Ⓐ



Monochromatic source



Tourmaline crystal

8. Ⓑ

$\tan ip = \mu \qquad \Rightarrow \tan 60^\circ = \mu \qquad \therefore \mu = \sqrt{3}$

9. Ⓓ

$$\frac{1}{\lambda} = R \cdot \left[\frac{1}{n^2} - \frac{1}{m^2}\right] z^2$$

$$\frac{1}{\lambda} = R \cdot \left[\frac{1}{4} - \frac{1}{16}\right] z^2 = \frac{3R}{16}$$

Put $z = 1$

$$\lambda = \frac{16}{3R}$$

10. Ⓐ

For shortest wave length

$\Delta E = 13.6$ eV (from infinity to $n = 1$)

$$\frac{12420\ (\text{eV Å})}{\lambda(\text{Å})} = 13.6$$

$$\lambda = \frac{12420}{13.6} \cong 909\ \text{Å}$$

For longest wave length $(2 \to 1)$

$$\Delta E = 13.6 \times \left(1 - \frac{1}{4}\right) = \frac{3}{4} \times 13.6$$

$$\therefore \lambda = \frac{4}{3} \times 909 = 1212\ \text{Å}$$

11. Ⓑ

$$\lambda_D = \frac{h}{mv} = \frac{6.6 \times 10^{-34}\,(\text{Js})}{9.1 \times 10^{-31}\ (\text{kg}) \times 1.5 \times 10^{8}\ (\text{m/s})}$$

$$\cong 0.42 \times 10^{-11}\ \text{m} = 4.2 \times 10^{-12}\ \text{m} \quad \text{(nearest answer)}$$

12. Ⓐ

13. Ⓐ

$$eV = \frac{1}{2}mv^2 = \frac{1}{2}\frac{m^2v^2}{m}$$

$$eV = \frac{p^2}{2m} \quad \Rightarrow p = \sqrt{2evm}$$

$$\lambda = \frac{h}{p} = \frac{h}{\sqrt{2evm}} \quad \Rightarrow \lambda \propto \frac{1}{\sqrt{m}}$$

14. Ⓐ

We know $\lambda = \frac{12.27}{\sqrt{v}}$ Å $= \sqrt{\frac{150}{v}}$ Å

15. Ⓓ

Ratio $= \sqrt{\frac{m_\alpha}{m_p}} = \sqrt{\frac{4}{1}} = 2$

16. Ⓓ

$$A = I_0 e^{-\lambda t} \quad \Rightarrow \frac{I_0}{3} = I_0 e^{-9\lambda} \quad \Rightarrow e^{-9\lambda} = \frac{1}{3}$$

$$A' = I_0 \cdot e^{-18\lambda} = I_0 \cdot \left(e^{-9\lambda}\right)^2 = I_0 \times \frac{1}{9} = \frac{I_0}{9}$$

17. Ⓐ

$$\frac{1}{8} = \left(\frac{1}{2}\right)^n \quad \therefore n = 3$$

$$t_{\frac{1}{2}} = \frac{60}{3} = 20 \text{ minute}$$

18. Ⓐ

Heavy water has low absorption cross section for neutron.

19. Ⓒ

Assertion is correct.

Fusion is a stronger source of energy than fission.

20. Ⓐ

21. Ⓑ

Base region should be narrow.

22. Ⓒ

$$\alpha=\frac{I_C}{I_E} \qquad \beta=\frac{I_C}{I_B}$$

$$I_E=I_C+I_B \quad \Rightarrow \frac{I_E}{I_C}=1+\frac{I_B}{I_C} \quad \Rightarrow \frac{1}{\alpha}=1+\frac{1}{\beta} \quad \Rightarrow \frac{1}{\beta}=\frac{1}{\alpha}-1=\frac{1-\alpha}{\alpha}$$

$$\therefore \beta=\frac{\alpha}{1-\alpha}$$

23. Ⓑ

$$\left(\overline{\overline{A}+\overline{B}}\right)=\overline{\overline{A}}\cdot\overline{\overline{B}}=A\cdot B$$

AND gate

24. Ⓐ

For bidden energy gap : Ge = 0.72 eV

Si = 1.1 eV

25. Ⓐ

NOR and NAND gates are called universal logic gates. Repeated use of NOR or a NAND gate alone can produce all the three basic gates OR, AND, NOT.

