FIITJEE

ALL INDIA TEST SERIES

CONCEPT RECAPITULATION TEST – II

JEE (Main)-2025

TEST DATE: 20-01-2025

ANSWERS, HINTS & SOLUTIONS

Physics

PART – A

SECTION – A

1. D

Sol. At focus path diff. = 0

$\Rightarrow \quad I = \left(\sqrt{I_1} + \sqrt{I_2}\right)^2 = 9I.$

2. B

Sol. Let the length of rod is ℓ and co-ordinate of B is (x, y)

$\vec{v}_B = v_x\hat{i} + v_y\hat{j} = \sqrt{3}\hat{i} + v_y\hat{j}$

$x^2 + y^2 = \ell^2 \quad \Rightarrow \quad 2xv_x + 2yv_y = 0 \Rightarrow \sqrt{3} + \frac{y}{x}v_y = 0$

$\Rightarrow \sqrt{3} + \tan 60^o v_y = 0 \quad v_y = -1$ m/s

$\vec{v}_B = \sqrt{3}\hat{i} - 1\hat{j}$

$\left|\vec{v}_B\right| = \sqrt{3+1} = 2m/s$

3. D

Sol. Apply Snell's law and use geometry.

4. B

Sol. If there is any charge inside the cavity of the conductor, the charge induced on the inner surface of the cavity is such that it will produce same amount of electric field but in opposite direction at each and every point outside the cavity as produced by the charge in the cavity.

5. A

Sol. $\frac{hc}{\lambda} = RhCZ^2\left(1-\frac{1}{4}\right)$

$\Rightarrow \frac{1}{\lambda_1}:\frac{1}{\lambda_2}:\frac{1}{\lambda_3}:\frac{1}{\lambda_4} = 1:1:4:9$

$\Rightarrow \lambda_1 : \lambda_2 : \lambda_3 : \lambda_4 = 1:1 : \frac{1}{4} : \frac{1}{9}$

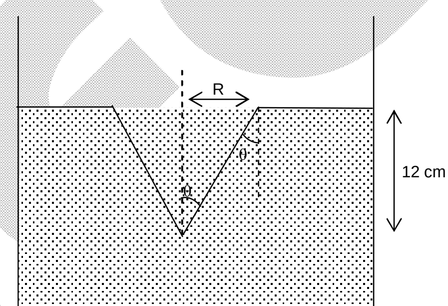
6. C

Sol. $T = T_{shm} + 4\sqrt{\frac{2h}{g}}$

7. D

Sol. $\theta = \theta_C$ (critical angle)

$\frac{R}{12} = \tan\theta_C$



8. D

Sol. $W_{agent} - mgH = 0$

$W_{agent} = mgH$

9. A

Sol. $N = N_o e^{-\lambda t}$

$0.99 = 1\, e^{-\lambda t} \Rightarrow \lambda t = \ln\left(\frac{100}{99}\right)$

$50 \text{ sec} = t = \frac{\ln\left(\frac{100}{99}\right)}{\lambda}$

$\Rightarrow t_{1/2} = \frac{50\ln(2)}{\ln(100/99)}$

10. B

Sol. If the capacitor has greater than E potential initially its potential will decrease and graph is first one. When capacitor has less than E potential initially it will follow the second graph.

11. D

Sol. $\vec{\tau} = \vec{\mu}\times\vec{B}$

$= (i\vec{A})\times\vec{B}$

12. B

Sol. $x = 2\sin 3t$

$y = 2 - 2\cos 3t$

$\sin^2 3t + \cos^2 3t = 1$

13. A

Sol. As λ increases saturation current also increases.

