MAHESH TUTORIALS SCIENCE

00 – 00		Q. Booklet Serial No: 190415	
Test No : 1181	3 Hrs.		Q. Booklet Version : 11

Hints & Solutions

PART A - PHYSICS

1. **b)** π

The magnitude of phase difference between the points separated by distance 10 metres = k × 10 = [10π × 0.01] × 10 = π

2. **a)** $\omega_1 = \omega_3 > \omega_2$

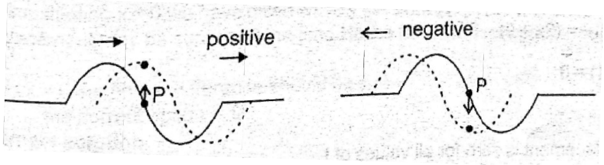
As $v = \sqrt{\frac{T}{\mu}}$ is same for all, wave with maximum wavelength will have minimum angular frequency (by $v = n\lambda$). Also as $\lambda_1 = \lambda_3$ thus $\omega_1 = \omega_3$. Hence (a).

3. **b)** **wave speed V**

AB = λ   CD = T

$\frac{AB}{CD} = \frac{\lambda}{T} = v\lambda = V$ i.e. wave speed

4. **d)** **none of these**



5. **c)** $\mathbf{\frac{10}{5+(x-2t)^2}}$

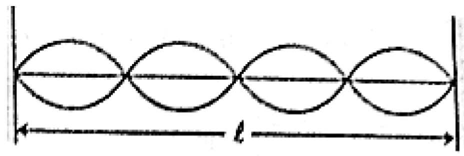
yf(x) is given

$$y(x, t) = f(x - vt) = \frac{10}{5+(x-2t)^2}$$

6. **c)** $\mathbf{\frac{\sqrt{3}a}{2}}$

For a string vibrating in its n^{th} overtone ($(n + 1)^{th}$ harmonic)

$$y = 2A \sin\left(\frac{(n+1)\pi x}{L}\right)\cos\omega t$$



For $x = \frac{l}{3}$, 2A = a and n = 3;

$$y = \left[a\sin\left(\frac{4\pi}{l}\times\frac{l}{3}\right)\right]\cos\omega t$$

$$= a\sin\frac{4\pi}{3}\cos\omega t$$

$$= -a\left(\frac{\sqrt{3}}{2}\right)\cos\omega t$$

i.e. at $x = \frac{l}{3}$, the amplitude is $\frac{\sqrt{3}\,a}{2}$

7. **a)** **1 : 2**

$v_1 = \frac{1}{2l_1}\sqrt{\left(\frac{T}{4\pi r^2\rho}\right)}$ and

$v_2 = \frac{1}{2l_2}\sqrt{\left(\frac{T}{\pi r^2\rho}\right)}$

$\Rightarrow \frac{1}{2l_1}\sqrt{\frac{T}{4\pi r^2\rho}} = \frac{1}{2l_2}\sqrt{\frac{T}{\pi r^2\rho}}$

$\Rightarrow \frac{1}{2l_1}\times\frac{1}{2} = \frac{1}{2l_2}$

$\Rightarrow l_1 : l_2 = 1 : 2$

8. **d)** $\mathbf{y_2 = a\cos(\omega t + kx + \frac{4\pi}{3})}$

At x = 0 the phase difference should be π.

∴ the correct option is d

Alternate solution

$y_2 = a\cos(\omega t + kx + \phi_0)$

$\therefore \quad y = y_1 + y_2 = a\cos\left(\omega t - kx + \frac{\pi}{3}\right) + a\cos(\omega t + kx + \phi_0)$

$$= 2a\cos\left[\omega t + \frac{\frac{\pi}{3} + \phi_0}{2}\right] \times \cos\left[kx + \frac{\phi_0 - \frac{\pi}{3}}{2}\right]$$

$\because \quad y = 0$ at $x = 0$ for any t

$\Rightarrow \quad kx + \frac{\phi_0 - \frac{\pi}{3}}{2} = \frac{\pi}{2}$ at $x = 0$

$\therefore \quad \phi_0 = \frac{4\pi}{3}$.