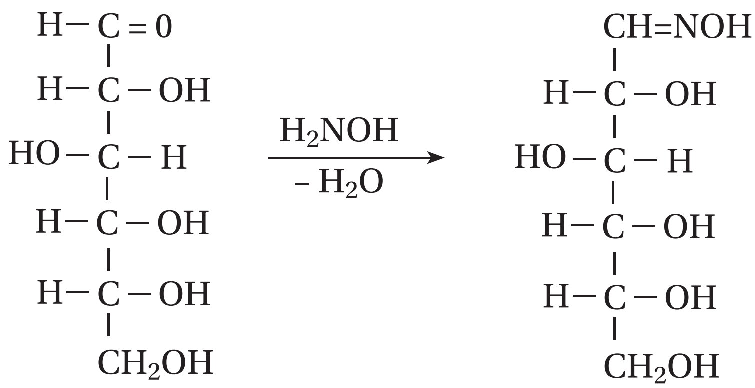
Chemistry

26. Ⓓ

Glucose does not give 2, 4 –DNP test as there is no free aldehyde group present in its cyclic form.

27. Ⓓ

D (+) glucose contains aldehydic group which reacts with NH_2OH to yield an oxime.



(Glyoxime)

28. Ⓒ

Sucrose undergoes inversion in the configuration on hydrolysis. Sucrose is dextrorotatory but after hydrolysis, it gives dextrorotatory glucose and laevorotatory fructose. The mixture is laevorotatory because laevorotation of fructose (–92.4°). Is more than dextrorotatiion of glucose (+ 52.5°).

29. Ⓒ

Fructose is a reducing sugar because it has a free ketone and aldehyhde group that can undergo Oxidation thus reducing Tollen's and Fehling's solution. The copper ions in Fehling solution and silver ions in Tollen's reagent get reduced, resulting in the formation of a red precipitate of copper (I) oxide and a silver mirror respectively. Hence, Assertion (A) is true but Reason (R) is false.

30. Ⓑ

Both (A) and (R) are correct but 'R' is not correct explanation of (A). The correct (R) for (A) is each enzyme contains an active site which has specific shape and size.

31. Ⓓ

Curdling of milk is an example of denaturation of protein.

32. Ⓓ

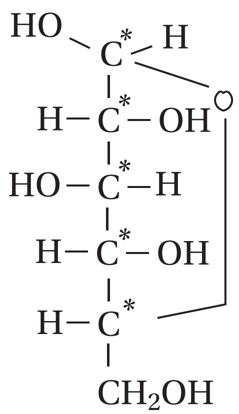
beri-beri

33. Ⓑ

Secondary sttructure

34. Ⓐ

The number of chiral carbon atom in β-D (+) glucose are five.

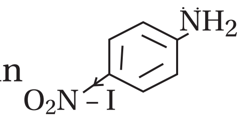


$\overset{*}{C} \longrightarrow$ chiral
(Asymetric Carbon atom)

35. Ⓐ

Epimers are carbohydrates which vary in one position for the placement of the –OH group. Other ex : D–glucose, D–galactose. Glucose and mannose differ in configuration at C –2 & is called epimers. While α – D(+) glucose & β–D(+), glucose are anomers differ at C_1, glycosidic carbon.

36. Ⓓ

Due to presence of –I effect group ($-NO_2$) in 

, lone pair of $-\dot{N}H_2$, group is less available and it is the least basic.

37. Ⓓ

In primary amine inter molecular association due to H–bonding is maximum while, intertiary it is minimum. Hence, the correct increasing order of boiling point is B < C < A.

38. Ⓓ

During mutarotation of glucose changes from an angle. of $+19.2^\circ$ to a constant value of $+52.5^\circ$.

39. Ⓒ

Glucose does not react with sodium bisulphite ($NaHSO_3$)

40. Ⓓ

Fructose is a Ketone. In presence of a base, it is converted into a mixture of glucose and manose (Lobry de. Bruyn Van E-kenstein) rearrangement via enolisation followed by conversion to aldehyde, Both of which contain the CHO group and hence reduce Tollen's reagent to give silver mirror test. Thus the option (D) is Correct.

