SOLUTIONS

PROGRESS TEST-3

GZ-1926, GZK-1909

GZBS-1904-1905

JEE MAIN PATTERN

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PHYSICS

1. (D)
2. (A)

Component of $\vec{A}$ along $\vec{B}$ = $\frac{\vec{A}.\vec{B}}{|\vec{B}|} \cdot \hat{B}$

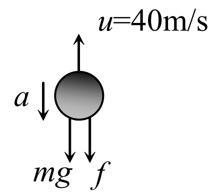
3. (A)	4. (C)	5. (C)	6. (B)
7. (C)	8. (C)	9. (C)	10. (B)

11. (A)
12. (D)

Let retardation of body is *a* and air resistance is *f*

$v = u + at$

$0 = 40 - 3a$



$a = \frac{40}{3}$ m/s²

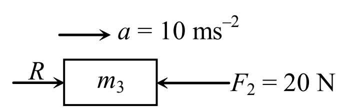
$ma = mg + f$

f = $ma - mg = 1.5\left(\frac{40}{3} - 10\right)$ = 5 N

13. (A)

14. (D)

$a = \frac{F_1 - F_2}{m_1 + m_2 + m_3} = 10 \text{ ms}^{-2}$



$R - F_2 = m_3 a$

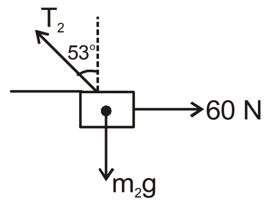
$R = 30 N$

15. (B)

16. (B)
17. (B)

18. **(A)**

From euquilibrium of lower block,



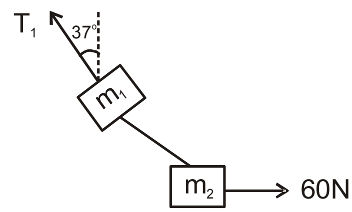
$T_2 \sin 53^\circ = 60$

$\Rightarrow \; T_2 = 75\,N$

$T_2 \cos 53^\circ = M_2 g$

$\Rightarrow \; 75 \times \frac{3}{5} = m_2 g \Rightarrow m_2 = 4.5\,kg$

From equilibrium of both the blocks together.



$T_1 \sin 37^\circ = 60$

$\Rightarrow T_1 = 100\ N$

$T_1 \cos 37^\circ = (m_1 + m_2) g$

$\Rightarrow 80 = (m_1 + m_2) g \Rightarrow m_1 = 3.5\,kg$

19. Average acceleration (A) $= \dfrac{\text{Change in velocity}}{\text{Time taken}}$

$\therefore$ Change in velocity = Area of acceleration – time graph

$\therefore$ Average acceleration $= \dfrac{\text{AreaOABE}}{20\ s} = \dfrac{600}{20} = 30\,m/s^2$

$\therefore$ **(C)**

20. Change in velocity $\Delta v = 8 - (-8) = 16\,m/s$

Time taken $\Delta t = \dfrac{\pi r}{v} = \dfrac{\pi \times 6}{8} = \dfrac{3\pi}{4}$

$\therefore$ Average acceleration $= \dfrac{\Delta v}{\Delta t} = \dfrac{16 \times 4}{3\pi} = \dfrac{64}{3\pi}$

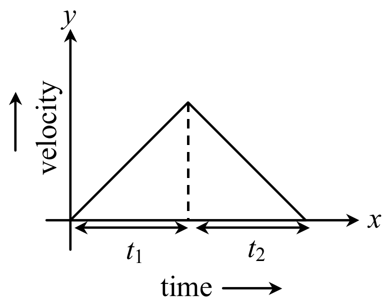
$\therefore$ **(C)**

21. Velocity = 0 at t = 5.5 s. S_{6th}

= 2 (distance travelled in (5.5)s – distance travelled in 5s) = 0.5 m

$\therefore$ **(B)**

22. $a_1t_1 = a_2t_2$ … (i)



$\frac{1}{2}(t_1 + t_2)a_1t_1 = 4$ … (ii)

