NEW STANDARD ACADEMY

Exam JEE **Marks: 300**
Date : 10-07-23 **CLASS : 12TH** **Time: 3 HRS**

Important Instructions:

1. Please read the instruction carefully. You are allotted five minutes specifically for this purpose.
2. The test is of 3 hours duration.
3. This test paper consists of 90 questions. Each subject (PCM) has 30 questions. The maximum marks are 300.
4. This question paper contains Three Parts. Section-A is Physics, Section-B is Chemistry and Section-C is Mathematics.
5. Each Section do only 25 questions out of 30 questions. Each question carries +4 marks for correct answer and –1 mark for wrong answer.

Section-A
PHYSICS

1. The distance of the moon from the earth is about 60 times the radius of the earth. What will be diameter of the earth (approximately in degrees) as seen from the moon?
(a) 1^0 (b) 2^0 (c) 4^0 (d) 6^0

2. If the unit of force is 100 N, unit of length is 10 m and unit of time is 100 s, what is the unit of mass in this system of units?
(a) 10^3 kg (b) 10^4 kg (c) 10^5 kg (d) 10^6kg

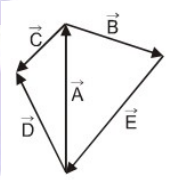
3. The displacement of a progressive wave is represented by y = A sin($\omega t - kx$) where x is distance and t is time
The dimensions of $\frac{\omega}{k}$ are same as those of
(a) Velocity (b) Wave number
(c) Wavelength (d) Frequency

4. If momentum (p), area (A) and time (t) are taken to be fundamental quantities, then energy has the dimensional formula
(a) $[p^1 A^{-1} t^{-1}]$ (b) $[p^2 A^1 t^1]$
(c) $[p^1 A^{-1/2} t^1]$ (d) $[p^1 A^{1/2} t^{-1}]$

5. A and B are two physical quantities having different dimensions. Then which of the following operation is dimensionally correct –
(a) A + B (b) $\log \frac{A}{B}$
(c) $\frac{A}{B}$ (d) $e^{A/B}$

6. The resultant of two vectors is perpendicular to first vector of magnitude 6 N. If the resultant has magnitude $6\sqrt{3}$N, then magnitude of second vector is
(a)$6\sqrt{2}$ N (b)12 N
(c)$9\sqrt{3}$N (d)$6\sqrt{3}$N

7. In figure, $\vec{E}+\vec{D}-\vec{C}$ equals



(a) $\vec{A}$ (b) $-\vec{A}$
(c) $\vec{B}$ (d) $-\vec{B}$

8. $y = \frac{\cot x}{1+\cot x}$, y□ is
(a) $\frac{-\csc^2 x}{(1+\cot x)^2}$ (b) $\frac{-\csc^2 x}{(1-\cot x)^2}$
(c) $\frac{-\csc^2 x}{(1+\cot x)^2}$ (d) $\frac{-\csc^2 x}{(1+\tan x)^2}$

9. $\int x^{-3}(x+1)\,dx$
(a) $-\frac{1}{x}-\frac{1}{2x^2}+C$ (b) $\frac{1}{x}+\frac{1}{2x^2}+C$
(c) $3-\frac{1}{2x^2}+C$ (d) $-\frac{1}{x}+\frac{1}{2x^2}+C$

10. The largest mass (m) that can be moved by a flowing river depends on velocity (v), density (ρ) of river water and acceleration due to gravity (g). The correct relation is
(a) $m \propto \frac{\rho^2 v^4}{g^2}$ (b) $m \propto \frac{\rho v^6}{g^2}$
(c) $m \propto \frac{\rho v^4}{g^3}$ (d) $m \propto \frac{\rho v^6}{g^3}$

11. The dimension of $\frac{1}{2}\varepsilon_0 E^2$, where □0 is permittivity of free space and E is electric field, is
(a) ML^2T^{-2} (b) $ML^{-1}T^{-2}$
(c) ML^2T^{-1} (d) MLT^{-1}

12. If force F is related with distance x and time t as $F = A\sqrt{x} + Bt^2$, the dimensions of $\frac{A}{B}$ is

(a) $M^{\circ}L^{-1/2}T$ (b) $ML^{-1/2}T^{-2}$

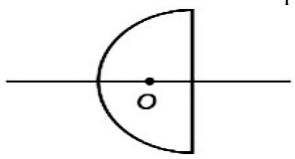
(c) $M^{\circ}L^{-1/2}T^{2}$ (d) $M^{\circ}LT^{-2}$