41. Ⓐ

The equation of Swarts reaction is

$$R-X + AgF \xrightarrow{\text{Acetone}} R-F + AgX \qquad (\text{where } X = Cl, Br)$$

42. Ⓒ

$$Na_2SO_4 \longrightarrow 2Na^+ + SO_4^{2-} \quad [\therefore n = 3]$$

As the solutions are isotonic,

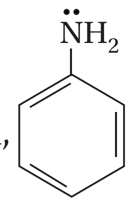
$$i_{(Na_2SO_4)}C_{(Na_2SO_4)} = C_{(C_6H_{12}O_6)}$$

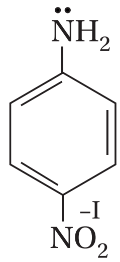
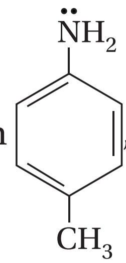
$$\therefore i_{Na_2SO_4} = \frac{0.01}{0.004} = 2.5$$

$$\alpha = \frac{(i-1)}{n-1} = \frac{(2.5-1)}{3-1} = 0.75$$

So, degree of dissociation = 75%

43. Ⓓ

In,  (I) due to the presence of lone pair of 'N' atom it is basic which can donate.

In  (II), due to presence of –I effect of $-NO_2$ group electron density over the 'N' atom further decrease so it is less basic than aniline. While in , due to presence of +I effect of $-CH_3$ group electron density over the 'N' atom is further increased and hence it is the most basic. Thus, basic strength increases II < I < III in this order.

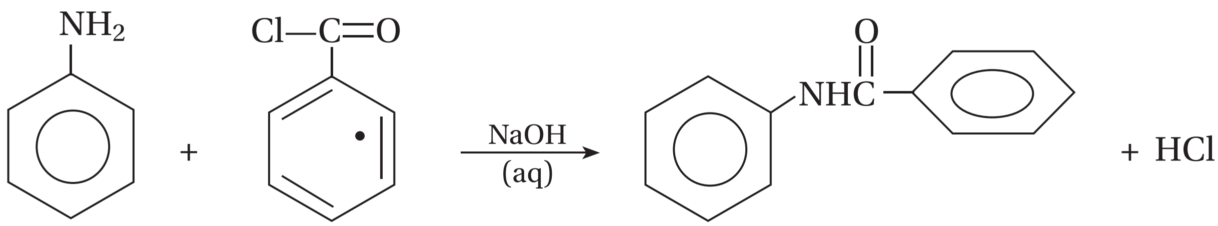
44. Ⓐ

CO is the strongest ligand, all electrons paired. So, spin magnetic moment is zero.

45. Ⓑ

Scotten-Baumann Reaction

Acylation of amine by the action of acid chloride in the aqueous alkali solution is known as Schotten-Baumann reaction.



46. Ⓒ

Ninhydrin test is a test to dettect aminoacids. Egg albumin contain protein, which is a natural polymer of amino acids. Hence, this will show positive ninhydrin test ... . So, option 'C' is correct.

47. Ⓒ

Alanine at its isoelectric point, exist as : $H_3^{+}N - \underset{\large CH_3}{\underset{|}{CH}} - COO^-$

$$\underset{\substack{|\\ CH_3}}{H_2N-CH-COOH} \rightleftharpoons \underset{\substack{|\\ CH_3}}{H_3^{+}N-CH-COO^{-}}$$

(Zwitter ion)

48. Ⓐ

DNA has 4 pairs of nitrogeneous bases as – adenine, guanine, thyamine and cytosine. Out of them adenine pairs with thyamine and guanine pairs with cytosinie.

49. Ⓓ

If there is a deficiency of vitamin K, the clotting time increase and the continuous bleeding occurs at the injured part.

50. Ⓑ

All the given options (base) present in both RNA as well as DNA except (B) i.e. uracil, which is present in RNA but not found in DNA.

Mathematics

51. Ⓑ

$l = \cos\alpha,\ m = \cos\beta,\ n = \cos\gamma$

$l^2 + m^2 + n^2 = 1$

$\Rightarrow \cos^2\alpha + \cos^2\beta + \cos^2\gamma = 1$

$\Rightarrow 1 - \sin^2\alpha + 1 - \sin^2\beta + 1 - \sin^2\gamma = 1$

$\Rightarrow \sin^2\alpha + \sin^2\beta + \sin^2\gamma = 2$

52. Ⓐ

$DRS = < -3, 2k, 2 >$

$DRS = < 3k, 1, -5 >$

$\because$ Lines are perpendiculars.

