

Mathematics

- (1) If $|A|=2, |B|=4$, then what is the number of subsets of $A \times B$ having 3 or more elements:
A) 250 B) 220 C) 219 D) None
- (2) If two lines $\frac{x-2}{1} = \frac{y-3}{1} = \frac{z-4}{-k}, \frac{x-1}{k} = \frac{y-4}{2} = \frac{z-5}{1}$ are coplanar then what is the value of k ?
A) any value B) exactly one value C) exactly two values D) None of these.
- (3) The circle which passes through $(1, -2)$ and touching x -axis at $(3, 0)$ also passes through the point
A) $(2, -5)$ B) $(5, -2)$ C) $(-2, 5)$ D) $(-5, 2)$
- (4) ABCD is a trapezium such that AB and CD are parallel and $BC \perp CD$. If $\angle ADB = \theta$, $BC = p$ and $CD = q$, then AB is equal to:
A) $\frac{p^2 + q^2 \cos \theta}{p \cos \theta + q \sin \theta}$ B) $\frac{p^2 + q^2}{p^2 \cos \theta + q^2 \sin \theta}$ C) $\frac{(p^2 + q^2) \sin \theta}{(p \cos \theta + q \sin \theta)^2}$ D) None of these.
- (5) The domain of $f(x) = \sin^{-1}(\log_3(x/3))$ is
A) $[-1, 9]$ B) $[1, 9]$ C) $[-9, 1]$ D) None of these.
- (6) A ray of light along $x + \sqrt{3}y = \sqrt{3}$ gets reflected upon reaching x -axis, the equation of the reflected rays is
A) $\sqrt{3}y = x - \sqrt{3}$ B) $y = \sqrt{3}x - \sqrt{3}$ C) $\sqrt{3}y = x - 1$ D) None of these.
- (7) If the coefficients of the k^{th} and $(k+1)^{\text{th}}$ terms in the expansion of $(3+7x)^{29}$ are equal then value of $k =$ -----.
A) 10 B) 26 C) 21 D) None of these.
- (8) What is the relation between two complex numbers $z_1 = 1+i, z_2 = 1-i$?
A) $z_1 > z_2$ B) $z_1 < z_2$ C) $z_1 = z_2$ D) None of these.
- (9) All the students of a class performed poorly in Mathematics. The teacher decided to give grace marks of 10 to each of the students. Which of the following statistical measures will not change even after the grace marks were given?
A) Median B) Mean C) Mode D) Variance
- (10) If x, y, z are in A.P. then $\tan^{-1} x, \tan^{-1} y, \tan^{-1} z$ are also in A.P then
A) $2x=3y=6z$ B) $6x=3y=2z$ C) $6x=4y=3z$ D) $x=y=z$
- (11) The equation of the circle passing through the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ having centre at $(0, 3)$ is
A) $x^2 + y^2 - 6y + 7 = 0$ B) $x^2 + y^2 - 6y - 5 = 0$ C) $x^2 + y^2 - 6y + 5 = 0$ D) $x^2 + y^2 - 6y - 75 = 0$.
- (12) The x -coordinate of the in centre of the triangle that has the coordinates of mid points

