**Q. 1. If the roots of the equation $bx^2 + cx + a = 0$ If the roots of the equation be imaginary, then for all real values of *x*, the expression is**

1. **less than –4*ab***
2. **greater than 4*ab***
3. **less than 4*ab***
4. **greater than –4*ab***

**Answer: (4)**

**Q. 2. For real *x*, let , f (x) $x^3 + 5x + 1$ then**

1. ***f* is neither one-one nor onto R**
2. ***f* is one-one but not onto R**
3. ***f* is onto R but not one-one**
4. ***f* is one-one and onto R**

**Answer: (4)**

**Q. 3. Let a, b, c be such that**

$$b\,(a+c) \neq 0.\ If \begin{vmatrix} a & a+1 & a-1 \\ -b & b+1 & b-1 \\ c & c-1 & c+1 \end{vmatrix} + \begin{vmatrix} a+1 & b+1 & c-1 \\ a-1 & b-1 & c+1 \\ (-1)^{n+2}a & (-1)^{n+1}b & (-1)^{n}c \end{vmatrix} = 0$$

**, then the value of n is**

1. **any integer**
2. **zero**

3. **any even integer**
4. **any odd integer**

**Answer: (4)**

**Q. 4. The lines p ($p^2$ + 1) x – y + q = 0and ($p^2$ + 1) x+ ($p^2$ + 1) y + 2q = 0 are perpendicular to a common line for**

1. **more than two values of p**
2. **no value of p**
3. **exactly one value of p**
4. **exactly two values of p**

**Answer: (3)**

**Q. 5. In a binomial distribution** $B\left(n, p=\frac{1}{4}\right)$**, if the probability of at least one success is greater than or equal to** $\frac{9}{10}$ **, then *n* is greater than**

1. $\frac{4}{\log_{10}^{4} - \log_{10}^{3}}$
2. $\frac{1}{\log_{10}^{4} - \log_{10}^{3}}$
3. $\frac{4}{\log_{10}^{4} + \log_{10}^{3}}$
4. $\frac{9}{\log_{10}^{4} - \log_{10}^{3}}$

**Answer: (2)**

**Q. 6. The differential equation which represents the family of curves** $y = c_1 e^{c_2 x}$, *where* $c_1$ *and* $c_2$**, where and are arbitrary constants, is**

1. $yy` = (y`)^2$
2. $y` = y^2$
3. $yy` = y`y$
4. $yy` = y`$

**Answer: (1)**

**Q. 7. If the mean deviation of the numbers 1, 1 + d, 1 + 2d,……. ……, 1 + 100d from their mean is 255, then the *d* is equal to**

1. **20.2**
2. **10.0**
3. **20.0**
4. **10.1**

**Answer: (4)**

**Q. 8. Let A and B denote the statements**

$$A: \cos\alpha + \cos\beta + \cos\gamma = 0,\ B: \sin\alpha + \sin\beta + \sin\gamma = 0.$$

$$If\ \cos(\beta-\gamma) + \cos(\gamma-\alpha) + \cos(\alpha-\beta) = -\frac{3}{2},\ then$$

1. **both *A* and *B* are false**
2. ***A* is true and *B* is false**
3. ***A* is false and *B* is true**
4. **both *A* and *B* are true**

**Answer: (4)**

**Q. 9.**

$Statement-1: \sim (p \leftrightarrow \sim q)$ *is equivalent to* $p \leftrightarrow q$.

$Statement-2 \sim (p \leftrightarrow \sim q)$ *is a tauto*$\log y$.

1. **Statement-1 is false, Statement-2 is true.**
2. **Statement-1 is true, Statement-2 is true; Statement-2 is a correct explanation for Statement-1.**
3. **Statement-1 is true, Statement-2 is true; Statement-2 is not a correct explanation for Statement-1.**

**Answer: (4)**

**Q. 10.**

**Let A be a** $2 \times 2$ **matrix**

**Statement 1: adj (adj A) = A.**

**Statement 2:** $|adj\ A| = |A|$

1. **Statement-1 is false, Statement-2 is true.**
2. **Statement-1 is true, Statement-2 is true; Statement-2 is a correct explanation for Statement-1.**
3. **Statement-1 is true, Statement-2 is true; Statement-2 is not a correct explanation for Statement-1.**
4. **Statement-1 is true, Statement-2 is false.**

**Answer: (3)**

**Q. 11. Statement-1: The variance of first *n* even natural numbers is** $\frac{n^2 - 1}{4}$ **.**

**Statement-2: The sum of first *n* natural numbers is** $\frac{n\,(n+1)}{2}$ **and the sum of squares of first *n* natural numbers is** $\frac{n\,(n+1)\,(2n+1)}{6}$.