$\therefore 3k(-3) + 1(2k) + (-5)(2) = 0$

$\Rightarrow -9k + 2k - 10 = 0 \qquad \Rightarrow 7k = -10 \qquad \Rightarrow k = \dfrac{-10}{7}$

53. Ⓒ

$\left|\vec{a} + \vec{b} + \vec{c}\right| = \left(\vec{a} + \vec{b} + \vec{c}\right)\cdot\left(\vec{a} + \vec{b} + \vec{c}\right)$

$= |\vec{a}|^2 + |\vec{b}|^2 + |\vec{c}|^2 + 2\left(\vec{a}\cdot\vec{b} + \vec{b}\cdot\vec{c} + \vec{c}\cdot\vec{a}\right)$

$= 1 + 1 + 1 + 0 = 3$

$\therefore \left|\vec{a} + \vec{b} + \vec{c}\right| = \sqrt{3}$

54. Ⓒ

$|\vec{a}| = 10, \qquad |\vec{b}| = 2$

$\vec{a} \cdot \vec{b} = 12$

$\Rightarrow |\vec{a}||\vec{b}|\cos\theta = 12 \quad \Rightarrow 10 \times 2 \times \cos\theta = 12 \quad \Rightarrow \cos\theta = \frac{12}{20} = \frac{3}{5}$

$\Rightarrow \sin\theta = \frac{4}{5}$

$\vec{a} \times \vec{b} = |\vec{a}||\vec{b}|\sin\theta\hat{n} \qquad \Rightarrow |\vec{a} \times \vec{b}| = |\vec{a}||\vec{b}|\sin\theta = 10 \times 2 \times \frac{4}{5} = 16$

55. Ⓑ

The objective function of a linear programming problem is a function to be optimised.

56. Ⓒ

Feasible solution.

57. Ⓑ

Total outcomes = 20

Number of favourable outcomes = 8

$\therefore$ Required probability $= \frac{8}{20} = \frac{2}{5}$

58. Ⓐ

$Z = 4x + 6y$

at (0,2), $Z = 12$

at (3,0), $Z = 12$

at (6,0), $Z = 24$

at (6,8), $Z = 72$

at (0,5), $Z = 30$

$\therefore$ Z is minimum at (0,2) and (3,0).

$\therefore$ Assertion is true.

Reason is also true and reason is the correct explanation of (A)

59. Ⓐ

Length of line segment $= \sqrt{2^2 + 3^2 + 6^2} = \sqrt{4 + 9 + 36} = 7$ units

Assertion is true.

Reason is also true and reason is the correct explanation of (A).

60. Ⓐ

$\vec{r_1} = \vec{a_1} + \lambda\vec{b}, \quad \vec{r_2} = \vec{a_2} + \mu\vec{b}$

$\therefore \text{S.D.} = \dfrac{\left|\left(\vec{a_2} - \vec{a_1}\right)\times\vec{b}\right|}{\left|\vec{b}\right|}$

61. Ⓑ

$\vec{r_1} = \left(4\hat{i} - \hat{j}\right) + \lambda\left(\hat{i} + 2\hat{j} - 3\hat{k}\right)$

$\vec{r_2} = \left(\hat{i} - \hat{j} + 2\hat{k}\right) + \mu\left(2\hat{i} + 4\hat{j} - 5\hat{k}\right)$

$\vec{a_1} = 4\hat{i} - \hat{j}, \quad a_2 = \hat{i} - \hat{j} + 2\hat{k}$

$\therefore \vec{a_2} - \vec{a_1} = -3\hat{i} + 2\hat{k}$

$\vec{b_1} = \hat{i} + 2\hat{j} - 3\hat{k}$

$\vec{b_2} = 2\hat{i} + 4\hat{j} - 5\hat{k}$

$$\vec{b_1}\times\vec{b_2} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & 2 & -3 \\ 2 & 4 & -5 \end{vmatrix} = 2\hat{i} - \hat{j}$$

$\therefore \left(\vec{b_1}\times\vec{b_2}\right)\cdot\left(\vec{a_2} - \vec{a_1}\right) = \left(2\hat{i} - \hat{j}\right)\cdot\left(-3\hat{i} + 2\hat{k}\right) = -6$