- Of its sides as (0, 1), (1, 1) and (1, 0) is
 A) $2 - \sqrt{2}$ B) $1 - \sqrt{2}$ C) $1 + \sqrt{2}$ D) None of these.
- (13) The intercepts on x-axis made by tangents to the curve, $\int_0^x |t| dt$, for all real x, which are parallel to $y=2x$ are equal to
 A) ± 2 B) ± 3 C) ± 4 D) ± 1 .
- (14) If the eigen values of matrix 'A' are 6, 1, 5 then what are eigen values of 'A⁻¹'?
 A) 2, 0, 5 B) 1/6, 1, 1/5 C) 5, 0, 2 D) None of these.
- (15) If for a non-zero 4x4 matrix, $|A|=0$ then what is its rank?
 A) 2 B) 0 C) 1 D) None of these.
- (16) The sum of first 20 terms of the sequence 0.7, 0.77, 0.777, ... is
 A) $\frac{7}{9}(99 - 10^{-20})$ B) $\frac{7}{81}(179 + 10^{-20})$ C) -1/2 D) None of these.
- (17) Area bounded by the curve $y = \sqrt{x}$, $2y - x + 3 = 0$, x axis, laying in the first quadrant is
 A) 36 B) 18 C) $\frac{27}{4}$ D) 9.
- (18) $\frac{\tan A}{1 - \cot A} + \frac{\cot A}{1 - \tan A}$ can be written as
 A) $\sec A \operatorname{cosec} A + 1$ B) $\tan A + \cot A$ C) $\sec A + \operatorname{cosec} A$ D) $\sin A \cos A + 1$.
- (19) The real number k for which the equation, $2x^3 + 3x + k = 0$ has two distinct real roots in [0, 1],
 A) lies between 2 and 3 B) lies between 1 and 0 C) does not exist D) None
- (20) For what values of 'x' the matrix $A = \begin{bmatrix} x & 20 \\ 2 & 5 \end{bmatrix}$ is singular?
 A) 2 B) 5 C) 8 D) 20.
- (21) Statement - I : $(p \wedge \neg q) \wedge (\neg p \wedge q)$ is fallacy
 Statement - II : $(p \rightarrow q) \leftrightarrow (\neg q \rightarrow \neg p)$ is a tautology
 A) Statement - I is True; Statement -II is true; Statement-II is not a correct explanation for Statement-I
 B) Statement -I is True; Statement -II is False.
 C) Statement -I is False; Statement -II is True D) None of these.
- (22) What is the truth value of $T \rightarrow F$?
 A) T B) F C) Doesn't exist D) None.
- (23) If $\theta = 130^\circ$ and $x = \sin \theta + \cos \theta$ then
 A) $x > 0$ B) $x < 0$ C) $x = 0$ D) None.
- (24) Number of solutions of $\tan x + \sec x = 2 \cos x$ for $x \in [0, 2\pi]$ is
 A) 1 B) 2 C) 3 D) None.

- (25) Two curves $y=\cos x$ and $y=\sin 3x$ intersect for $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$ at
- A) $\left(\frac{\pi}{4}, \frac{1}{\sqrt{2}}\right)$ and $\left(\frac{\pi}{8}, \cos \frac{\pi}{8}\right)$ B) $\left(-\frac{\pi}{4}, \frac{1}{\sqrt{2}}\right)$ and $\left(-\frac{\pi}{8}, \cos \frac{\pi}{8}\right)$
 C) $\left(\frac{\pi}{4}, \frac{-1}{\sqrt{2}}\right)$ and $\left(\frac{\pi}{8}, -\cos \frac{\pi}{8}\right)$ D) None of these.
- (26) If P, Q, R, S are represented by the complex numbers $4+i, 1+6i, -4+3i, -1-2i$ respectively, then PQRS is a
 A) Rectangle B) Square C) Rhombus D) Parallelogram
- (27) If z_1, z_2, z_3 are three collinear points in argand plane, then $\begin{vmatrix} 1 & z_1 & \bar{z}_1 \\ 1 & z_2 & \bar{z}_2 \\ 1 & z_3 & \bar{z}_3 \end{vmatrix} =$
 A) 0 B) -1 C) 1 D) 2
- (28) If z is a complex number, then the equation $|z-2|+|z+2|=8$ represents:
 A) Parabola B) Ellipse C) Hyperbola D) Circle
- (29) If z_1, z_2 are two complex numbers, then $|z_1 + z_2|$ is
 A) $\leq |z_1| + |z_2|$ B) $\geq |z_1| + |z_2|$ C) $< |z_1| + |z_2|$ D) $> |z_1| + |z_2|$
- (30) For any two matrices A and B, $AB=0$, if and only if
 A) $A \neq 0, B=0$ B) $A=0, B \neq 0$ C) $A=0$ or $B=0$ D) None of these
- (31) If $A = \begin{pmatrix} 2 & 2 \\ a & b \end{pmatrix}$ and $A^2 = O$, then $(a, b) =$
 A) $(-2, -2)$ B) $(2, -2)$ C) $(-2, 2)$ D) $(2, 2)$
- (32) If the matrix $\begin{bmatrix} 1 & 3 & \lambda+2 \\ 2 & 4 & 8 \\ 3 & 5 & 10 \end{bmatrix}$ is singular, then $\lambda =$
 A) -2 B) 4 C) 2 D) -4
- (33) If $AB=C$, then matrices A, B and C are
 A) $A_{2 \times 3}, B_{3 \times 2}, C_{2 \times 3}$ B) $A_{3 \times 2}, B_{2 \times 3}, C_{3 \times 2}$ C) $A_{3 \times 3}, B_{2 \times 3}, C_{3 \times 3}$ D) $A_{3 \times 2}, B_{2 \times 3}, C_{3 \times 3}$
- (34) If $A = \begin{pmatrix} 4 & 3 \\ 1 & 2 \end{pmatrix}$ and $I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ then $A^2 - 6A =$
 A) $3I$ B) $5I$ C) $-5I$ D) None of these
- (35) If A is a $m \times n$ matrix and B is a matrix such that both AB and BA are defined, then the order of B is:
 A) $m \times n$ B) $n \times m$ C) $m \times m$ D) $n \times n$
- (36) If A and B are square matrices of order 2, then $(A+B)^2 =$