1. **Statement-1 is false, Statement-2 is true.**
2. **Statement-1 is true, Statement-2 is true; Statement-2 is a correct explanation for Statement-1.**
3. **Statement-1 is true, Statement-2 is true; Statement-2 is not a correct explanation for Statement-1.**
4. **Statement-1 is true, Statement-2 is false.**

**Answer: (1)**

**Q. 12.**

$Let\ f\ (x) = (x+1)^2 - 1,\ x \geq -1.$

$Statement\ 1 : The\ set\ \left\{x : f\ (x) = f^{-1}\ (x)\right\} = \{0, -1\}.$

**Statement-2: *f* is a bijection.**

1. **Statement-1 is false, Statement-2 is true.**
2. **Statement-1 is true, Statement-2 is true; Statement-2 is a correct explanation for Statement-1.**
3. **Statement-1 is true, Statement-2 is true; Statement-2 is not a correct explanation for Statement-1.**
4. **Statement-1 is true, Statement-2 is false.**

**Answer: (3)**

**Q. 13. Let f (x) = x |x| and g (x) = sinx.**

**Statement-1: is differentiable at *x* = 0 and its derivative is continuous at that point.**

**Statement-2: is twice differentiable at *x* = 0.**

1. **Statement-1 is false, Statement-2 is true.**
2. **Statement-1 is true, Statement-2 is true; Statement-2 is a correct explanation for Statement-1.**
3. **Statement-1 is true, Statement-2 is true; Statement-2 is not a correct explanation for Statement-1.**

4. **Statement-1 is true, Statement-2 is false.**

**Answer: (4)**

**Q. 14. Given $p(x) = x^4 + ax^3 + bx^2 + cx + d$ such that $x = 0$ is the only real root of $p`(x) = 0$. If $p(-1) < p(1)$, then in the interval [-1, 1]**

1. **neither p (-1)is the minimum nor p(1)is the maximum of p**
2. **p (-1)is the minimum and p(1) is the maximum of p**
3. **p (-1) is not minimum but p(1) is the maximum of p**
4. **p (-1) is the minimum but p(1) is not the maximum of p**

**Answer: (3)**

**Q. 15. The shortest distance between the line $y - x = 1$ and curve $x = y^2$is**

1. $\frac{\sqrt{3}}{4}$
2. $\frac{3\sqrt{2}}{8}$
3. $\frac{2\sqrt{3}}{8}$
4. $\frac{3\sqrt{2}}{5}$

**Answer: (2)**

**Q. 16. The area of the region bounded by the parabola $(y - 2)^2 = x - 1$, the tangent to the parabola at the point (2, 3) and the *x*-axis is**

1. **12**
2. **3**
3. **6**
4. **9**

**Answer: (4)**

**Q. 17. The sum to infinity of the series** $1+\frac{2}{3}+\frac{6}{3^2}+\frac{10}{3^3}+\frac{14}{3^4}+\ldots\ldots\ldots\ldots$ **is**

1. **6**
2. **2**
3. **3**
4. **4**

**Answer: (3)**

**Q. 18. The ellipse $x^2 + 4y^2 = 4$ is inscribed in a rectangle aligned with the coordinate axes, which in turn is inscribed in another ellipse that passes through the point (4, 0). Then the equation of the ellipse is**

1. **$4x^2 + 64y^2 = 48$**
2. **$x^2 + 16y^2 = 16$**
3. **$x^2 + 12y^2 = 16$**
4. **$4x^2 + 48y^2 = 48$**

**Answer: (3)**

**Q. 19. The projections of a vector on the three coordinate axis are 6, –3, 2 respectively. The direction cosines of the vector are**