$\therefore \left|\vec{b_1}\times\vec{b_2}\right| = \sqrt{4+1} = \sqrt{5}$ $\qquad \therefore \text{S.D} = \dfrac{6}{\sqrt{5}}$ units

62. Ⓒ

$\vec{r_1} = \left(4\hat{i} - \hat{j}\right) + \lambda\hat{k}$

$\vec{r_2} = \left(\hat{i} - \hat{j} + 2\hat{k}\right) + \mu\hat{k}$

$\vec{a_1} = 4\hat{i} - \hat{j}, \quad a_2 = \hat{i} - \hat{j} + 2\hat{k}$

$\therefore \vec{a_2} - \vec{a_1} = -3\hat{i} + 2\hat{k}$

$\vec{b} = \hat{k}$

$$\left(\vec{a_2} - \vec{a_1}\right)\times\vec{b} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ -3 & 0 & 2 \\ 0 & 0 & 1 \end{vmatrix} = 3\hat{j}$$

$$\left|\left(\overrightarrow{a_2}-\overrightarrow{a_1}\right)\times\vec{b}\right|=\left|3\hat{j}\right|=3$$

$$\left|\vec{b}\right|=1$$

$$\therefore \text{S.D}=\frac{3}{1}=3 \text{ units}$$

63. Ⓐ

$$P(A^C)=0.3,\quad P(B)=0.4,\quad P(A\cap B^C)=0.5$$

$$P\left(B/A\cup B^C\right)=\frac{P\left(B\cap\left(A\cup B^C\right)\right)}{P\left(A\cup B^C\right)}=\frac{P\left(A\cap B\right)}{P\left(A\cup B^C\right)}=\frac{0.2}{0.8}=\frac{1}{4}=0.25$$

64. Ⓐ

$$\overrightarrow{OA}=2\hat{i}+3\hat{j}-\hat{k}$$

$$\overrightarrow{OB}=\hat{i}+2\hat{j}+3\hat{k}$$

$$\overrightarrow{OC}=3\hat{i}+4\hat{j}-2\hat{k}$$

$$\overrightarrow{OD}=\hat{i}-\lambda\hat{j}+6\hat{k}$$

$$\overrightarrow{AB}=-\hat{i}-\hat{j}+4\hat{k}$$

$$\overrightarrow{AC}=\hat{i}+\hat{j}-\hat{k}$$

$$\overrightarrow{AD}=-\hat{i}-(\lambda+3)\hat{j}+7\hat{k}$$

$$\overrightarrow{AB}\cdot\left(AC\times\overrightarrow{AD}\right)=\left(-\hat{i}-\hat{j}+4\hat{k}\right)\cdot\begin{vmatrix}\hat{i} & \hat{j} & \hat{k}\\ 1 & 1 & -1\\ -1 & -(\lambda+3) & 7\end{vmatrix}$$

$$=\left(-\hat{i}-\hat{j}+4\hat{k}\right)\cdot\{(7-\lambda-3)\hat{i}-6\hat{j}-(\lambda+2)\hat{k}\}$$

$$=-1\left(4-\lambda\right)+6+4\times(-\lambda-2)$$

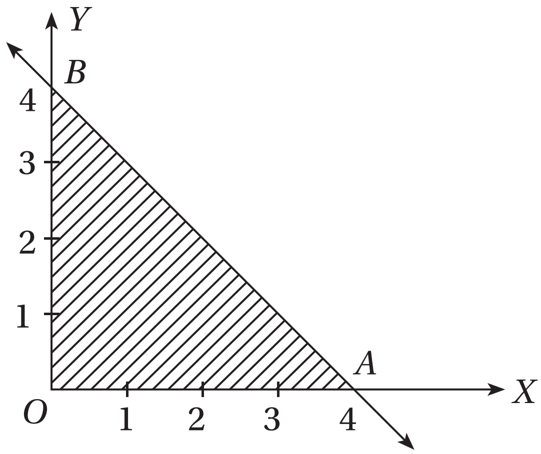
$$=-4+\lambda+6-4\lambda-8=-3\lambda-6$$

$$\therefore -3\lambda-6=0 \quad \lambda=-2$$

65. Ⓒ

Max $z=3x+4y$

$x+y\le 4,\ x\ge 0,\ y\ge 0$



at $(4,0)$, $z = 12$

at $(0,4)$ $z = 16$

$\therefore$ z is maximum at $(0,4)$

$\therefore$ Max $z = 16$

66. Ⓑ

$$\left(1+x^2\right)\frac{dy}{dx}+2xy=\cos x \quad \Rightarrow \frac{dy}{dx}+\frac{2x}{1+x^2}y=\frac{\cos x}{1+x^2}$$