- (37) A) $A^2 - 2AB + B^2$ B) $A^2 + 2AB + B^2$ C) $A^2 - 2BA + B^2$ D) None of these
 If A is a square matrix of order n and $A=kB$, where k is a scalar, then $|A| =$
 A) $|B|$ B) $k|B|$ C) $k^n |B|$ D) $n|B|$
- (38) What is the value of $\lim_{x \rightarrow \infty} (x - \sqrt{x^2 + x})$?
 A) ∞ B) 0 C) $-1/2$ D) None of these.
- (39) What is the value of $\lim_{x \rightarrow 0} (\sin 5x) / (\sin 2x)$?
 A) $2/5$ B) 5 C) 3 D) $5/2$.
- (40) The four disjoint points (2, 3), (0, 2), (4, 5), (0, a) are concyclic if the value of 'a' is
 A) 5 B) 7 C) 17 D) None of these.
- (41) The direction cosine of the line joining the points (4, 3, -5) and (-2, 1, -8) are
 A) (6, 2, 3) B) (6/7, 2/7, 3/7) C) (4, 5, 8) D) None of these.
- (42) $2 \int \sin(\log x) dx =$
 A) $x \sin(\log x)$ B) $\cos(\log x) - x$ C) $x[\sin(\log x) - \cos(\log x)]$ D) $\log x$
- (43) If $\frac{df(x)}{dx} = x \cos x + \sin x$ and $f(0) = 2$, then $f(x) =$
 A) $x \sin x$ B) $x \cos x$ C) $x \sin x + 2$ D) $\cos x + 2$
- (44) The eccentricity of a rectangular hyperbola is
 A) $\sqrt{5}$ B) $\sqrt{2}$ C) $\sqrt{3}$ D) None of these.
- (45) If the lines $x + 2ay + a = 0$, $x + 3by + b = 0$, $x + 4cy + c = 0$ are concurrent then 'a', 'b' and 'c' are in
 A) A.P B) G.P C) H.P D) None of these.
- (46) The probability of three persons having the same date and month for the birthday is
 A) $1/365$ B) $(1/365)^2$ C) $(1/365)^3$ D) None of these.
- (47) If a vector P making angles α, β, γ respectively with the X, Y and Z axes respectively. Then $\sin^2 \alpha + \sin^2 \beta + \sin^2 \gamma =$
 A) 0 B) 1 C) 2 D) 3
- (48) The solution of $(1+xy) y dx + (1-xy) x dy = 0$ is
 A) $\frac{x}{y} + \frac{1}{xy} = k$ B) $\log\left(\frac{x}{y}\right) = k + \frac{1}{xy}$ C) $\frac{x}{y} + \frac{1}{xy} = k$ D) $\log\left(\frac{x}{y}\right) = xy + k$.
- (49) If c is any arbitrary constant, then the general solution of the differential equation $y dx - x dy = xy dx$ is given by,
 A) $y = cxe^{-x}$ B) $x = cye^{-x}$ C) $y + e^x = cx$ D) $ye^x = cx$
- (50) Two dice are thrown. What is the probability that the sum of the numbers appearing on the two dice is 11, if 5 appears on the first?
 A) $1/36$ B) $1/6$ C) $5/6$ D) None of these.
- (51) If $\sin \theta + \cos \theta = 1$ then the general value of θ is