13. A verniercalliperhas 20 divisions on the vernier scale which coincide with 19 divisions on the main scale. The least count of the instrument is 0.1 mm. The length of one main scale division is

(a) 0.5 mm (b) 1 mm

(c) 2 mm (d)0.25 mm

14. A glass hemisphere (μ=1.5) has a radius of curvature of 16 cm. A small object O is located on its axis halfway between the plane and spherical surface. The distance between two images, when viewed along the axis from the sides of the hemisphere, is



(a) $\frac{32}{15}$ cm (b) $\frac{48}{15}$ cm

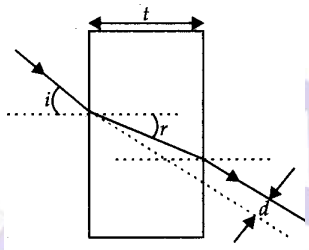
(c) $\frac{64}{15}$ cm (d) $\frac{80}{15}$ cm

15. A convex lens forms inverted image of a real object on a fixed screen. The size of image is 9 cm. When lens is displaced 40 cm along principle axis it again forms a real image of size 4 cm on the screen. Focal length of the lens is .

(a)48 cm (b) 100 cm

(c)30cm (d)10cm

16. A ray of light is incident on a thick slab of glass of thickness t as shown in the figure. The emergent ray is parallel to the incident ray but displaced sideways by a distance d. If the angles are small then d is, :



(a) $t\left(1-\frac{i}{r}\right)$ (b) $rt\left(1-\frac{i}{r}\right)$

(c) $it\left(1-\frac{r}{i}\right)$ (d) $t\left(1-\frac{r}{i}\right)$

17. A ray incident at a point at an angle of incidence of 60^0 enter a glass sphere of refractive index $\sqrt{3}$ and is reflected and refracted at the farther surface of the sphere. The angle between the reflected and refracted rays at this surface is :

(a) 50^0 (b) 60^0 (c) 90^0 (d) 40^0

18. Critical angle for light going form medium (i) to (ii) is θ. Thespedoflight in medium (i) is v, then then speed of light in medium (ii) is:

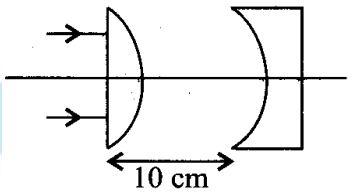
(a) $v(1-\cos\theta)$ (b) $\frac{v}{\sin\theta}$

(c) $\frac{v}{\cos\theta}$ (d) $\frac{v}{(1-\sin\theta)}$

19. An air bubble in a glass sphere(μ=1.5) is situated at a distanced 3 cm form a convex surface of diameter 10 cm. At what distance from the surface will the bubble appear?

(a) 2.5 cm (b) -2.5 m (c) 5 m (d) -5 m

20. In the given figure. The radius of curvature of curved surface for both the plano-convex and plano- concave lens is 10 cm and refractive index for both is 1.5. The location of the final image after all the refractions through lenses is :



(a) 15 cm (b) 20 cm (c) 25 cm (d) 40 cm

21. The far point of a near sighted person is 6.0 m from her eyes, and she wears contacts that enable her to see distant objects clearly. A tree is 18.0 m away 2.0 m high. How high is the image formed by the contacts?

(a) 0.1 m (b) 1.5 m (c) 0.75 m (d) 0.50 m

22. A convex of lens of focal length 15 cm is placed on a plane mirror. An object is placed at 30 cm from the lens. The image is :

(a) Real, at 30 cm in front of the mirror

(b) Real, at 30 cm behind the mirror

(c) Real, at 10 cm in front of the mirror

(d) Virtual ,at 10 cm behind the mirror

23. Two identical glass $\mu_g = \frac{3}{2}$equiconvex lenses of focal length F are kept in contact. The space between the two lenes is filled with water $\left(\mu_w = \frac{4}{3}\right)$.The focal length of the combination is :

(a) f (b) $\frac{f}{2}$ (c) $\frac{4f}{3}$ (d) $\frac{3f}{4}$

24. Two beams of red and violet color are made to pass separately through a prism (angle of the prism is 60^0).In the position of minimum deviation, the angle of refraction will be:

(a) 30^0 for both the colors

(b) Greater for the violet color

(c) Greater for the red color

(d) Equal but not $30^0$for both the colors

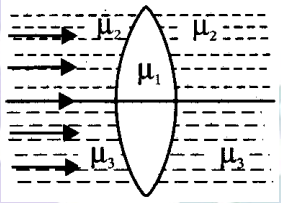
25. For a glass prism ($\mu = \sqrt{3}$) the angle of minimum deviation is equal to the angle of the prism. The angle of the prism is :

(a) 45^0 (b) 30^0 (c) 90^0 (d) 60^0

26. A ray of light is incident at 60^0 on one face of a prism of angle 30^0 and the emergent ray makes 30^0 with the incident ray. The refractive index of the prism is :
(a) 1.732 (b) 1.414 (c) 1.5 (d) 1.33

27. The focal length of the lenses of an astronomical telescope are 50 cm and 5 cm. The length of the telescope when the image is formed at the least distance of distinct vision is :
(a) 45 cm (b) 55 cm (c) $\frac{275}{6}$ cm (d) $\frac{325}{6}$ cm

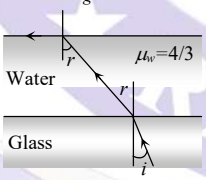
28. A double convex lens, made of a material of refractive index μ_1, is placed inside two liquids of refractive indices μ_2 is placed inside two liquids of refractive indies μ_2 and μ_3 as shown. $\mu_2 > \mu_1 > \mu_3$. A wide, parallel beam of light is incident on the lens from the left. The lens will give rise to :



(a) A single convergent beam
(b) Two different convergent beams
(c) Two different divergent beams
(d) A convergent and a divergent beam.

29. In a compound microscope, the focal lengths of two lenses are 1.5cm 6.25 cm , If an object is placed at 2 cm from objective and the final image is formed at 25 cm from eye lens, the distance between the two lenses is
(a) 6.00 cm (b) 7.75 cm (c) 9.25 cm (d) 11.0 cm

30. A ray of light is incident at the glass–water interface at an angle i, it emerges finally parallel to the surface of water, then the value of μ_g would be



(a) (4/3) sin I (b) 1/ sin I
(c) 4/ 3 (d) None

Section-B
CHEMISTRY

31. An ideal solution contains two volatile liquids A (p^o = 100 torr) and B (p^o = 200 torr). If mixture contain 1 mole of A and 4 mole of B then total vapour pressure of the distillate is:
(a) 150 (b) 180
(c) 188.88 (d) 198.88

32. Two liquids A and B have P^o_A and P^o_B in the ratio of 1 : 3 and the ratio of number of moles of A and B in liquid phase are 1 : 3 then mole fraction of 'A' in vapour phase in equilibrium with the solution is equal to:
(a) 0.1 (b) 0.2
(c) 0.5 (d) 1.0

33. Which of the following is less than zero for ideal solutions ?
(a) ΔH_{mix} (b) ΔV_{mix}
(c) ΔG_{mix} (d) ΔS_{mix}

34. One mole of a solute A is dissolved in a given volume of solvent. The association of the solute take place as follows: $nA \rightleftharpoons A_n$
If α is the degree of association of A, the van't Hoff factor i is expressed as:
(a) $i = 1-\alpha$ (b) $i = 1+\frac{\alpha}{n}$
(c) $i = \frac{1-\alpha+\frac{\alpha}{n}}{1}$ (d) i = 1

35. The degree of dissociation of an electrolyte is α and its van't Hoff factor is i. The number of ions obtained by complete dissociation of 1 molecule of the electrolyte is:
(a) $\frac{i+\alpha-1}{\alpha}$ (b) $i-\alpha-1$
(c) $\frac{i-1}{\alpha}$ (d) $\frac{i+1+\alpha}{1-\alpha}$

36. If M_{normal} is the normal molecular mass and α is the degree of ionization of $K_3[Fe(CN)_6]$, then the abnormal molecular mass of the complex in the solution will be:
(a) $M_{normal}(1+2\alpha)^{-1}$ (b) $M_{normal}(1+3\alpha)^{-1}$
(c) $M_{normal}(1+\alpha)^{-1}$ (d) equal to M_{normal}

37. A complex containing K^+, Pt(IV) and Cl^- is 100% ionised giving i = 3. Thus, complex is :
(a) $K_2[PtCl_4]$ (b) $K_2[PtCl_6]$
(c) $K_3[PtCl_5]$ (d) $K[PtCl_3]$