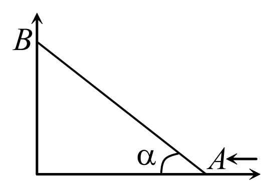
$t_1 + t_2 = 4$ … (iii)

$\frac{1}{a_1} + \frac{1}{a_2} = 2$

$\therefore$ **(B)**

23. **(B)**

24. $x^2 + y^2 = l^2 \Rightarrow 2x\frac{dx}{dt} + 2y\frac{dy}{dt} = 0 \Rightarrow -xv_A + yv_B = 0$



$\therefore \quad v_B = \frac{v_A}{\tan\alpha} = 10\sqrt{3} = 17.3 \text{ m/s}$

$\therefore$ **(D)**

25. $a = \frac{dv}{dt} = 6t + 5$; $v = \int_0^t (6t+5)dt = 3t^2 + 5t$; $\frac{ds}{dt} = 3t^2 + 5t$

$s = t^3 + \frac{5t^2}{2}$; $(s)_{t=1s} = 3.5 \text{ m}$

$\therefore$ **(B)**

26. **(A)**

27. $8 = 0 + a\left(2 - \frac{1}{2}\right)$ …(1)

$S_5 = 0 + a\left(5 - \frac{1}{2}\right)$ …(2)

Dividing equation (2) by (1)

We get, $S_5 = 24$ m.

$\therefore$ **(B)**

28. $x^2 = 1 + t^2$

$$2x\frac{dx}{dt} = 2t \Rightarrow \frac{dx}{dt} = \frac{t}{x} \therefore \frac{d^2x}{dt^2} = \frac{x - t\,dx/dt}{x^2} = \frac{1}{x} - \frac{t^2}{x^3}$$

$\therefore$ **(C)**

29. (D)

30. (D)

CHEMISTRY

31. (D)

$$\nu = K\left[\frac{1}{n_{1^2}} - \frac{1}{n_{2^2}}\right] \cdot K = \left(3.29 \times 10^{15}\text{Hz}\right)z^2$$

(A) $\frac{1}{2^2} - \frac{1}{5^2} = \frac{21}{100}$

(B) $\frac{1}{2^2} - \frac{1}{3^2} = \frac{5}{36}$

(C) $\frac{1}{2^2} - \frac{1}{42} = \frac{3}{16}$

(D) $\frac{1}{1^2} - \frac{1}{3^2} = \frac{8}{9}$ (highest)

32. (D)

$$\frac{1}{\lambda} = Rz^2\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$$

$$\frac{1}{\lambda} = R \times 1^2\left[\frac{1}{1^2} - \frac{1}{2^2}\right]$$

$$\frac{1}{\lambda} = R \times \frac{3^2}{3^2}\left[\frac{1}{1^2} - \frac{1}{2^2}\right]$$

$$\frac{1}{\lambda} = R3^2\left[\frac{1}{3^2} - \frac{1}{6^2}\right]$$

Required Transition $6 \to 3$ for Li^{++}.

33. (C)

$\lambda = \frac{h}{mv}$ $\lambda = \frac{h}{\sqrt{2mKE}}$

$\lambda_{req} = \frac{h}{\sqrt{2m9(KE)}} = \frac{1}{3}\frac{\lambda}{\sqrt{2m(KE)}} = \frac{\lambda}{3}$

34. (B)

$\Delta x m \Delta V \geq \frac{h}{4\pi}$

$\Delta V = \frac{h}{4\pi \times m \times \Delta x} = \frac{6.63 \times 10^{-34}}{4 \times 3.14 \times 1.1 \times 10^{-27} \times 3 \times 10^{-12}} = 1.6 \times 10^{4}\ m/s$

35. (D)

$\Delta P = \frac{h}{4\pi \Delta x}$

$\Delta x \longrightarrow 0$ than $\Delta P \longrightarrow \infty$

36. (B)

$\Delta x = \lambda$

$\lambda \Delta P = \frac{h}{4\pi}$

$\frac{h}{mv} \times m\Delta V = \frac{h}{4\pi}$

$\frac{\Delta V}{V} = \frac{1}{4\pi}$

$\% \frac{\Delta V}{V} = \frac{1}{4\pi} \times 100 = \frac{25}{\pi} \cong 8$

37. (A)

s-orbital is non-directional it does not depends on θ, ϕ angular function $n = 2, \ell = 1, m = 0$ indicate p_z orbital which is directional have angular dependence.

