MATHEMATICS

1. Area enclosed by $0 \le y \le x^2 + 1, 0 \le y \le x + 1, \frac{1}{2} \le x \le 2$ is :
(a) $\frac{1}{12}$ (b) $\frac{1}{6}$
(c) 1 (d) $\frac{1}{3}$

2. If T_1, T_2, T_3 …… are in A.P. such that $T_1 + T_2 + \ldots. + T_{25} = T_{26} + T_{27} + \ldots\ldots T_{40}$ and first term is 3 then value of common difference of A.P. is
(a) $\frac{1}{2}$ (b) $\frac{1}{6}$
(c) 2 (d) 3

3. $\left(\frac{1+i}{1-i}\right)^{\frac{m}{2}} = \left(\frac{1+i}{1-i}\right)^{\frac{n}{3}} = 1$, m, n ∈ N find HCF of (m, n) for least m & n
(a) 4 (b) 3
(c) 6 (d) 9

4. A pair of dice is thrown and sum of dice come up multiple of 4 then find probability that at least one dice shows 4.
(a) $\frac{2}{7}$ (b) $\frac{4}{9}$
(c) $\frac{1}{9}$ (d) $\frac{5}{8}$

5. Let $A = \begin{bmatrix} x & 1 \\ 1 & 0 \end{bmatrix}$ be a 2 × 2 matrix such that $A^4 = [a_{ij}]_{2\times2}$ $a_{11} = 109$, then find a_{22}.
(a) 12 (b) 4
(c) –8 (d) 10

6. The equation of curve satisfying differential equation $(1 + y^2)(e^2 + 1)dy = e^x y^2\, dx$ and also passes through the point (0, 1) is
(a) $y^2 + 1 = y\ell n\left(\frac{1+e^x}{2}\right)$ (b) $y^2 - 1 = y\ell n\left(\frac{1+e^x}{2}\right)$
(c) $y + 1 = y\ell n\left(\frac{1+e^x}{2}\right)$ (d) $2y^2 + 1 = y\ell n\left(\frac{1+e^x}{2}\right)$

7. Let $\frac{x^2}{4} + \frac{y^2}{3} = 1$ is an ellipse and a hyperbola which is confocal with ellipse such that its transverse excess is $\sqrt{2}$ then which of following point does not lie on hyperbola
(a) $\left(1, -\frac{1}{\sqrt{2}}\right)$ (b) $\left(-\sqrt{\frac{3}{2}}, 1\right)$
(c) $\left(\sqrt{\frac{3}{2}}, \frac{1}{\sqrt{2}}\right)$ (d) None of these

8. $2\pi - \left[\sin^{-1}\frac{4}{5} + \sin^{-1}\frac{5}{13} + \sin^{-1}\frac{16}{65}\right] =$
(a) $\frac{\pi}{2}$ (b) π (c) $\frac{3\pi}{2}$ (d) $-\frac{\pi}{2}$

9. If $y^2 + \ell n \cos^2 x = y$ then
(a) |y"(0) = 2 (b) |y'(0)| + |y"(0)|=1
(c) |y'(0)| + |y"(0)|=3 (d) None of these

10. $\lim_{x \to 0} \left(\frac{1-x|x|}{1+[x]-\lambda}\right) = L$ (finite) where [·] denotes the greatest integer function then find L.
(a) 0 (b) $\frac{1}{2}$ (c) 1 (d) 2

11. Let α, β are roots of $x^2 + px + 2 = 0$ and $\frac{1}{\alpha}, \frac{1}{\beta}$ are the roots of $2x^2 - 2qx + 1 = 0$. Then find the value of $\left(\alpha + \frac{1}{\beta}\right)\left(\beta + \frac{1}{\alpha}\right)\left(\alpha - \frac{1}{\alpha}\right)\left(\beta - \frac{1}{\beta}\right)$
(a) $\frac{9}{4}(9 - p^2)$ (b) $\frac{9}{4}(9 + p^2)$
(c) $\frac{4}{9}(9 - q^2)$ (d) $\frac{9}{4}(9 - q^2)$

12. Evaluate $\int_{-\pi}^{\pi} |\pi - |x||dx$
(a) π^2 (b) $\frac{\pi^2}{2}$
(c) $\frac{\pi^2}{3}$ (d) $\frac{\pi^2}{4}$

13. $\lim_{x \to 0} \frac{\left(1-\cos\frac{x^2}{2}\right)\left(1-\cos\frac{x^2}{4}\right)}{x^8} = 2^{-k}$, find k

14. The value of $0.16^{\log_{2.5}\left(\frac{1}{3}+\frac{1}{3^2}+\frac{1}{3^3}+\ldots\infty\right)}$ is

15. S = (2 $^1p_0$ – 3 $^2p_1$ + 4 $^3p_2$ + ……. 51 terms) + (1! – 2! + 3! – 4! + …….. 51 terms), find S
(a) 1 + 51! (b) 1 + 52!
(c) 1 + 50(51!) (d) 1 + 51(51!)

16. The preposition $p \Rightarrow (\sim p \wedge \sim q))$ is equivalent to
(a) q (b) $\sim p \vee q$
(c) $p \vee \sim q$ (d) $\sim p \vee \sim q$

17. The centre of a circle lies on x + y = 3 and touching the lines x = 3, y = 3 then find diameter of circle

18. $(2^{1/2} + 5^{1/8})$ has 33 integral terms find least value of n is :
(a) 256 (b) 257
(c) 258 (d) 259

19. The area (in sq. unit) of the region $\{(x, y); \frac{1}{2} \le y \le \sin x, 0 \le x \le \pi\}$ is equal
(a) $3 - 2\pi$ (b) $\sqrt{3} - \frac{\pi}{6}$
(c) $3 - \frac{\pi}{3}$ (d) $\sqrt{3} - \frac{\pi}{3}$

20. Let the data 4, 10, x, y, 27 be in increasing order. If the median of data is 18 and its mean deviation about mean is 7.6 then the mean of this data is :
(a) 17 (b) 16
(c) 16.5 (d) 15.5

21. A bag contains 6 red and 10 green balls, 3 balls are drawn from it one by one without replacement. If the third ball drawn is red, then the probability, that first two balls are green is
(a) $\frac{3}{7}$ (b) $\frac{9}{149}$
(c) $\frac{9}{56}$ (d) $\frac{3}{8}$

22. If $\begin{vmatrix} x-2 & 2x-3 & 3x-4 \\ 2x-3 & 3x-4 & 4x-5 \\ 3x-5 & 5x-8 & 10x-17 \end{vmatrix} = Ax^3 + Bx^2 + Cx + D$ then find the absolute value of B + C ?

ANSWER

1.	(a)	**2.**	(b)	**3.**	(a)	**4.**	(c)	**5.**	(d)	**6.**	(b)	**7.**	(c)	**8.**	(c)	**9.**	(a)	**10.**	(d)
11.	(a)	**12.**	(a)	**13.**	(08.00)	**14.**	(04.00)	**15.**	(b)	**16.**	(b)	**17.**	(03.00)	**18.**	()	**19.**	(d)	**20.**	(a)
21.	(a)	**22.**	(03.00)																