$$\text{I.F.} = e^{\int\frac{2x}{1+x^2}dx} = e^{\log(1+x^2)} = \left(1+x^2\right)$$

$$\therefore y(1+x^2)=\int\cos dx=\sin x+c$$

67. Ⓒ

$$\int\frac{1}{x(x^4-1)}dx=\int\frac{x^3\,dx}{x^4\left(x^4-1\right)}=\frac{1}{4}\int\frac{4x^3\,dx}{x^4\left(x^4-1\right)}$$

$$=\frac{1}{4}\int\frac{dt}{t(t-1)} \qquad \text{where } x^4=t$$

$$=\frac{1}{4}\left[\log\left(\frac{t-1}{t}\right)\right]+c=\frac{1}{4}\log\left(\frac{x^4-1}{x^4}\right)+c$$

68. Ⓑ

$$y=\cos^{-1}\left(\frac{2\cos x-3\sin x}{\sqrt{13}}\right)$$

$$=\cos^{-1}\left(\frac{2}{\sqrt{3}}\cos x-\frac{3}{\sqrt{3}}\sin x\right)$$

$= \cos^{-1}(\cos\alpha\cos x - \sin\alpha\sin x)$ where $\cos\alpha = \frac{2}{\sqrt{13}}$; $\sin\alpha = \frac{3}{\sqrt{13}}$; $\tan\alpha = \frac{3}{2}$

$= \cos^{-1}\cos(x+\alpha) = x + \tan^{-1}\left(\frac{3}{2}\right)$

$\therefore \frac{dy}{dx} = 1$

69. Ⓑ

$$f(x) = \frac{1-\cos\lambda x}{x\sin x}, \quad x \neq 0$$

$$= \frac{1}{2}, \quad x = 0$$

$$\lim_{x\to 0}\frac{1-\cos\lambda x}{x\sin x} = \lim_{x\to 0}\frac{\sin^2\lambda x}{x\sin x(1+\cos\lambda x)}$$

$$= \lim_{x\to 0}\frac{\left(\frac{\sin\lambda x}{\lambda x}\right)^2\lambda^2}{\frac{\sin x}{x}(1+\cos\lambda x)} = \frac{\lambda^2}{2}$$

$$f(0) = \frac{1}{2}$$

$$\therefore \frac{\lambda^2}{2} = \frac{1}{2} \Rightarrow \lambda^2 = 1 \Rightarrow \lambda = \pm 1$$

70. Ⓓ

$$\begin{vmatrix} 1-x & 2 & 3 \\ 0 & 2-x & 0 \\ 0 & 2 & 3-x \end{vmatrix} = 0 \Rightarrow (1-x)(2-x)(3-x) = 0 \Rightarrow x = 1,2,3$$

71. Ⓑ

$$P(A) = \frac{1}{2}, \quad P(B) = \frac{1}{3}, \quad P(C) = \frac{1}{4}$$

P (question will not be solved)

$$= P(A^C)\,P(B^C)\,P(C^C)$$

$$= \frac{1}{2}\times\frac{2}{3}\times\frac{3}{4} = \frac{1}{4}$$

$\therefore$ P (question will be solved)

$$= 1 - \frac{1}{4} = \frac{3}{4}$$

72. Ⓑ

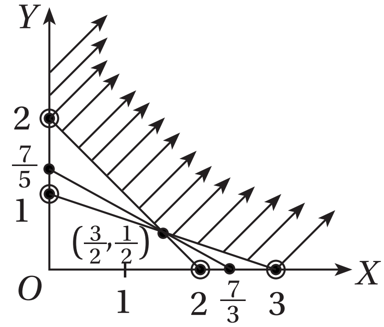
Min z = 3x + 5y

$x + 3y \geq 3$

$x + y \geq 2$

$x \geq 0$

$y \geq 0$



Intersecting point of $x + 3y = 3$ and $x + y = 2$ is $\left(\dfrac{3}{2}, \dfrac{1}{2}\right)$

at (3,0), $z = 9$

at $\left(\dfrac{3}{2}, \dfrac{1}{2}\right)$, $z = 7$

at (0,2), $z = 10$

Now for $3x + 5y < 7$, the resulting open half plane has no common point with feasible region.