14. D

Sol. $\phi_B = 0$

$\because\ \vec{B} \perp \vec{S}$

$\therefore\ \dfrac{d\phi_B}{dt} = 0$

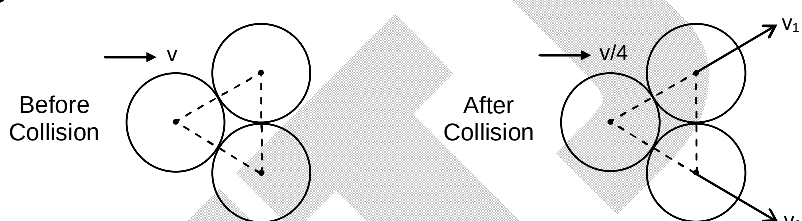
15. C

Sol. $\Delta V = \left|\dfrac{d\phi}{dt}\right| = (\text{Area}) \times \dfrac{dB}{dt} = \dfrac{\pi R}{2}\left(\dfrac{R}{2}\right)(B_o)$

$\Delta V_{AB} = \dfrac{\pi R^2}{4} B_o$

16. C

Sol.



$2mv_1\cos 30° + m\dfrac{v}{4} = mv$ ...(i)

$e = \dfrac{v_1 - \dfrac{v}{4}\cos 30^o}{v\cos 30^o}$ ...(ii)

17. C

Sol. Using doppler's effect to calculate apparent frequency.

18. B

Sol. Net force F = m a_{net} = m $\sqrt{a^2 + a^2}$ = $ma\sqrt{2}$.

19. C

Sol. From conservation of mechanical energy.

$\dfrac{1}{2}mv^2 = mgL + \dfrac{1}{2}m3(L - \ell)g$

$\therefore\quad v = \sqrt{g(5L - 3\ell)}$

20. A

Sol. $a = \sqrt{a_t^2 + a_c^2}$

SECTION – B

21. 3

Sol. t = 20 min = $\frac{1}{3}$hr

1 km = $\sqrt{(6)^2 - V^2} \times \left(\frac{1}{3}\text{hr}\right)$

V = $3\sqrt{3}$ km/hr

22. 11

Sol. $I_1 = \left(\frac{s}{s+99}\right) \times I$

$\frac{I_1}{I} = \frac{s}{99+s} = 0.1$

$s = 11\Omega$

23. 5

Sol. $\frac{2}{3}MR_1^2 = \frac{2}{5}MR_2^2$

24. 5

Sol. EPE per unit volume = $\frac{1}{2} \times \text{stress} \times \text{strain}$

25. 6

Sol. Time of height, T = $\frac{4V}{g\sqrt{7}}$, V = speed of projection

$V_H = \frac{V\sqrt{3}}{2\sqrt{7}}$

$V_\perp = \frac{3V}{2\sqrt{7}}$, when projectile with incline.

Tan α = $\frac{1}{\sqrt{3}}$, α = 30°.

Chemistry

PART – B

SECTION – A

26. B

Sol. In H-atom, the orbitals(five 3d, three 3p and one 3s) have same energy. So, they are called degenerate orbitals.

27. B

Sol. It is a zero order reaction.

28. D

Sol. Hybridization of boron changes to sp^3.

29. C

Sol. $pH = p_{Ka} + \log\frac{[CH_3COONa]}{[CH_3COOH]} = 5 + \log\frac{200 \times 0.4}{400 \times 0.2} = 5$

30. D

Sol. The observed bond angles are 120^o, 180^o and 90^o.

31. D

Sol. In chlorobenzene, Cl exerts –I and +R effect. In other compounds, it only exerts –I effect.

32. D

Sol. $Ca_3P_2 + 6H_2O \longrightarrow 3Ca(OH)_2 + 2PH_3$

33. B

Sol. Expansion of ring takes place in (B). In(C) the initially formed carbocation does not undergo rearrangement to initiate ring expansion.

34. C

Sol. Due to stable $t_{2g}^3 e_g^2$ configuration of Fe^{3+} ion.

35. C

Sol. It produces maximum number of ions as compared to other salts.

36. B

Sol. $E = E^o - \frac{0.0591}{n}\log\frac{1}{[H^+]} = 0 - \frac{0.0591}{n}\log\frac{1}{10^{-4}} = -0.236\,V$

37. B

Sol. For spontaneous process, $\Delta G < 0$.

$\therefore$ $\Delta H - T\Delta S < 0$, $\Delta H < T\Delta S$

$\therefore\ T > \frac{\Delta H}{\Delta S} = \frac{18000}{60} = 300K$

38. C

Sol. It contains no chiral atom, $H_2N - CH_2 - COOH$.