38. A solute'S' undergoes a reversible trimerization when dissolved in a certain solvent. The boiling point elevation of its 0.1 molal solution was found to be identical to the boiling point elevation in case of a 0.08 molal solution of a solute which neither undergoes association nor dissociation. To what percent had the solute 'S' undergone trimerization?
(a) 30% (b) 40%
(c) 50% (d) 60%

39. A solution of x moles of sucrose in 100 grams of water freezes at -0.2^oC. As ice separates the freezing point goes down to -0.25^oC. How many grams of ice would have separated?
(a) 18 grams (b) 20 grams
(c) 25 grams (d) 23 grams

40. If α is the degree of dissociation of Na_2SO_4, the vant Hoff's factor (i) used for calculating the molecular mass is :
(a) $1+\alpha$ (b) $1-\alpha$
(c) $1+2\alpha$ (d) $1-2\alpha$.

41. The solubility of a gas in water depends on
(a) Nature of the gas (b) Temperature
(c) Pressure of the gas (d) All of the above

42. Which is correct about Henry's law
(a) The gas in contact with the liquid should behave as an ideal gas
(b) There should not be any chemical interaction between the gas and liquid
(c) The pressure applied should be high
(d) All of these

43. The statement "If 0.003 moles of a gas are dissolved in 900 *g* of water under a pressure of 1 atmosphere, 0.006 *moles* will be dissolved under a pressure of 2 atmospheres", illustrates
(a) Dalton's law of partial pressure
(b) Graham's law
(c) Raoult's law
(d) Henry's law

44. The solution of sugar in water contains
(a) Free atoms (b) Free ions
(c) Free molecules (d) Free atom and molecules

45. $25\,ml$ of $3.0\,M\,HNO_3$ are mixed with $75\,ml$ of $4.0\,M\,HNO_3$. If the volumes are additive, the molarity of the final mixture would be
(a) $3.25\,M$ (b) $4.0\,M$
(c) $3.75\,M$ (d) $3.50\,M$

46. The amount of anhydrous Na_2CO_3 present in 250 *ml* of 0.25 *M* solution is
(a) 6.225 *g* (b) 66.25 *g*
(c) 6.0 *g* (d) 6.625 *g*

47. Dilute one litre 1 molar H_2SO_4 solution by 5 litre water, the normality of that solution is
(a) $0.2N$ (b) $5\,N$
(c) $10\,N$ (d) $0.33\,N$

48. Which of the following has maximum number of molecules
(a) 16 *gm* of O_2 (b) 16 *gm* of NO_2
(c) 7 *gm* of N_2 (d) 2 *gm* of H_2

49. $20\,ml$ of HCl solution requires $19.85\,ml$ of $0.01\,M\,NaOH$ solution for complete neutralization. The molarity of HCl solution is
(a) 0.0099 (b) 0.099
(c) 0.99 (d) 9.9

50. A mixture has 18*g* water and 414*g* ethanol. The mole fraction of water in mixture is (assume ideal behaviour of the mixture)
(a) 0.1 (b) 0.4
(c) 0.7 (d) 0.9

51. The number of molecules in 4.25 *g* of ammonia is approximately
(a) 0.5×10^{23} (b) 1.5×10^{23}
(c) 3.5×10^{23} (d) 2.5×10^{23}

52. When the concentration is expressed as the number of moles of a solute per litre of solution it known as
(a) Normality (b) Molarity
(c) Mole fraction (d) Mass percentage

53. The normality of 2.3 $M\,H_2SO_4$ solution is
(a) 2.3 *N* (b) 4.6 *N*
(c) 0.46 *N* (d) 0.23 *N*

54. The molarity of a solution made by mixing 50*ml* of conc. H_2SO_4 (36*N*) with 50 *ml* of water is
(a) 36 *M* (b) 18 *M*
(c) 9 *M* (d) 6 *M*

55. With increase of temperature, which of these changes
(a) Molality
(b) Weight fraction of solute
(c) Fraction of solute present in water
(d) Mole fraction

56. Amorphous substances show
(A) Short and long range order
(B) Short range order
(C) Long range order
(D) Have no sharp M.P.
(a) A and C are correct (b) B and C are correct
(c) C and D are correct (d) B and D are correct

57. The characteristic features of solids are
(a) Definite shape
(b) Definite size
(c) Definite shape and size
(d) Definite shape, size and rigidity

58. Which one of the following is a good conductor of electricity
(a) Diamond (b) Graphite
(c) Silicon (d) Amorphous carbon