Hence $y_2 = a\cos\left(\omega t + kx + \frac{4\pi}{3}\right)$

9. **b)** **22 m/s**

The motorcyclist observes no beats. So the apparent frequency observed by him from the two sources must be equal.

f_1 = Frequency recorded by motorcyclist from plice car.

f_2 = Frequency recorded by motocyclist from stationary siren.

For no beats $\Rightarrow f_1 = f_2$

$\therefore \quad 176\left(\frac{330 - \upsilon}{330 - 22}\right) = 165\left(\frac{330 + \upsilon}{330}\right)$

Solving this equation we get, υ = 22 m/s

10. **c)** **2.76×10^{-3} m/s**

$v_{max} = \omega_n A = (2\pi f)A$

$= (2\pi)(440)(10^{-6})$

$= 2.76 \times 10^{-3}$ m/sec

11. **c)** **927°C**

In a gas, $V = \sqrt{\frac{\gamma RT}{M}}$

$\Rightarrow \quad V \alpha \sqrt{T} \Rightarrow \frac{V}{2V} = \sqrt{\frac{300}{T}}$

$\Rightarrow \quad T = 300 \times 4 = 1200$ K

$= 927°C$

12. **b)** **69 dB**

Let intensity due to single person = I

then $10 \log I/I_0 = 60$

Also, Intensity due to 8 person = 8I.

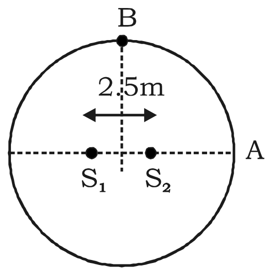
Final decibal level

$= 10\log\left(\frac{8I}{I_0}\right) = 10\left(\log\frac{I}{I_0} + \log 8\right)$

$= 60 + 10\log 8 = 60 + 30\log 2$

$= 60 + 30(.3010) \simeq 69$

13. **c)** **10**



At point A, the path difference is 2.5 λ and at B, path difference is zero. While moving from A to B, path difference changes from 2.5 to zero, making two maxima corresponding to 2λ and λ (excluding B). B is common for both upper quarter circles hence there are five maxima in one half circle, making 10 in total circular movement.

14. **d)** **4L, 4L/3, 4L/5**

$L = (2n - 1)\frac{\lambda}{4}$

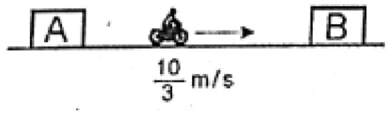
$\lambda = \frac{4L}{(2n - 1)}$

$\lambda_1 = \frac{4L}{2(1) - 1} = 4L$

$\lambda_2 = \frac{4L}{4 - 1} = \frac{4L}{3}$

$\lambda_3 = \frac{4L}{6 - 1} = \frac{4L}{5}$

15. **c)** **333 ms^{-1}**



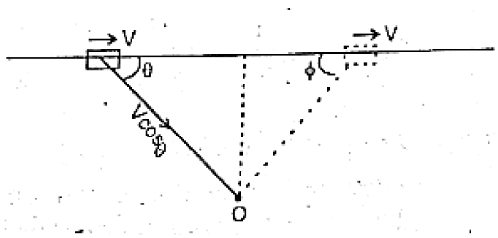
If f_B is the frequency as heard by cyclist from source B and f_A is the frequency as heard by the cyclist from source A.

Then, $f_B - f_A = 5$

$$\Rightarrow \quad 250\left(\frac{V_s + \frac{10}{3}}{V_s}\right) - 250\left(\frac{V_s - \frac{10}{3}}{V_s}\right) = 5$$

$$V_s = \frac{1000}{3} = 333 \text{ m/s}$$

16. **a)** **continuously decreases**



From figure, the velocity of approach (Vcosθ) decrease as the source comes closer (as θ increases) and the velocity of separation also increases as ϕ will decreases. Hence the frequency of sound as heared by the observed decreases continuously.