- A) $2n\pi$ B) $n\pi + (-1)^n \frac{\pi}{4} - \frac{\pi}{4}$ C) $2n\pi + \frac{\pi}{2}$ D) None of these.
- (52) The general value of θ satisfying the equations $\sin \theta = \sin \alpha$ and $\cos \theta = \cos \alpha$ is
 A) $2n\pi + \alpha$ B) $2n\pi - \alpha$ C) $n\pi + \alpha$ D) $n\pi - \alpha$.
- (53) The solution of $3\tan(A-15^\circ) = \tan(A+15^\circ)$ is
 A) $n\pi + \frac{\pi}{4}$ B) $2n\pi + \frac{\pi}{4}$ C) $2n\pi - \frac{\pi}{4}$ D) $2n\pi$.
- (54) The number of solution of the equation $2\cos(e^x) = 5^x + 5^{-x}$ are
 A) No solution B) One solution C) Two solutions D) Infinite solutions.
- (55) If $|A|=3$ and $|B|=6$ then $|A \cup B| =$
 A) 3 B) 6 C) 9 D) 18
- (56) If $A = \{x: x^2 - 5x + 6 = 0\}$, $B = \{2, 4\}$, $C = \{4, 5\}$ then $A \times (B \cap C)$ is
 A) $\{(2, 4), (3, 4)\}$ B) $\{(4, 2), (4, 3)\}$ C) $\{(3, 4), (4, 4)\}$ D) $\{(2, 2), (4, 4)\}$
- (57) Let $A = \{1, 2, 3, 4, 5\}$ and $B = \{2, 3, 6, 7\}$. Then $|(A \times B) \cap (B \times A)| =$
 A) 18 B) 6 C) 4 D) 0
- (58) Let X be the relation on the set R of all real numbers defined by $a X b$ iff $|a - b| \leq 1$. Then X is:
 A) Reflexive and Symmetric B) Symmetric C) Transitive D) Anti-symmetric.
- (59) Let R be a relation on the set N be defined by $\{(x, y) | x, y \in N, 2x + y = 41\}$. Then R is:
 A) Reflexive B) Symmetric C) Transitive D) None of these
- (60) If $f(x) = \sin(\log x)$, then the value of $f(xy) + f(x/y) - 2f(x) \cdot \cos(\log y) =$
 A) 1 B) 0 C) -1 D) 2
- (61) The value of 'b' and 'c' for which the identity $f(x+1) - f(x) = 8x + 3$ is satisfied, where $f(x) = bx^2 + cx + d$, are
 A) $b = 2, c = 1$ B) $b = 4, c = -1$ C) $b = -1, c = 4$ D) $b = -1, c = 1$
- (62) Given the function $f(x) = \frac{a^x + a^{-x}}{2}$, ($a > 2$). Then $f(x+y) + f(x-y)$ is
 A) $2f(x) \cdot f(y)$ B) $f(x) \cdot f(y)$ C) $f(x)/f(y)$ D) $f(x) - f(y)$
- (63) If $f(x) = \cos[\pi^2]x + \cos[-\pi^2]x$, then
 A) $f(\pi/4) = 2$ B) $f(-\pi) = 2$ C) $f(\pi) = 1$ D) $f(\pi/2) = -1$
- (64) The graph of the function $y=f(x)$ is symmetrical about the line $x=2$, then
 A) $f(x) = -f(-x)$ B) $f(2+x) = f(2-x)$ C) $f(x) = f(-x)$ D) $f(x+2) = f(x-2)$.
- (65) If $f(x) = \frac{x}{x-1} = \frac{1}{y}$, then $f(y)$ is
 A) x B) $x+1$ C) $x-1$ D) $1-x$.
- (66) The value of $(\sqrt{2}+1)^6 + (\sqrt{2}-1)^6$ will be
 A) -198 B) 198 C) 99 D) -99

- (67) If $(1+ax)^n = 1+8x+24x^2+\dots$, then the value of 'a' and 'n' is
 A) 2, 4 B) 2, 3 C) 3, 6 D) 1, 2
- (68) The coefficient of x^5 in the expansion of $(1+x^2)^5(1+x)^4$ is
 A) 30 B) 60 C) 40 D) None of these
- (69) In the polynomial $(x-1)(x-2)(x-3)\dots(x-100)$, the coefficient of x^{99} is
 A) 5050 B) - 5050 C) 100 D) 99
- (70) The coefficients of three successive terms in the expansion of $(1+x)^n$ are 165, 330 and 462 respectively, then the value of 'n' will be
 A) 11 B) 10 C) 12 D) 8
- (71) Middle term in the expansion of $(1+3x+3x^2+x^3)^6$ is
 A) 4^{th} B) 3^{rd} C) 10^{th} D) None of these
- (72) The points z_1, z_2, z_3, z_4 in the complex plane are the vertices of a parallelogram taken in order, if and only if
 A) $z_1 + z_4 = z_2 + z_3$ B) $z_1 + z_3 = z_2 + z_4$ C) $z_1 + z_2 = z_3 + z_4$ D) None of these
- (73) If three complex numbers are in A.P., then they lie on
 A) A circle in complex plane B) A straight line in complex plane
 C) A parabola in complex plane D) None of these
- (74) The equation $z\bar{z} + (2-3i)z + (2+3i)\bar{z} + 4 = 0$ represents a circle of radius
 A) 2 B) 3 C) 4 D) 6
- (75) In the argand diagram, if O, P and Q represents respectively the origin, the complex numbers z and $z + iz$, then the angle $\angle OPQ$ is
 A) $\pi/4$ B) $\pi/3$ C) $\pi/2$ D) 2π