39. C

Sol. Moles of HCl = $\frac{1200 \times 0.4}{1000} = 0.48$

Moles of NaOH = $\frac{19.2}{40} = 0.48$

40. B

Sol. $X = Na_2SO_3$

$Y = BaSO_3$

$Z = BaSO_4$

41. B

Sol. Anisole is the simplest aromatic ether.

42. C

Sol. Anti Markownikoff reaction takes place in this case.

43. D

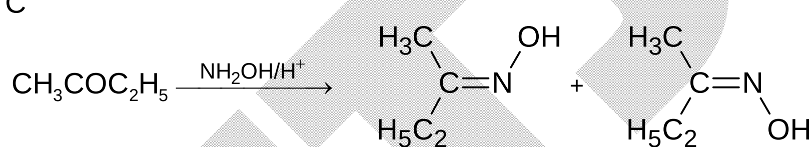
Sol. In Cl_2O_7, the oxidation number of Cl is maximum.

44. A

Sol. Oxygen forms both sigma and pi bonds with xenon.

45. C

Sol.



SECTION – B

46. 6

Sol. $P_4 + 3NaOH + 3H_2O \longrightarrow PH_3 + 3NaH_2PO_2$

x + y = 6

47. 3

Sol. $2X(g) \rightleftharpoons 2Y(g) + Z(g)$

$1 - \alpha \qquad \alpha \qquad \frac{\alpha}{2}$ Total moles = $1 + \frac{\alpha}{2} = \frac{2+\alpha}{2}$

$K_P = \frac{(P_Y)^2 (P_Z)}{(P_X)^2}$

$= \frac{\left(\frac{2\alpha}{(2+\alpha)}\right)^2 P^2 . \left(\frac{\alpha}{2+\alpha}\right) P}{\left(\frac{2(1-\alpha)}{(2+\alpha)}\right)^2 P^2}$ neglecting α compared to 1 and solving

$$\alpha = \left(\frac{2K_P}{P}\right)^{1/3} \Rightarrow n = 3$$

48. 5

Sol. $4H^+ + MnO_4^- \rightleftharpoons MnO_2 + 2H_2O$

$$\Delta G^o = -3F\left(\frac{1.5\times5 - 2\times1.25}{3}\right) = -5F$$

x = 5

49. 1

Sol. $KMnO_4$ H_2O_2

$N_1V_1 = N_2V_2$

$5 \times 0.1 \times 10 = 28 \times N_2$

$$N_2 = \frac{5}{28}$$

$V = 5.6 \times N$

$$= 5.6 \times \frac{5}{28} = 1$$

50. 1

Sol. $$\text{Slope} = \frac{-\Delta H}{2.303R}$$

so, $$\frac{-\Delta H}{2.303R} = \frac{-1}{4.606}$$

$\Delta H = 1$ cal

Mathematics

PART – C

SECTION – A

51. C

Sol. When $\left(\frac{1}{y}+y^2\right)^{10}$ is expanded, the powers of y go on increasing as the terms proceed.

Hence it is expanded in ascending powers of y. So $\left(y^2+\frac{1}{y}\right)^{10}$, when expanded, will be in descending powers of y.

Hence, $t_7 = {}^{10}C_6\left(y^2\right)^4\left(\frac{1}{y}\right)^6 = \frac{10\times9\times8\times7}{4\times3\times2\times1}y^2$

$= 210y^2$

52. B

Sol. We can rewrite the given expression as $(1-y)\frac{\left[1-(2x)^6\right]}{1-2x} = 1-y^6$, one of the possible values of y is clearly 2x. Therefore, one of the possible values of $\frac{y}{x}$ is 2.

53. C

Sol. Since roots are imaginary, therefore $b^2-4ac<0$ and the roots α and β are given by

$\alpha = \frac{-b+i\sqrt{4ac-b^2}}{2a}$ and $\beta = \frac{-b-i\sqrt{4ac-b^2}}{2a}$

Clearly, $\alpha=\bar{\beta}$. Therefore, $|\alpha|=|\beta|$.