17. **c)** $\mathbf{\frac{5}{3}\alpha}$

$L(1 + \alpha\theta) + 2L(1 + 2\alpha\theta)$

$= 3L + 5K\,\alpha\,\theta$

$= 3L\left(1 + \frac{5}{3}\alpha\theta\right)$

$= \frac{5}{3}\alpha$

18. **d)** **3.6 × 10^{-4}**

$l_f = l_i(1 + \alpha\Delta T)$

$$\text{Strain} = \frac{l_f - l_i}{l_i}$$

$= \alpha\Delta T$

$= (1.2 \times 10^{-5})(50 - 20)$

$= 3.6 \times 10^{-4}$

19. **c)** $\frac{\alpha_s}{(\alpha_s + \alpha_a)}$

$l_1\alpha_a t = l_2\alpha_s t$

$$\Rightarrow \frac{l_1}{l_2} = \frac{\alpha_s}{\alpha_a} \quad \Rightarrow \quad \frac{l_2}{l_1} = \frac{\alpha_a}{\alpha_s}$$

$$\Rightarrow \frac{l_2}{l_1} + 1 = \frac{\alpha_a}{\alpha_s}$$

$$\Rightarrow \frac{l_2 + l_1}{l_1} = \frac{\alpha_a + \alpha_s}{\alpha_s}$$

$$\Rightarrow \frac{l_1}{l_1 + l_2} = \frac{\alpha_s}{\alpha_a + \alpha_s}$$

20. **c)** **3 : 2**

Thermal strain $= \alpha\Delta T$

stress $= Y$ (strain)

$= Y(\alpha\Delta T)$

$Y_1\alpha_1\Delta T = Y_2\alpha_2\Delta T$

$$\Rightarrow \frac{Y_1}{Y_2} = \frac{\alpha_2}{\alpha_1} = \frac{3}{2}$$

21. **a)** **– 40°C**

$$\frac{F - 32}{180} = \frac{C - 0}{100}$$

$$\Rightarrow \frac{x - 32}{180} = \frac{x}{100}$$

22. **b)** **bend with B on outer side**

23. **d)** $\mathbf{4\pi R^3\,\alpha\Delta T}$

$$V_f = \frac{4}{3}\pi\left[R(1 + \alpha\Delta T)\right]^3$$

$\Delta V = V_f - V_i$

$$= \frac{4}{3}\pi R^3(1 + \alpha\Delta T)^3 - \frac{4}{3}\pi R^3$$

$$= \frac{4}{3}\pi R^3\left((1 + \alpha\Delta T)^3 - 1\right)$$

$\simeq \frac{4}{3}\pi R^3(1+3\alpha\Delta T-1)$

$\simeq 4\pi R^3\alpha\Delta T$

24. **b) 15.2 cc**

Due to volume expansion of both liquid and vessel, the change in volume of liquid relative to container is given by

$\Delta V = V_0[\gamma_L - \gamma_g]\Delta\theta$

Given

V_0 = 1000 cc, α_g = $0.1\times 10^{-4}/^oC$

$\therefore \gamma_g = 3\alpha_g = 3\times 0.1\times 10^{-4}/^oC$

$= 0.3\times 10^{-4}/^oC$

$\therefore \Delta V = 1000[1.82\times 10^{-4} - 0.3\times 10^{-4}]\times 100$

= 15.2 cc

25. **b)** $\mathbf{\frac{C+3A-S}{3}}$

$\gamma_r = \gamma_a + \gamma_v$;

where

γ_r = coefficient of real expansion,

γ_a = coefficient of apparent expansion and

γ_v = coefficient of expansion of vessel.