Quantitative Aptitude

- (76) The unit digit in the product $(784 \times 618 \times 917 \times 463)$
 A) 2 B) 3 C) 4 D) 5
- (77) The smallest prime number is:
 A) 0 B) 1 C) 2 D) 3
- (78) Which of the following is a prime number
 A) 33 B) 81 C) 93 D) 97
- (79) If a and b are odd numbers then which of the following is even?
 A) $a + b$ B) $a + b + 1$ C) ab D) $ab + 2$
- (80) What decimal of an hour is a second?
 A) .0025 B) .0256 C) .00027 D) .000126
- (81) $100 + 50 \times 2$?
 A) 75 B) 150 C) 200 D) 300

- (82) The square root of 256 is
 A) 16 B) 18 C) 8 D) 14
- (83) The average of first five multiples of 3 is :
 A) 3 B) 9 C) 12 D) 15
- (84) The difference between a number and its three-fifth is 50. What is the number
 A) 75 B) 100 C) 125 D) None
- (85) If one-third of one-fourth of a number is 15, then three-tenth of that number is
 A) 35 B) 36 C) 45 D) 54
- (86) A number is doubled and 9 is added. If the resultant is trebled, it becomes 75. What is that number?
 A) 3.5 B) 6 C) 8 D) None
- (87) At present the ratio between the ages of Arun and Deepak is 4 : 3. After 6 years Arun's age will be 26 years. What is the age of Deepak at present?
 A) 12 years B) 15 Years C) 19.5 Years D) 21 Years
- (88) The ratio 5 : 4 expressed as percent equals :
 A) 12.5 % B) 40% C) 80% D) 125%
- (89) Subtracting 40% of a number from the number, we get the result as 30. The number is :
 A) 28 B) 50 C) 52 D) 70
- (90) A student has to obtain 33% of the total marks to pass. He got 125 marks and failed by 40 marks. The maximum marks is:
 A) 300 B) 500 C) 800 D) 1000
- (91) I gain 70 paise on Rs70. My gain percentage is :
 A) 0.1% B) 1% C) 7% D) 10%
- (92) A sells an article which costs him Rs400 to B at a profit of 20%. B then sells it to C making a profit of 10% on the price he paid to A. How much does C pay B?
 A) 472 B) 476 C) 528 D) 532
- (93) If $A : B = 5 : 7$ and $B : C = 6 : 11$, then $A : B : C$ is :
 A) 55:77:66 B) 30:42:77 C) 35:49:42 D) None
- (94) If $2A = 3B = 4C$ then $A : B : C$ is :
 A) 2:3:4 B) 4:3:2 C) 6:4:3 D) 20:15:2
- (95) P and Q started a business investing Rs.85,000 and Rs.15,000 respectively. In what ratio and profit earned after 2 years be divided between P and Q respectively?
 A) 3 : 4 B) 3 : 5 C) 15 : 23 D) None
- (96) 36 men completes a piece of work in 18 days. In how many days will 27 men complete the same work?
 A) 12 B) 18 C) 22 D) 24
- (97) If 8 men can reap 80 hectares in 24 days, then how many hectares can 36 men reap in 30 days?
 A) 350 B) 400 C) 425 D) 450

(98) A does a work in 10 days and B does the same work in 15 days. In how many days they together will do the same work?

- A) 5 days B) 6 days C) 8 days D) 9 days

(99) Two pipes A and B can fill a tank in 20 and 30 minutes respectively. If both the pipes are used together, then how long will it take to fill the tank?

- A) 12 min B) 15 min C) 25 min D) 50 min

(100) An athlete runs 200 meters race in 24 seconds. His speed is

- A) 20 km/ hr B) 24 km/hr C) 28.5 km/hr D) 30 km/hr