Further more,

$|\alpha| = \sqrt{\frac{b^2}{4a^2}+\frac{4ac-b^2}{4a^2}} = \sqrt{\frac{c}{a}}$

$\Rightarrow |\alpha|>1 \qquad [\because c>a]$.

54. C

Sol. Let $x=\sqrt{-1-\sqrt{-1-\sqrt{-1-....\text{to}\,\infty}}}$

Then $x=\sqrt{-1-x}$ or $x^2=-1-x$

or $x^2+x+1=0$

$\therefore\ x = \frac{-1\pm\sqrt{1-4.1.1}}{2.1} = \frac{-1\pm\sqrt{-3}}{2}$

$= \frac{-1\pm\sqrt{3}i}{2} = \omega$ or ω^2.

55. D

Sol. $1+n+n^2+......+n^{127}=\dfrac{n^{128}-1}{n-1}$

$=\dfrac{(n^{64}-1)(n^{64}+1)}{n-1}$

$=(1+n+n^2+......+n^{63})(n^{64}+1)$

$\therefore k=64$ which is divisible by 8, 16, 32 and 64.

56. A

Sol. Let $z=1+2i$

$\Rightarrow |z|=\sqrt{1+4}=\sqrt{5}$

Now, $f(z)=\dfrac{7-z}{1-z^2}=\dfrac{7-(1+2i)}{1-(1+2i)^2}$

$=\dfrac{6-2i}{1-1-4i^2-4i}=\dfrac{6-2i}{4-4i}$

$=\dfrac{(3-i)(2+2i)}{(2-2i)(2+2i)}$

$=\dfrac{6-2i+6i-2i^2}{4-4i^2}=\dfrac{6+4i+2}{4+4}$

$=\dfrac{8+4i}{8}=1+\dfrac{1}{2}i$

$f(z)=1+\dfrac{1}{2}i$

$\therefore |f(z)|=\sqrt{1+\dfrac{1}{4}}=\sqrt{\dfrac{4+1}{4}}=\dfrac{\sqrt{5}}{2}=\dfrac{|z|}{2}$

57. A

Sol. Let P (t, 4 – 2t) be any point on the line $2x+y=4$. The equation of the chord of contact of tangents drawn from P to the circle $x^2+y^2=1$ is

$tx+(4-2t)y=1\Rightarrow(4y-1)+t(x-2y)=0$

Clearly, it passes through the point of intersection of the lines $4y-1=0$ and $x-2y=0$

i.e. $\left(\dfrac{1}{2},\dfrac{1}{4}\right)$.

58. B

Sol. Let AP be the lamp post of height h at a point A on a circular path of radius r and centre C.
Let B be the point on this path such that $\underline{|PBA} = \alpha \Rightarrow AB = h\cot\alpha$

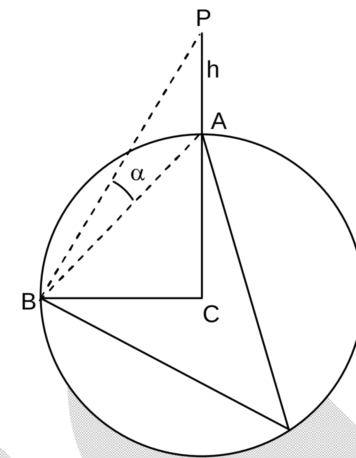
Since AB subtends an angle 45^o at another point of the path it subtends an angle of 90^o at the centre C so that $\underline{|BCA} = 90^o$

Also $CA = CB = r$

$\Rightarrow AB = \sqrt{2}r$

Also $h\cot\alpha = \sqrt{2}r$

$\Rightarrow h = \sqrt{2}\,r\tan\alpha$



59. C

Sol. We know that the total number of terms in $(x_1 + x_2 + ... + x_r)^n$ is ${}^{n+r-1}C_{r-1}$

So, the total number of terms in $(x_1 + x_2 + ... + x_n)^3$ is

$${}^{3+n-1}C_{n-1} = {}^{n+2}C_{n-1} = {}^{n+2}C_3 = \frac{(n+2)(n+1)n}{6}$$

60. C

Sol. We know that

$|\cos x - \sin x| \le \sqrt{2}$

$\therefore |\cos x - \sin x| \ge \sqrt{2}$

$\Rightarrow |\cos x - \sin x| = \sqrt{2}$

$\Rightarrow \cos x - \sin x = \sqrt{2}, -\sqrt{2}$

$\Rightarrow \cos\left(x + \frac{\pi}{4}\right) = 1, -1$

$\Rightarrow x + \frac{\pi}{4} = 0, \pi, 2\pi$

$\Rightarrow x = \frac{3\pi}{4}, \frac{7\pi}{4}$ $\quad [\because x \in [0, 2\pi]]$

Hence, there are two values of x.