For copper,

$\gamma_r = C + 3\alpha_{Cu} = C + 3A$

For silver,

$\gamma_r = S + 3\alpha_{Ag}$

$\Rightarrow C + 3A = S + 3\alpha_{Ag}$

$\Rightarrow \alpha_{Ag} = \frac{C-S+3A}{3}$

26. **d) 4.5 cm**

$V = V_0(1+\gamma\Delta\theta)$

$\Rightarrow$ change in volume

$V - V_0 = \Delta V = A\,.\,\Delta l = V_0\gamma\Delta\theta$

$\Rightarrow \Delta l = \frac{V_0\,.\,\Delta\theta}{A}$

$= \frac{10^{-6}\times 18\times 10^{-5}\times(100-0)}{0.004\times 10^{-4}}$

$= 45\times 10^{-3}$ m = 4.5 cm

27. **b)** $\sqrt{\frac{l\,n\,4}{a}}$

As $dl = \alpha\, l\, dT$

$\therefore \int_l^{2l}\frac{dl}{l} = a\int_0^T T\,dT$

$ln\,2 = a\frac{T^2}{2}$

$\therefore T = \left[\frac{l\,n\,4}{a}\right]^{1/2}$

28. **c)** $\mathbf{\frac{1}{T_0}}$

PV = nRT PdV = nRdT

$\gamma = \frac{1}{V}\frac{dV}{dT}$ and $\frac{dV}{dT} = \frac{nR}{P}$

$\gamma = \frac{1}{T}$

For given temperature T_0,

$\gamma = \frac{1}{T_0}$

29. **c) 1000**

$\frac{R'}{t'} = \frac{R(1+\alpha\Delta\theta)}{t(1+\alpha\Delta\theta)} = 1000.$

Hence the ratio $\frac{t}{R}$ will remain constant on heating.

30. **c) 1375.0^{o}X**

$\frac{X-(-125)}{500} = \frac{Y-(-70)}{40}$

For

Y = 50

X = 1375.0^{o}X

PART B - CHEMISTRY

31. **a)** **small size of lithium atom and Li^{+} ion**
Conceptual

32. **d)** **9.32, 8.29**
Conceptual

33. **a)** **Good conductors of heat and electricity**
Conceptual

34. **d)** **Na_2O, Li_3N, Li_2O**
Conceptual

35. **d)** **Li^{+}**
Hydrated ion size os large, due to small size.

36. **c)** **Sodium hydride**
$Na + NH_3 \rightarrow NaNH_2 + H^{+} + e^{-}$

37. **a)** **They are for above the hydrogen in electrochemical series based on oxidation potential.**
Conceptual

38. **a)** **Li_2CO_3**
Conceptual

39. **c)** **K**
Conceptual

40. **a)** **$LiHCO_3$**
$CaHCO_3$ is liquid at RT

41. **d)** **$Ca + 2C \longrightarrow CaC_2$**
Conceptual

42. **d)** **a and b**
$2NaNO_3 \rightarrow N_2 + 3O_2$

43. **b)** **Tarnishes in dry air**
$2Mg + O_2 \rightarrow 2MgO$

44. **a)** **Na_2CO_3**
$4Na + O_2 \rightarrow 2Na_2O$
$2Na_2O + O_2 \rightarrow 2Na_2O_2$
$Na_2O_2 + 2H_2O \rightarrow 2Na^{+} + H_2O_2 + 2OH^{-}$
$H_2O_2 + CO_2 \rightarrow CO_3^{-2} + H_2O$
$CO_3^{-2} + 2Na^{+} \rightarrow Na_2CO_3$