38. (D)

$-1 \cdot 6 \times 10^{-19}$ and $-4 \cdot 0 \times 10^{-19}$

has highest common factor $\cdot - \cdot 8 \times 10^{-19}$ coulomb

So electronic charge is $-0 \cdot 8 \times 10^{-19} C$

39. (B)

$KE_1 = h\nu_1 - h\nu_0$

$KE_2 = h\nu_2 - h\nu_0$

$\frac{1}{K} = \frac{\nu_1 - \nu_0}{\nu_2 - \nu_0}$

$\nu_2 - \nu_0 = kv_1 - kv_0$

$(k-1)\nu_0 = k\nu_1 - \nu_2$

$\nu_0 = \frac{k\nu_1 - \nu_2}{k-1}$

40. (B)

$\frac{hc}{\lambda} = \frac{hc}{\lambda_1} + \frac{hc}{\lambda_2}$

$\frac{1}{\lambda} = \frac{\lambda_1 + \lambda_2}{\lambda_1 + \lambda_2}$

$\lambda = \frac{\lambda_1 \lambda_2}{\lambda_1 + \lambda_2}$

41. (B)

Let $n_{P_4O_{10}} = x$

$n_{P_4O_6} = y$

By POAC on P

$4 \times \frac{31}{124} = 4x + 4y$ ... (i)

By POAC on O

$2 \times 1 = 10 \times x + 6y$ ... (ii)

On solving (i) & (ii)

x = 1/8 y = 1/8

$\therefore$ Mass of P_4O_{10} = $\frac{1}{8} \times 284\,g = 35.5\,g$

$\therefore$ Mass of P_4O_6 = $\frac{1}{8} \times 220\,g = 27.5\,g$

42. (A)

Moles of AgCl = $\frac{14.35}{143.5} = 0.1$ = Moles of Ag

$\therefore$ Mass of Ag = 0.1 x 108 g = 10.8 g

%Ag = $\frac{10.8}{21.6} \times 100 = 50\%$

43. (A)

$0.5 = \frac{0.4 \times V \times 2 + 50 \times 0.3}{50 + V}$

V = 33.33 ml

44. (C)

120 + 1000 = 1120 g solution

density = 1.15 g/ml

volume = $\frac{1120}{1.15} = 973.91\text{ml}$

M = $\frac{2 \times 1000}{973.91} = 2.05\text{M}$

45. (A)

$\frac{750 \times 0.5 + 250 \times 2}{750 + 250} = 0.875\text{M}$

46. (D)

m.mole before addition = 50 x 0.06

m.mole after addition = 50 x 0.042

milimole CH_3COOH absorbed = 50(0.06 – 0.042)

mass = $\frac{50}{1000}(0.06 - 0.042) \times 60$

mass absorbed per gram = $\frac{50[0.06 - 0.042] \times 60}{1000 \times 3} = 0.018 = 18\text{mg}$

47. (D)

%Br = $\frac{80}{188} \times \frac{W_{AgBr}}{W_{sample}} \times 100$

= $\frac{80}{188} \times \frac{141}{250} \times 100 = 24$

48. (C)

$$4PH_3 \longrightarrow P_4 + 6H_2$$

$$100\,ml \quad \frac{1}{4}\times 100 \ . \ \frac{6}{4}\times 100$$

$$25\,ml \quad 150\,ml$$

Vol of gases (Product) = 175

Change in Volume = 175 – 100 = + 75 ml.