61. D

Sol. Let $P = (a\cos\theta, b\sin\theta)$

$\Rightarrow P_1 = (a\cos\theta, 0), P_2 = (0, b\sin\theta)$

Thus, equation of line P_1P_2 is $\frac{x}{a\cos\theta} + \frac{y}{b\sin\theta} = 1$

$$\Rightarrow \frac{x/a}{\cos(-\theta)} - \frac{y/b}{\sin(-\theta)} = 1$$

which is clearly a normal to the ellipse of the form $\frac{x^2}{A^2}+\frac{y^2}{B^2}=1$

where $\frac{A}{A^2-B^2}=\frac{\lambda}{a}$, and $\frac{B}{A^2-B^2}=\frac{\lambda}{b}$

If $a>b$, then $B>A$.

Let the eccentricity of the second ellipse be e_1

$\Rightarrow \quad 1-e_1^2=\frac{A^2}{B^2}=\frac{b^2}{a^2}=1-e^2$

$\Rightarrow \quad e_1=e$

Hence (D) is the correct answer.

62. B

Sol. Here centre A (1,2), and Tangent at (1,7) is

x.1 + y.7 – 1 (x+1) – 2 (y+7) – 20 = 0

or y = 7 ...(1)

Tangent at D (4,–2) is

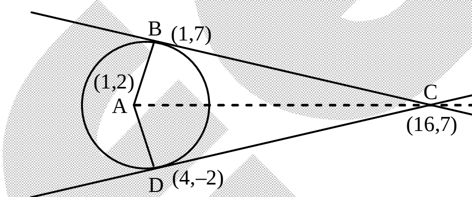
3x – 4y – 20 = 0 ...(2)

Solving (1) and (2), C is (16, 7)

Area ABCD = AB x BC

= 5 × $\sqrt{256+49-32-28-20}$ = 5 × 15 = 75 units

Hence (B) is the correct answer.



63. A

Sol. Random experiment here is that selecting a digit at units place in each of the four numbers.

The digit at units place in each of the numbers can be any one of the ten digits 0, 1, 2, …, 9.

$\therefore$ The total number of ways in which the digit at units place in four numbers can be, is n(S) = 10 × 10 × 10 × 10 = 10^4.

Let E be the event that the digit in the units place of product of the four numbers is 1, 3, 7 or 9.

Since, in order to have 1, 3, 7 or 9 in units place in the product each and every number should be ended with 1, 3, 7 or 9.

$\therefore$ n(E) = 4 × 4 × 4 × 4 = 4^4

P(E) = $\frac{n(E)}{n(S)}=\frac{4^4}{10^4}=\frac{16}{6^{25}}$

Hence (A) is the correct answer.

64. D

Sol. Equation of tangent in terms of slope of parabola $y^2=4x$ is $y=mx+\frac{1}{m}$ …………(i)

$\because$ Eq. (i) is also tangent of $x^2=-32y$

then $\quad x^2=-32\left(mx+\frac{1}{m}\right)$

$\Rightarrow \quad x^2+32mx+\frac{32}{m}=0$

$\therefore \quad B^2 = 4AC$ (Condition of tangency)

$\Rightarrow (32m)^2 = 4.1.\frac{32}{m}$

$\Rightarrow \quad m^3 = \frac{1}{8}$ or $m = \frac{1}{2}$

From Eq. (i), $y = \frac{x}{2} + 2$

$\Rightarrow x - 2y + 4 = 0$

Hence (D) is the correct answer.