45. **a)** **iv < i < ii < iii**
Conceptual

46. **a)** **NaH**
$NaH + H_2O \rightarrow NaOH + H_2$

47. **a)** **Light bluish flame**
Conceptual

48. **d)** **Liquid H_2**
Conceptual

49. **d)** **Both a and c**
Conceptual

50. **b)** **$KHCO_3$**
Conceptual

51. **a)** **Mg**
$Mg + 2HCl \rightarrow MgCl_2 + H_2$

52. **b)** **F T T F**

53. **b)** **2**
Conceptual

54. **d)** **Hot Al_2O_3**
Conceptual

55. **d)** **Helium**
Conceptual

56. **c)** **Dihydrogen**
Conceptual

57. **b)** **Low in D_2O**
Conceptual

58. **a)** **High T & High P**
Conceptual

59. **c)** **$Ba(OH)_2$**
Conceptual

60. **c)** **Chemical properties**
Conceptual

PART C - MATHS

61. **b)** **0**

$z^4 = 1$

$z^4 = 1, e^{\pi i/2}, e^{\pi i}, e^{3\pi i/2}$

$z_1 = 1$

$z_2 = i$

$z_3 = -1$

$z_4 = -i$

$z_1^2 + z_2^2 + z_3^2 + z_4^2 = 1^2 + i^2 + 1 + (-i)^2 = 0$

62. **b)** $\mathbf{\frac{1}{5}}$

The total no of ways of getting 15 are

(3, 6, 6), |(4, 5, 6)| (5, 5, 5)|

$\frac{\lfloor 3}{\lfloor 2} + \lfloor 3 + 1 = 10$

For ways = 4, 5, 6 or 4, 6, 5

∴ Required probability $= \frac{2}{10} = \frac{1}{5}$

63. **b)** **circle**

$\arg\frac{z-1}{z+1} = \frac{\pi}{3}$

$\arg(z-1) - \arg(z+1) = \frac{\pi}{3}$

$\tan^{-1}\left(\frac{y}{x-1}\right) - \tan^{-1}\left(\frac{y}{x+1}\right) = \frac{\pi}{3}$

$\tan^{-1}\frac{y\left\{\frac{1}{x-1} - \frac{1}{x+1}\right\}}{1 + \frac{y^2}{x^2-1}} = \frac{\pi}{3}$

$\tan^{-1}\frac{2y}{x^2 + y^2 - 1} = \frac{\pi}{3}$

$x^2 + y^2 - 1 = \frac{2y}{\sqrt{3}}$

which is equation of circle.

64. **d)** **none of these**

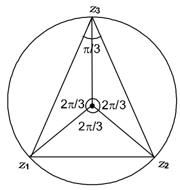
$z_2 = z_1 e^{2\pi i/3} = z_1 w$

$z_2 = z_1 e^{4\pi i/3} = z_1 w^2$

$z_1 z_2 z_3 = z_1^3\, 1.w.w^2 = z_1^3$

$z_1 + z_2 + z_3 = z_1(1 + w + w^2) = 0$

$z_1 z_2 + z_2 z_3 + z_3 z_1 = z_1^2\,(w + w^3 + w^2) = 0$



65. **d)** **none of these**

cases are (2, 3, 6) + (3, 2, 6)

∴ Required probability

$= \frac{2}{^6C_3} = \frac{2\times 6}{6\times 5\times 4} = \frac{1}{10}$

66. **c)** $\mathbf{\frac{3}{8}}$

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= P(A) + P(B) - P(A)\,P(B)$

$.7 = .2 + P(B) - .2\,P(B)$

$P(B) = \frac{5}{8}$

67. **a)** $\mathbf{2\sqrt{5}}$

For a circle $z\bar{z} + \bar{g}z + g\bar{z} + c = 0$

Radius of circle

$z\bar{z} + (4+3i)z + (4-3i)\bar{z} + 5 = 0$ will be

$\sqrt{25-5} = \sqrt{20} = 2\sqrt{5}$

68. **d)** $\mathbf{\frac{n}{2} + 1}$

$(1+i)^n + (1-i)^n = 2^k \cos\frac{n\pi}{4}$

L.H.S. $= (1+i)^n + (1-i)^n$

$= (\sqrt{2})^n\left(\left(\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}\right)^n + \left(\frac{1}{\sqrt{2}} - \frac{i}{\sqrt{2}}\right)^n\right)$

$= (\sqrt{2})^n\left(\cos\frac{n\pi}{4} + i\sin\frac{n\pi}{4} + \cos\frac{n\pi}{4} - i\sin\frac{n\pi}{4}\right)$

$= 2^{\frac{n}{2}+1}\cos\frac{n\pi}{4}$

⇒ $k = \frac{n}{2} + 1$

69. **b)** $\beta + i\alpha$

$(a + ib)^5 = \alpha + i\beta$

Taking complex conjugate

$(a - ib)^5 = \alpha - i\beta$

$(-i^2a - ib)^5 = \alpha - i\beta$

$(-i)^5\ (b + ai)^5 = \alpha - i\beta$

$(\beta + ai)^5 = -\dfrac{\alpha}{i} + \beta$

$= \alpha i + \beta$

70. **a)** $\mathbf{\dfrac{3}{4}}$

It is last throw

$\Rightarrow$ score lass then 5 point is obtained

$\therefore$ same space = {1, 2, 3, 4}

for ways = {2, 3, 4}

$\therefore$ Required probability = $\dfrac{3}{4}$

71. **b)** $\mathbf{\dfrac{31}{32}}$

Required probability = 1- no head

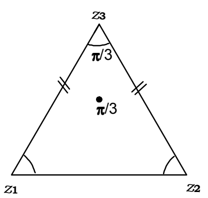
$1 = -\left(\dfrac{1}{2}\right)^5 = \dfrac{31}{32}$