1. $\frac{-6}{7}, \frac{-3}{7}, \frac{2}{7}$
2. **6, -3, 2**
3. $\frac{6}{5}, \frac{-3}{5}, \frac{2}{5}$
4. $\frac{6}{7}, \frac{-3}{7}, \frac{2}{7}$

**Answer: (4)**

**Q. 20. From 6 different novels and 3 different dictionaries, 4 novels and 1 dictionary are to be selected and arranged in a row on a shelf so that the dictionary is always in the middle. Then the number of such arrangements is**

1. **at least 1000**
2. **less than 500**
3. **at least 500 but less than 750**
4. **at least 750 but less than 1000**

**Answer: (1)**

**Q. 21.** $If\ \vec{u}, \vec{v}, \vec{w}$ **are non-coplanar vectors and *p, q* are real numbers, then the equality** $[3\vec{u}\ p\vec{v}\ p\vec{w}] - [p\vec{v}\ \vec{w}\ q\vec{u}] - [2\vec{w}\ q\vec{v}\ q\vec{u}] = 0\ holds\ for$

1. **all values of (p, q)**
2. **exactly one value of (p, q)**
3. **exactly two values of (p, q)**
4. **more than two but not all values of (p, q)**

**Answer: (2)**

**Q. 22.**

*Let the line* $\frac{x-2}{3}=\frac{y-1}{-5}=\frac{z+2}{2}$ *lie in the plane* $x+3y-\alpha z+\beta=0.$
*Then* $(\alpha, \beta)$ *equals*

1. **(-5, 5)**
2. **(6, -17)**
3. **(-6, 7)**
4. **(5, -15)**

**Answer: (3)**

**Q. 23.**

*If* $\left|Z-\frac{4}{z}\right|=2,$ *then the* max *imum value of* $|Z|$ *is equal to*

1. $2+\sqrt{2}$
2. $\sqrt{2}+1$
3. $\sqrt{5}+1$
4. **2**

**Answer: (3)**

**Q. 24. The remainder left out when** $8^{2n}-(62)^{2n+1}$ **is divided by 9 is**

1. **8**
2. **0**
3. **2**
4. **7**

**Answer: (3)**

**Q. 25. If *A, B* and *C* are three sets such that $A \cap B = A \cap C \; and \; A \cup B = A \cup C, then$**

1. $A \cap B = \phi$
2. **A = B**
3. **A = C**
4. **B = C**

**Answer: (4)**

**Q. 26.** $\int_0^x [\cot x] dx, where [.]$ **denotes the greatest integer function, is equal to**

1. $-\frac{\pi}{2}$
2. $\frac{\pi}{2}$
3. **1**
4. **-1**

**Answer: (1)**

**Q. 27. If *P* and *Q* are the points of intersection of the circles $x^2 + y^2 + 3x - 7y + 2p - 5 = 0$ and $x^2 + y^2 + 2x + 2y - p^2 = 0$ , then there is a circle passing through *P, Q* and (1, 1) for**

1. **exactly one value of *p***
2. **all values of *p***
3. **all except one value of *p***
4. **all except two values of *p***

**Answer: (2)**

**Q. 28. Three distinct points *A*, *B* and *C* are given in the 2-dimensional coordinate plane such that the ratio of the distance of any one of them from the point (1, 0)to the distance from the point (-1, 0) is equal to $\frac{1}{3}$ . Then the circumcentre of the triangle *ABC* is at the point**

1. $\left(\frac{5}{3}, 0\right)$
2. **(0, 0)**
3. $\left(\frac{5}{4}, 0\right)$
4. $\left(\frac{5}{2}, 0\right)$

**Answer: (3)**

**Q. 29. One ticket is selected at random from 50 tickets numbered 00, 01, 02, ……., 49. Then the probability that the sum of the digits on the selected ticket is 8, given that the product of these digits is zero, equals**

1. $\frac{1}{50}$
2. $\frac{1}{14}$
3. $\frac{1}{7}$
4. $\frac{5}{14}$

**Answer: (2)**

**Q. 30. Let be an implicit function of x defined $x^{2x} - 2x^{x} \cot y - 1 = 0$. Then y`(1) equals**

1. **-log2**
2. **-1**
3. **1**
4. **log2**

**Answer: (2)**