65. B

Sol. $\alpha + \beta = 1$ and $\alpha\beta = -1$

AM of A_{n-1} and $A_n = \frac{A_{n-1} + A_n}{2}$

$= \frac{\alpha^{n-1} + \beta^{n-1} + \alpha^n + \beta^n}{2}$

$= \frac{\alpha^{n-1}(1+\alpha) + \beta^{n-1}(1+\beta)}{2}$

$= \frac{\alpha^{n-1}(\alpha^2) + \beta^{n-1}(\beta^2)}{2} \quad (\because \alpha^2 = \alpha + 1 \text{ and } \beta^2 = \beta + 1)$

$= \frac{1}{2}(\alpha^{n+1} + \beta^{n+1})$

$= \frac{1}{2}A_{n+1}$

Hence (B) is the correct answer.

66. D

Sol. Image of the centre = (–16, –2)

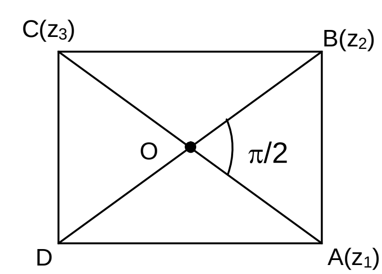
So equation of required circle is

$(x + 16)^2 + (y + 2)^2 = 5^2$

Hence (D) is the correct answer.

67. D

Sol. $\because$ OA = OB = OC = OD



Let $B(z_2)$ and $C(z_3)$

$\therefore \frac{z_2 - 0}{z_1 - 0} = \frac{OB}{OA}e^{i\pi/2} \Rightarrow z_2 = iz_1$

and $z_3 = -z_1$

($\because$ O is the mid point of A and C)

$\therefore$ Centoid $= \frac{z_1 + iz_1 - z_1}{3}$

$= \frac{iz_1}{3} = \frac{z_1}{3}\left(\cos\frac{\pi}{2} + i\sin\frac{\pi}{2}\right) \quad$ ……………..(i)

If B at D, then $z_2 = -iz_1$

$\therefore$ Centroid $= \dfrac{z_1 - iz_1 - z_1}{3}$

$= -\dfrac{iz_1}{3} = \dfrac{z_1}{3}\left(\cos\dfrac{\pi}{2} - i\sin\dfrac{\pi}{2}\right)$ ……………..(ii)

Combining Eqs. (i) and (ii), we get

Centroid of Δ ABC $= \dfrac{z_1}{3}\left(\cos\dfrac{\pi}{2} \pm i\sin\dfrac{\pi}{2}\right)$

Hence (D) is the correct answer.

68. C

Sol. $3!(1+3+5+7)+(10)\times 3!(1+3+5+7)$

$+10^2\times 3!(1+3+5+7)+10^3\times 3!(1+3+5+7)$

Hence (C) is the correct answer.

69. B

Sol. $\sqrt{\log_2 x} - 0.5 = \log_2 \sqrt{x}$

$\Rightarrow \sqrt{\log_2 x} = 0.5 = 0.5\log_2 x \Rightarrow y - 0.5 = 0.5y^2$

$\Rightarrow y^2 - 2y + 1 = 0 \Rightarrow y = 1 \Rightarrow \log_2 x = 1 \Rightarrow x = 2$

Hence (B) is the correct answer.

70. C

Sol. Major axis of hyperbola bisects the asymptote

$\Rightarrow$ equation of other asymptote x = 2y

equation of hyperbola (y – 2x)(x – 2y) + k = 0 it passes through (3, 4)

$\Rightarrow$ required equation $2x^2 + 2y^2 - 5xy + 10 = 0$.

SECTION – B

71. 0

Sol. We have,

$$\frac{x^2}{1-|x-5|} = 1$$

$$\Rightarrow x^2 = 1 - |x-5|$$

$$\Rightarrow x^2 - 1 = -|x-5|$$

The total number of real solutions of this equation is equal to the number of points of intersection of the curves $y = x^2 - 1$ and $y = -|x-5|$. Clearly, these two curves do not intersect. Hence, the given equation has no solution.