72. **c)** **equilateral**

$\arg\dfrac{z_1 - z_3}{z_2 - z_3} = -\dfrac{\pi}{3}$

$(z_1 - z_3) = (z_2 - z_3)e^{-\pi/3i}$

$\dfrac{(z_1 - z_3)}{(z_2 - z_3)} = \cos\dfrac{\pi}{3} - i\sin\dfrac{\pi}{3} = \dfrac{1 - i\sqrt{3}}{2}$



$\left|\dfrac{z_1 - z_3}{z_2 - z_3}\right| = \left|\dfrac{1 - i\sqrt{3}}{2}\right| = 1$

$|z_1 - z_3| = |z_2 - z_3|$

Triangle is equilateral

73. **b)** **a hyperbola**

Let ω be centre of circle, r-radius of circle

$\Rightarrow$ $|\omega - z_1| = a + r, |\omega - z_2| = b + r$

$\Rightarrow$ $|\omega - z_1| - |\omega - z_2| = a - b$

$\Rightarrow$ Locus of 'ω' is

$|z - z_2| - |z - z_2| = a - b$

which is hyperbola.

74. **d)** **9**

$|z_1 + z_2| \le |z_1| + |z_2|$

Solution: $|iz + 3 - 4i| \le |iz| + |3 - 4i|$

$\le |z| + |3 - 4i|$

$< 4 + 5 = 9$

75. **b)** $\boldsymbol{a = -1}$

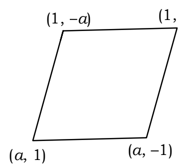
Hint : Diagonals of Parallelogram intersects at midpoint

$\dfrac{a+1}{2} = \dfrac{a+1}{2}$

$\dfrac{-1-a}{2} = \dfrac{a+1}{2}$

$2a = -2$

$a = -1$



76. **a)** **1**

$A^2 + B^2 = (A + iB)\ (A - iB)$

$A + iB = \dfrac{1 - i\alpha}{1 + i\alpha}$

$A - iB = \dfrac{1 + i\alpha}{1 - i\alpha}$

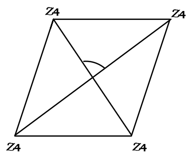
$A^2 + B^2 = \dfrac{1 + \alpha^2}{1 + \alpha^2} = 1$

77. **a)** $\mathbf{z_1 - z_3 = ik\ (z_2 - z_4)}$

Diagonals of rhombus are perpendicular

$\arg\dfrac{z_1 - z_3}{z_2 - z_4} = \dfrac{\pi}{2}$ or $\dfrac{z_1 - z_3}{z_2 - z_4}$

= pure Imaginary $\frac{z_1 - z_3}{z_2 - z_4} = ki$



78. **c)** **line**

$3z_1 = 5z_2 - 2z_3$

$z_1 = \frac{5z_2 - 2z_3}{5 - 2}$

$\Rightarrow$ z_1 divides line joining z_2 and z_3 externally in ration 5 : 2

$\Rightarrow$ z_1, z_2, z_3 are collinear.

79. **c)** $\mathbf{\frac{1}{2}}$

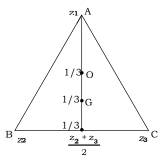
Tossing of each coin is independent event

$\therefore$ The probability that the fifth coin will fall with head upwards $= \frac{1}{2}$

80. **d)** $\mathbf{4z_1 + z_2 + z_3 = 0}$

$G = \frac{z_1 + z_2 + z_3}{3}$

$O = \frac{\frac{z_1 + z_2 + z_3}{3} + z}{2}$



81. **d)** $\mathbf{\frac{1}{18}}$

Case –I : We choose first square from corner square. In this total no. of ways choosing 25 square = 4 × 2