59. Diamond is an example of
(a) Solid with hydrogen bonding
(b) Electrovalent solid
(c) Covalent solid
(d) Glass

60. Which is not a property of solids
(a) Solids are always crystalline in nature
(b) Solids have high density and low compressibility
(c) The diffusion of solids is very slow
(d) Solids have definite volume

Section-C
MATHS

61. If $1< x <\sqrt{2}$, then number of solutions of the equation $\tan^{-1}(x-1)+\tan^{-1}x+\tan^{-1}(x+1)=\tan^{-1}3x$, is/are
(a) 0 (b) 1 (c) 2 (d) 3

62. If $\sin^{-1}x+\sin^{-1}y+\sin^{-1}z=\pi$, then $x^4+y^4+z^4+4x^2y^2z^2=k\,(x^2y^2+y^2z^2+z^2x^2)$, where k is equal to -
(a) 1 (b) 2 (c) 4 (d) None of these

63. $\tan^{-1}x>\cot^{-1}x$ thenfind x-
(a) [–1, 1] (b) $(-\infty,\infty)$ (c) $[1,\infty)$ (d) $(-\infty,1]$

64. The value of

$\cos^{-1}\left(-\frac{1}{2}\right)-2\sin^{-1}\left(\frac{1}{2}\right)+3\cos^{-1}\left(-\frac{1}{\sqrt{2}}\right)-4\tan^{-1}(-1)$ is equal to

(a) $7\pi/4$ (b) $11\pi/4$ (c) $\pi/12$ (d) $25\pi/12$

65. $\tan^{-1}\left(\frac{\pi}{4}+\frac{1}{2}\cos^{-1}\left(\frac{3a}{b}\right)\right)+\tan^{-1}\left(\frac{\pi}{4}-\frac{1}{2}\cos^{-1}\left(\frac{3a}{b}\right)\right)$ is equal to -

(a) $\frac{2b}{a}$ (b) $\frac{b}{2a}$ (c) $\frac{2}{3}\frac{b}{a}$ (d) $\frac{3}{2}\frac{a}{b}$

66. $\cos^{-1}\left\{\frac{1}{2}x^2+\sqrt{1-x^2}\sqrt{1-\frac{x^2}{4}}\right\}=\cos^{-1}\frac{x}{2}-\cos^{-1}x$ holds

(a) $|x|\le 1$ (b) $x\in R$

(c) $0\le x\le 1$ (d) $-1\le x\le 0$

67. If $\sec^{-1}x=\text{cosec}^{-1}y$, then $\cos^{-1}\frac{1}{x}+\cos^{-1}\frac{1}{y}=$

(a) π (b) $\frac{\pi}{4}$ (c) $\frac{-\pi}{2}$ (d) $\frac{\pi}{2}$

68. If A &B are two sets such that n (A x B) = 60 &n (a) = 12 also n (A∩B) = K, then the sum of maximum & minimum possible value of K is

1. (a) 17 (b)12
2. (c)5 (d)7

69. Let A and B be two sets. The set A has 2016 more subsets than B. If A∩B has 3 members, then the number of members in A∪B is

1. (a) 10 (b) 11
2. (c)12 (d) 13

70. If in a class there are 200 students in which 120 take Mathematics, 90 take Physics, 60 take Chemistry, 50 take Mathematics & Physics, 50 takeMathematics &Chemistry, 43 take Physics &Chemistry and 38 take Mathematics, Physics & Chemistry, then the number of students who havetaken exactly one subject is

1. (a) 42 (b)56
2. (c) 270 (d) 98

71. If $f(x)=\cos[\pi^2]x+\cos[-\pi^2]x$, then

(a) $f\left(\frac{\pi}{4}\right)=2$ (b) $f(-\pi)=2$

(c) $f(\pi)=1$ (d) $f\left(\frac{\pi}{2}\right)=-1$

72. The domain of the derivative of the function $f(x)=\begin{cases}\tan^{-1}x & ,\ |x|\le 1\\ \frac{1}{2}(|x|-1) & ,\ |x|>1\end{cases}$ is

(a) $R-\{0\}$ (b) $R-\{1\}$

(c) $R-\{-1\}$ (d) $R-\{-1,1\}$

73. Let E = {1, 2, 3, 4} and F = {1, 2}. Then the number of onto functions from E to F is

(a) 14 (b) 16 (c) 12 (d) 8

74. 'f ' is a real valued function not identically zero, satisfying f(x + y) + f(x - y) = 2f(x). f(y) ∀ x, y ∈ R. f(x) is definitely