$\therefore$ Min $z = 7$

73. Ⓐ

$\vec{a} = \hat{j} - \hat{k}$

Let $\vec{b} = a_1\hat{i} + b_1\hat{j} + c_1\hat{k}$

$\vec{a} \cdot \vec{b} = 3 \quad \Rightarrow b_1 - c_1 = 3$

$$\vec{a} \times \vec{b} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 1 & -1 \\ a_1 & b_1 & c_1 \end{vmatrix} = (c_1 + b_1)\hat{i} - a_1\hat{j} - a_1\hat{k}$$

$\therefore \vec{a} \times \vec{b} + \vec{c} = \vec{0}$

$\Rightarrow (c_1 + b_1)\hat{i} - a_1\hat{j} - a_1\hat{k} + \hat{i} - \hat{j} - \hat{k} = \hat{0}$

$\Rightarrow (c_1 + b_1 + 1)\hat{i} - (a_1 + 1)\hat{j} - (a_1 + 1)\hat{k} = \vec{0}$

$\therefore\ c_1 + b_1 = -1, \quad a_1 + 1 = 0$

$-c_1 + b_1 = 3, \quad a_1 = -1$

$\Rightarrow\ 2b_1 = 2$

$\Rightarrow\ b_1 = 1 \quad \therefore\ c_1 = -2$

$\therefore \vec{b} = -\hat{i} + \hat{j} - 2\hat{k}$

74. Ⓑ

$\vec{r} = 3\hat{i} - 5\hat{j} + 7\hat{k} + \lambda\left(2\hat{i} + \hat{j} - 3\hat{k}\right)$

Cartesian form of this equation is

$$\frac{x-3}{2} = \frac{y+5}{1} = \frac{z-7}{-3}$$

75. Ⓑ

$$\frac{x-6}{1} = \frac{y-2}{-2} = \frac{z-2}{2}$$

$$\frac{x+4}{3} = \frac{y}{-2} = \frac{z-1}{-2}$$

$$\text{S.D} = \left| \frac{\begin{vmatrix} x_2 - x_1 & y_2 - y_1 & z_2 - z_1 \\ a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \end{vmatrix}}{\sqrt{(b_1c_2 - b_2c_1)^2 + (a_1c_2 - a_2c_1)^2 + (a_1b_2 - a_2b_1)^2}} \right|$$

$$= \left| \frac{\begin{vmatrix} -10 & -2 & -1 \\ 1 & -2 & 2 \\ 3 & -2 & -2 \end{vmatrix}}{\sqrt{(4+4)^2 + (-8)^2 + (4)^2}} \right| = \left| \frac{-10(8) + 2(-8) + (-1)(4)}{\sqrt{64+64+16}} \right| = \left| \frac{-100}{12} \right| = \frac{25}{3} \text{ units}$$

Biology

76. Ⓓ

34

77. Ⓒ

Sacred groves

78. Ⓑ

5

79. Ⓒ

Inverted, exceeds

80. Ⓐ

Mineralization

81. Ⓒ

Respiration

NPP is the rate at which material is accumulated in excess of respiration.

82. Ⓑ

10

Lindeman's 10% Law

83. Ⓒ

A is true but R is false

Forests are extremely rich in biodiversity

84. Ⓒ

A is true but R is false

Scavengers are normally the top consumers in a food chain.

85. Ⓐ

Genetic diversity

86. Ⓓ

All

87. Ⓓ

Slope of the line (regression coefficient)

88. Ⓒ

Pyramid of ecological succession

89. Ⓒ

Pyramid of Energy

As energy flows from one trophic level to the next, some amount of energy is lost in each trophic level as heat.

90. Ⓑ

The Pyramid of Number is inverted

The producer is one and consumers many

91. Ⓑ
Porogamy

92. Ⓑ
Weekly

93. Ⓑ
Rhizobium

94. Ⓐ
Cistron

95. Ⓐ
The sequence from where replication starts

96. Ⓒ
Mammals and amphibians

97. Ⓑ
Fungi
Fungi, along with bacteria, work as decomposers and help to recycle nutrients on earth.

98. Ⓑ
Molluscs

99. Ⓑ
Primary consumers
They feed on phytoplanktons

100. Ⓓ
All