Case –II : We choose first square from first or last row or colour. Total no. ways = 24 × 3

Case – III : Any square except probability

Total ways = 36 × 4

Total ways = 8 + 72 + 144 = 224

Now any square can be choose as first or second

$\therefore$ Required probability $= \frac{112}{^{64}C_2} = \frac{1}{18}$

82. **c)** $\mathbf{\frac{14}{19}}$

As first ball is red

$\therefore$ Required probability $= \frac{^{14}C_1}{^{19}C_1} = \frac{14}{19}$

83. **a)** $\mathbf{P(A \cup B) \geq \frac{2}{3}}$

As $B \subset (A \cup B)$

$\Rightarrow$ $P(B) \leq P(A \cup B)$

or $P(A \cup B) \geq \frac{2}{3}$

Now, as $A \cap B' \subset B'$

$\Rightarrow$ $P(A \cap B') \leq P(B')$

$\Rightarrow$ $P(A \cap B') \leq \frac{1}{3}$

Now, $A \cap B \subset A \Rightarrow P(A \cap B) \leq P \leq \frac{1}{2}$

and

$A' \cap B \subset A' \Rightarrow P(A' \cap B) \leq P(A') \leq \frac{1}{2}$

84. **c)** $\mathbf{\frac{5}{512}}$

M	F	R	P	IN	NIN
55	25	10	70	20	60

$\therefore$ Required probability $\frac{25}{80} \times \frac{10}{80} \times \frac{20}{80}$

85. **a)** $\mathbf{\frac{1}{2}}$

Let we choose firstly five digit if these sum is even we place an even no. at six place so that overall sum is even

∴ Required probability $= \frac{9\times10^4\times5}{9\times10^5} = \frac{1}{2}$

86. **b)** $\mathbf{\frac{5}{16}}$

Case –I : O is at last place :- We can fill fourth place by 2 or 4

Place	_	_	_	_	_
	3	2	1	2	1

total ways = 12

Case –II : O is at 4^{th} place :- We can fill fifth place by 4 only.

Place	_	_	_	_	_
	3	2	1	1	4

Total ways = 6

Case -III : 2 is at last place :-

Place	_	_	_	_	_
	2	2	1	2	1

Total ways = 8

Case –IV : 4 is at last place :-

Place	_	_	_	_	_
	2	2	1	1	1

Total ways = 4

∴ Total no. = 30

∴ Required probability $= \frac{30}{96} = \frac{5}{16}$

87. **a)** **the x-axis**

$|z - z_1| = |z - z_2|$ locus of will be ⊥' bisector of line joining z_1 and z_2

$|x + i(y - 3) = |x + iy\ (y + 3)$

$x^2 + (y - 3)^2 = x^2 + (y + 3)^2$

$y = 0$

88. **d)** **none of these.**

$(a + ib)^n = c + id$ if $n \neq 0$

= complex can't be real

$(3 + 4i)^n = 25^n$

$(3 + 4i)^n$ = complex " $n \neq 0, n \in I$

So it will not satisfy for any n.

89. **b)** $\mathbf{\frac{6}{11}}$

Let E_1 = It is from bag A

E_2 = It is from bag B

E = Ball is white

$P(E_1) = P(E_2) = \frac{1}{2}$ ....(1)

$P\left(\frac{E}{E_1}\right) = \frac{5}{8}$ .....(2)

$P\left(\frac{E}{E_2}\right) = \frac{3}{4}$ ....(3)

$$P\left(\frac{E_2}{E}\right) = \frac{P(E_2)P\left(\frac{E}{E_2}\right)}{P(E_2)P\left(\frac{E}{E_2}\right) + P(E_1)P\left(\frac{E}{E_1}\right)}$$

90. **b)** $\mathbf{\frac{25}{6^3}}$

For ways a'x equal to coefficient of x^0 in

$(x^{-3} + x^{-2} + x^{-1} + 1 + x + x^2)^3$

$\frac{1}{x^9}\left[1 + x + x^2 + x^3 + x^4 + x^5\right]^3$

or coefficient of x^9 in $(1 - x^6)^3\ (1 - x)^3$ in

= 55 – 30 = 25

∴ Required probability