49. (A)

$$CaC_2 + 2H_2O \longrightarrow Ca(OH)_2 + C_2H_2$$

64 kg 1 K mole

$$\frac{64}{64}K\ mole$$

$$C_2H_2 + H_2 \longrightarrow C_2H_4$$

1 K mole 1 K mole

$$n\,C_2H_4 \longrightarrow (C_2H_4)$$

$$1\ K\ mole \quad \frac{1}{n}K\ mole \times 28n$$

$$mass = \frac{1}{n}\times 28n\ Kg = 28Kg$$

50. (A)

Molecular wt. = $\frac{4x24x100}{0.096}$=100000

51. (D)

1 L H_2O = 1000 g H_2O

No. of mole of H_2O = $\frac{1000}{18} = 55.55$

No. of H_2O molecule = $55.55N_A$

52. (B)

$$1\times n_{CO_2} = 6\times n_{K_4[Fe(CN)_6]}$$

$$\therefore \quad n_{K_4[Fe(CN)_6]} = \frac{1}{6}$$

53. (D)

$$\frac{100\times 2}{M_{acid} + 107\times 2} = \frac{27}{108}$$

$M_{acid} + 214 = 800$

$M_{acid} = 586$ g

54. (A)

Let the mixture of O^{17} and O^{18} has at wt =M

$$\frac{90 \times 16 + M \times 10}{100} = 16.12 \quad M = 17.2$$

((%O^{17} x 17) + (100 – %O^{17} x 18)) /100 –17.2

%O^{17} is 80

In scale of 10 ans is 8%

55. (B)

$$\lambda = \frac{h}{m_e x} = \frac{h}{m_p V} = \frac{h}{1840 m_e V} [m_p = 1840 m_e]$$

Hence, $V = \frac{x}{1840}$

56. (D)

57. (C)

$$\frac{hc}{\lambda} = 1 + \phi \quad .... (1)$$

$$3 \times \frac{hc}{\lambda} = 4 + \phi \quad ....(2)$$

from eq. (1) and (2) $\phi = 0.5 eV$

58. (C)

$$\lambda_i = \frac{hc}{5\phi} \; ; \; \lambda_e = \frac{h}{\sqrt{2 \times 4\phi m}}$$

$$\frac{\lambda_i}{\lambda_e} = \frac{C}{5}\sqrt{\frac{8m}{\phi}}$$

59. (B)

60. (D)

MATHEMATICS

61. (D)

f(x) = $\cos^2\theta + \sec^2\theta$

$= \cos^2\theta + \frac{1}{\cos^2\theta}$

$\because \cos\theta \neq 0$

$f(x) \geq 2$

62. (C)

We have tan 9º – tan 27º – tan 63º + tan 81º

$= (\tan 9^o + \tan 81^o) - (\tan 27^o + \tan 63^o)$

$= \frac{1}{\sin 9^o \cos 9^o} - \frac{1}{\sin 27^o \cos 27^o}$

$= \frac{2}{\sin 18^o} - \frac{2}{\sin 54^o}$

$= 2\left[\frac{\sin 54^o - \sin 18^o}{\sin 54^o \sin 18^o}\right]$

$= 2\left[\frac{\cos 36^o \sin 18^o}{\sin 18^o \cos 36^o}\right] = 4$

63. (D)

$= \frac{2^{\log_2(a^4)} - 3^{\log_3(a^2+1)} - 2a}{7^{\log_7(a^2)} - a - 1} = \frac{a^4 - (a^2+1) - 2a}{a^2 - a - 1}$

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

64. (D)

cos 2A + cos2B + cos 2C

= 2 cos (A + B) cos (A – B) + cos 2 C

$= 2\cos\left(\frac{3\pi}{2} - C\right)\cos(A - B) + \cos 2C$

$= -2\sin C\cos(A - B) + 1 - 2\sin^2 C$

$= 1 - 2\sin C(\cos(A-B) + \sin C)$

$= 1 - 2\sin C\{\cos(A-B) + \sin[3\pi/2 - (A+B)]\}$

$= 1 - 2\sin C[\cos(A-B) - \cos(A+B)]$

$= 1 - 4\sin A \sin B \sin C$

65. (C)