72. 4

Sol. Required limit $= \dfrac{\log_e(1+x) + x^2 - x}{x^2}$

$$=\lim_{x\to 0}\frac{\left(x-\frac{x^2}{2}+\frac{x^3}{3}-........\right)+x^2-x}{x^2}$$

$$=\lim_{x\to 0}\frac{\frac{x^2}{2}+\frac{x^3}{3}-\frac{x^4}{4}+........}{x^2}$$

$$=\lim_{x\to 0}\frac{x^2\left(\frac{1}{2}+\frac{x}{3}-......\right)}{x^2}=\frac{1}{2}$$

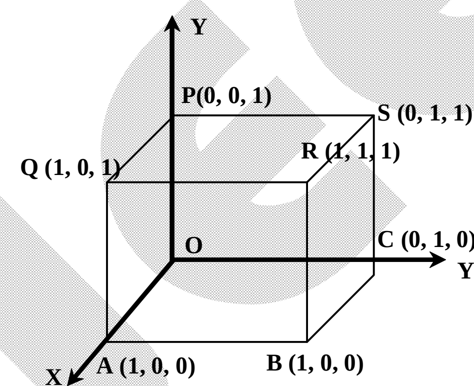
Hence 8λ will be equal to 4.

73. 1

Sol. The direction ratios of the diagonal $\overrightarrow{OR}$ is (1, 1, 1)

Direction cosine are

$$\left(\frac{1}{\sqrt{3}},\frac{1}{\sqrt{3}},\frac{1}{\sqrt{3}}\right)$$



Similarly direction cosine of $\overrightarrow{AS}$ are

$$\left(\frac{1}{\sqrt{3}},-\frac{1}{\sqrt{3}},-\frac{1}{\sqrt{3}}\right)$$

$\overrightarrow{BP}$ are $\left(\frac{1}{\sqrt{3}},\frac{1}{\sqrt{3}},-\frac{1}{\sqrt{3}}\right)$

$\overrightarrow{CQ}$ are $\left(\frac{1}{\sqrt{3}},\ -\ \frac{1}{\sqrt{3}},\ \frac{1}{\sqrt{3}}\right)$

Let l, m, n be direction cosines of the line

$\cos\alpha=\frac{l+m+n}{\sqrt{3}}$, $\cos\beta=\frac{l-m-n}{\sqrt{3}}$, $\cos\gamma=\frac{l+m-n}{\sqrt{3}}$, $\cos\delta=\frac{l-m+n}{\sqrt{3}}$

$\cos^2\alpha+\cos^2\beta+\cos^2\gamma+\cos^2\delta=\frac{4\left(l^2+m^2+n^2\right)}{3}=\frac{4}{3}$ (since $l^2+m^2+n^2=1$)

Hence answer is 00001.33.

74. 2

Sol. $b + c = 4a$

$\sin B+\sin C=4\sin A$

$$\cos\frac{B-C}{2}=4\cos\frac{B+C}{2}$$

$$\cos\frac{B}{2}\cos\frac{C}{2}+\sin\frac{B}{2}\sin\frac{C}{2}=4\left[\cos\frac{B}{2}\cos\frac{C}{2}-\sin\frac{B}{2}\sin\frac{C}{2}\right]$$

$$3\cos\frac{B}{2}\cos\frac{C}{2}=5\sin\frac{B}{2}\sin\frac{C}{2}$$

$$\cot\frac{B}{2}\cot\frac{C}{2}=\frac{5}{3}.$$

75. 1

Sol. As, $T_n = \cot^{-1}\left[\frac{(n+1)(n+2)}{2}x + \frac{2}{x}\right]$

$$\Rightarrow T_n = \tan^{-1}\left(\frac{2x}{(n+2)(n+1)x^2+4}\right)$$

$$\therefore T_n = \tan^{-1}\left(\left(\frac{n+2}{2}\right)x\right) - \tan^{-1}\left(\left(\frac{n+1}{2}\right)x\right)$$

So, $S_n = \tan^{-1}\left(\left(\frac{n+2}{2}\right)x\right) - \tan^{-1}x$

$$\Rightarrow \lim_{n\to\infty} S_n = \frac{\pi}{2} - \tan^{-1}x$$

$= \cot^{-1}x = 1$ (given)

$\Rightarrow \quad x = \cot 1$