(a) Odd (b) Even

(c) Neither even nor odd (d)None of these

75. Let α,β and γ be three positive real numbers. Let $f(x)=\alpha x^5+\beta x^3+\gamma x, x\in R$ and g: R $\to$R be such that g(f(x)) = x for all x ∈ R. If $a_1,a_2,a_3,\ldots,a_n$ be in arithmetic progression with mean zero, then the value of $f\left(g\left(\frac{1}{n}\sum_{i=1}^{n}f(a_i)\right)\right)$ is equal to :

1. (a)0 (b)3
2. (c) 9 (d) 27

76. The equation $x^2-4x+[x]+3=x[x]$, where $[x]$ denotes the greatest integer function, has:

1. (a)Exactly two solutions in $(-\infty\ \infty)$
2. (b) No Solution
3. (c)A unique solution in $(-\infty,1)$
4. (d)A unique solution in $(-\infty,\infty)$

77. Let $f(x)=2n^n+\lambda,\lambda\epsilon\mathbb{R}$, $n\epsilon\mathbb{N}$, and $f(4)=133$, $f(5)=255$. Then the sum of all the positive integer divisors of $(f(3)-f(2))$ is

1. (a) 61 (b) 60
2. (c) 58 (d) 59

78. If a, b, c are in G.P. then the equations $ax^2+2bx+c=0$ and $dx^2+2ex+f=0$ have a common root if $\frac{d}{a},\frac{e}{b},\frac{f}{c}$ are in

(a) A.P. (b) G.P. (c) H.P. (d)None of these

79. If a non-zero root of the equation $x^2 + 2x + 3\lambda = 0$ and $2x^2 + 3x + 5\lambda = 0$ is common, then the value of λ will be-

(a) 2 (b) 1 (c) –1 (d) 0

80. Let α and β be the roots of the equation $x^2+x+1=0$, the equation whose roots are α^{19}, β^7 is

(a) $x^2-x-1=0$ (b) $x^2-x+1=0$

(c) $x^2+x-1=0$ (d) $x^2+x+1=0$

81. The expression $\frac{x^2+2x+1}{x^2+2x+7}$ lies in the interval ($x \in R$)

(a) [0, – 1] (b) $(-\infty, 1) \cup [1, \infty)$

(c) [0, 1) (d) None of these

82. The values of 'a' for which $(a^2-1)x^2 + 2(a-1)x + 2$ is positive for any x is -

(a) $a \geq 1$ (b) $a \leq 1$

(c) $a > -3$ (d) $a \leq -3$ or $a > 1$

83. The difference between the corresponding roots of the equations $x^2 + ax + b = 0$ and $x^2 + bx + a = 0$ is the same, then-

(a) $a + b - 4 = 0$ (b) $a - b + 4 = 0$

(c) $a + b + 4 = 0$ (d) None of these

84. If α, β are the roots of the equation $8x^2 - 3x + 27 = 0$, then the value of $\left(\frac{\alpha^2}{\beta}\right)^{1/3} + \left(\frac{\beta^2}{\alpha}\right)^{1/3}$ is-

(a) 1/3 (b) ¼ (c) 7/2 (d) 4

85. If α, β are the roots of the equation $ax^2 + bx + c = 0$, then $\frac{\alpha}{a\beta+b} + \frac{\beta}{a\alpha+b} = -A/a - B/b - C/c$. Find $A + B + C$

86. Let α, β be the roots of $x^2 - x + p = 0$ and γ, δ be the roots of $x^2 - 4x + q = 0$. If $\alpha, \beta, \gamma, \delta$ are in $G.P.$, then absolute value of $p + q$ is

87. Let $A = \{1,2,3,5,8,9\}$. Then the number of possible functions $f: A \to A$ such that $f(m.n) = f(m).f(n)$ for every $m, n \in A$ with $m.n \in A$ is equal to

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88. The number of distinct solutions of the equation, $\log_{1/2} |\sin x| = 2 - \log_{1/2} |\cos x|$ in the interval $[0,2\pi]$, is

89. If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \frac{3\pi}{2}$, then the value of $x^{100} + y^{100} + z^{100} - \frac{9}{x^{101}+y^{101}+z^{101}}$ is equalto

90. Let $f: R - \{0,1\} \to R$ be a function such that $f(x) + f\left(\frac{1}{1-x}\right) = 1 + x$. Then $f(2)$ is equal to

1. (a) $\frac{9}{2}$ (b) $\frac{9}{4}$
2. (c) $\frac{7}{4}$ (d) $\frac{7}{3}$