We have $\cos^2 A + \cos^2 B - (1 - \cos^2 C) = 0$

$\Rightarrow \cos^2 A + \cos^2 B - \sin^2 C = 0$

$\Rightarrow \cos^2 A + \cos(B+C)\cos(B-C) = 0$

$\Rightarrow 2\cos A \cos B \cos C = 0$

$\Rightarrow$ Either A or B or C is 90º

66. (B)

$(x - 2y)\sqrt{2} = (x - 2y) + (x - y - 1)\sqrt{6}$

$\Rightarrow (x - 2y)(\sqrt{2} - 1) = (x - y - 1)\sqrt{6}$

$\Rightarrow x - 2y = 0$ & $x - y - 1 = 0 \Rightarrow y = 1, x = 2$

67. (B)

Let ratio be $\lambda : 1 \Rightarrow \dfrac{6\lambda - 3}{\lambda + 1} = 0,\ \lambda = \dfrac{1}{2}$

68. (C)

$\sqrt{x^2} = |x| \because x < 0 \Rightarrow |x| = -x$

$\Rightarrow \sqrt{\log_{10}(-x)} = \log_{10}\sqrt{(-x)^2}$

$\Rightarrow \sqrt{\log_{10}(-x)} = \log_{10}(-x)$

$\Rightarrow \log_{10}(-x) = (\log_{10}(-x))^2$

$\Rightarrow \log_{10}(-x)(\log_{10}(-x) - 1) = 0$

$\Rightarrow \log_{10}(-x) = 0$ or $\log_{10}(-x) = 1$

$\therefore$ (–x) = 1 or (–x) = 10 $\Rightarrow$ x = –1 or x = –10

number of real solution is exactly 2.

69. (A)

Let P is (h, k)

then | h – 2| + | k – 3| = 1

$\Rightarrow |x-2|+|y-3|=1$

which is a square having centre at (2, 3).

70. (B)

Given that, sin2θ = k

$$\frac{\tan^3\theta}{(1+\tan^2\theta)} + \frac{\cot^3\theta}{(1+\cot^2\theta)}$$

$$= \frac{\sin^3\theta}{\cos^3\theta}\cos^2\theta + \frac{\cos^3\theta}{\sin^3\theta}\sin^2\theta$$

$$= \frac{2(\sin^4\theta+\cos^4\theta)}{2(\sin\theta\cos\theta)}$$

$$= \frac{2[(\sin^2\theta+\cos^2\theta)^2-2\sin^2\theta\cos^2\theta]}{\sin 2\theta}$$

$$= \frac{2\left[1-\frac{1}{2}\sin^2 2\theta\right]}{\sin 2\theta} = \frac{2-\sin^2 2\theta}{\sin 2\theta} = \frac{2-k^2}{k}$$

71. (B)

Given that,

$$f(\theta) = \sin^2\theta + \sin^2\left(\theta+\frac{2\pi}{3}\right) + \sin^2\left(\theta+\frac{4\pi}{3}\right)$$

$$= 1 + \sin^2\theta - [\cos^2\left(\theta+\frac{2\pi}{3}\right) - \sin^2\theta\left(\theta+\frac{\pi}{3}\right)]$$

$$= 1 + \sin^2\theta - \cos(2\theta+\pi)\cos\frac{\pi}{3}$$

$$= 1 + \sin^2\theta + \frac{\cos 2\theta}{2}$$

$= 1 + \sin^2\theta + \frac{1}{2} - \sin^2\theta = \frac{3}{2}$

Hence, $f\left(\frac{\pi}{15}\right) = \frac{3}{2}$

72. (C)

Sum of integers divisible by 2

$S_2 = \frac{50}{2}\,[2 + 100] = 25 \times 102 = 2550$

Sum of integers divisible by 5

$S_5 = \frac{20}{2}\,[5 + 100] = 10 \times 105 = 1050$

Sum of integers divisible by 2 & 5

$S_{2,5} = \frac{10}{2}\,[10 + 100] = 5 \times 110 = 550$

required sum = 2550 + 1050 – 550 = 3050

73. (B)

3. $A_1, A_2, \ldots, A_n$, 54 are in AP with common difference d

& $\frac{A_8}{A_{n-2}} = \frac{3}{5}$

$d = \frac{54-3}{n+1} = \frac{51}{n+1}$

$A_8 = 3 + 8d$ & $A_{n-2} = 3 + (n-2)d$

$\frac{A_8}{A_{n-2}} = \frac{3+8d}{3+(n-2)d} = \frac{3}{5}$

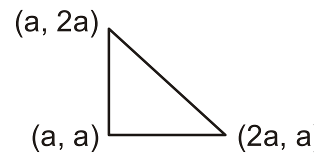
$\Rightarrow \frac{3+8\left(\frac{51}{n+1}\right)}{3+(n-2)\left(\frac{51}{n+1}\right)} = \frac{3}{5}$

$\Rightarrow \frac{n+1+136}{n+1+(n-2)17} = \frac{3}{5}$

$\Rightarrow 5(n + 137) = 3\,(18n - 33) \Rightarrow 784 = 49n$

$\Rightarrow n = \frac{784}{49} = \frac{112}{7} \Rightarrow n = 16$

74. (D)



$\frac{1}{2}a^2 = 72$

$a = \pm 12$

Centroid = (16, 16) or (-16, -16)

75. (B)

$A = \frac{a+b+c}{3}$, $G = (a\,b\,c)^{1/3}$, $H = \frac{3}{\frac{1}{a}+\frac{1}{b}+\frac{1}{c}}$

$H = \frac{3(abc)}{ab+bc+ca}$

$x^3 - (a + b + c)\,x^2 + (ab + bc + ca)\,x - abc = 0$

$\Rightarrow x^3 - 3Ax^2 + (3G^3/H)x - G^3 = 0$

76. (B)

$\frac{5-1}{8-2} = \frac{7-5}{x-8} \Rightarrow x = 11$

77. (C)

$a^x = b^y = c^z = d^t = k$ (let)

$x \log a = \log k$, $y \log b = \log k$

$z \log c = \log k$, $t \log d = \log k$

$\because$ a, b, c, d in G.P.

$\Rightarrow$ log a, log b, log c, log d in A.P.

$\Rightarrow \frac{\log k}{x}, \frac{\log k}{y}, \frac{\log k}{z}, \frac{\log k}{t}$ in A.P.

$\Rightarrow \frac{1}{x}, \frac{1}{y}, \frac{1}{z}, \frac{1}{t}$ in A.P. $\Rightarrow$ x, y, z, t in H.P.

78. (B)

$\log(-2x) = 2\log(x+1)$

$-2x > 0 \Rightarrow x < 0$ ....(i)

$x + 1 > 0 \Rightarrow x > -1$ ....(ii)

from (i) & (ii), we get $x \in (-1, 0)$

$\therefore -2x = (x+1)^2 \Rightarrow x^2 + 4x + 1 = 0 \Rightarrow x = \frac{-4 \pm 2\sqrt{3}}{2}$

so only one solution lies in (–1, 0)

79. **(C)** $\log_{\frac{1}{3}}(x^2 + x + 1) > -1$

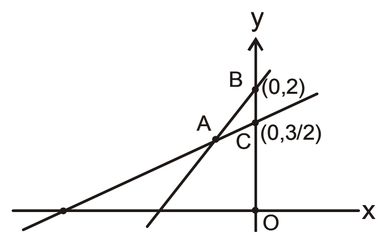
$\Rightarrow x^2 + x + 1 < 3$

$\Rightarrow x^2 + x - 2 < 0$

$\Rightarrow (x + 2)(x - 1) < 0$

$\Rightarrow x \in (-2, 1)$

80. **(C)**



Co-ordinate of point $A\left(-\frac{1}{7}, \frac{10}{7}\right)$

Ar (ABC) $= \frac{1}{2} \times \frac{1}{2} \times \frac{1}{7} = \frac{1}{28}$

81. **(C)**

Given that $T_m = AR^{m-1} = \frac{1}{n^2}$ and $T_n = AR^{n-1} = \frac{1}{m^2}$

$\Rightarrow A^2R^{m+n-2} = \frac{1}{m^2n^2}$

$\Rightarrow AR^{\frac{m+n}{2}-1} = \frac{1}{mn}$

$\Rightarrow T_{\frac{m+n}{2}} = \frac{1}{mn}$.

82. **(D)**

Let d be the common difference

since $a_7 = 9$

$\therefore a_1 + 6d = 9$

Let $D = a_1a_2a_7$

$D = (9 - 6d)(9 - 5d)(9)$

$= 270\left[\left(d - \frac{33}{20}\right)^2 - \frac{9}{400}\right]$

For least value of d.

$d - \frac{33}{20} = 0 \Rightarrow d = \frac{33}{20}$.

83. (B)

$A.M \geq G.M$

$\frac{a+b+c}{3} \geq (abc)^{\frac{1}{3}}$; for (a, b, c > 0)

$\Rightarrow\ a+b+c \geq 3(abc)^{\frac{1}{3}}$

but given ab^2c^3, $a^2b^3c^4$, $a^3b^4c^5$ are in A.P

Hence $2abc = 1 + a^2b^2c^2 \Rightarrow (abc-1)^2 = 0 \Rightarrow abc = 1$

hence minimum value of

$a+b+c = 3(abc)^{\frac{1}{3}} = 3.(1)^{\frac{1}{3}} = 3$

84. (A)

The given expression is

$1+2\sin 3x \sin 2x + \frac{1-\cos 4x}{2} + \frac{1-\cos 6x}{2}$

$\Rightarrow 1+2\sin 3x \sin 2x + \sin^2 2x + \sin^2 3x$

$\Rightarrow 1+(\sin 2x + \sin 3x)^2$

Thus least value is 1

85. (A)

$\cos^2 x = \sin x \tan x \Rightarrow \cos^3 x = \sin^2 x$

$\Rightarrow \cot^3 x = \operatorname{cosec} x \Rightarrow \cot^6 x = \operatorname{cosec}^2 x \qquad \Rightarrow \cot^6 x - \cot^2 x = 1$

86. (A)

$-5 \leq 3\sin x - 4\cos x \leq 5$

$\log_{20} 10 \leq \log_{20}(3\sin x - 4\cos x + 15) \leq \log_{20} 20$

87. (C)

$a^{12}r^{66} = 8^{2014} = 2^{6042}$

$\therefore a^2 r^{11} = 2^{1007}$

Let $a = 2^{\alpha}, r = 2^{\beta}$

then $2\alpha + 11\beta = 1007$

$\Rightarrow (\alpha,\beta) = (498,1),(487,3),(476,5),...(3,91)$ i.e. 46 pairs.

88. (B)

By ratio and proportion

$$\frac{a}{b}=\frac{c}{d}=\frac{xa+yc}{xb+yd}$$

$$\frac{\sin(\alpha+\beta+\gamma)(\sin\alpha+\sin\beta+\sin\gamma)+\cos(\alpha+\beta+\gamma)(\cos\alpha+\cos\beta+\cos\gamma)}{\sin^2(\alpha+\beta+\gamma)+\cos^2(\alpha+\beta+\gamma)}$$

$$\frac{\cos(\alpha+\beta)+\cos(\beta+\gamma)+\cos(\gamma+\alpha)}{1}=2$$

89. (D)

$|x^2-9|+|x^2-4|=5$

$|x^2-9|+|x^2-4|=|(x^2-9)-(x^2-4)|$

$\Rightarrow (x^2-9)(x^2-4)\le 0 \{\therefore |a|+|b|=|a-b| \Leftrightarrow a.\,b\le 0\}$

$\Rightarrow x\in[-3,-2]\cup[2,3]$

90. (A)

$$(\tan\theta+\cot\theta)(\tan^2\theta+\cot^2\theta-1)=52$$

Let $\tan\theta+\cot\theta=t$

$t^3-3t-52=0 \quad \Rightarrow t=4$

$\tan^2\theta+\cot^2\theta=(\tan\theta+\cot\theta)^2-2=14$