

16. If $x^3 dy + xy dx = x^2 dy + 2y dx$; $y(2) = e$ and $x > 1$, then $y(4)$ is equal to :

(1) $\frac{3}{2} + \sqrt{e}$ (2) $\frac{3}{2}\sqrt{e}$

(3) $\frac{1}{2} + \sqrt{e}$ (4) $\frac{\sqrt{e}}{2}$

Official Ans. by NTA (2)

17. Let e_1 and e_2 be the eccentricities of the ellipse,

$$\frac{x^2}{25} + \frac{y^2}{b^2} = 1 (b < 5) \quad \text{and the hyperbola,}$$

$$\frac{x^2}{16} - \frac{y^2}{b^2} = 1 \quad \text{respectively satisfying } e_1 e_2 = 1. \text{ If}$$

α and β are the distances between the foci of the ellipse and the foci of the hyperbola respectively, then the ordered pair (α, β) is equal to :

(1) (8, 10) (2) (8, 12)

(3) $\left(\frac{20}{3}, 12\right)$ (4) $\left(\frac{24}{5}, 10\right)$

Official Ans. by NTA (1)

18. The set of all real values of λ for which the quadratic equations,

$$(\lambda^2 + 1)x^2 - 4\lambda x + 2 = 0 \text{ always have exactly one root in the interval } (0, 1) \text{ is :}$$

(1) (-3, -1) (2) (1, 3]

(3) (0, 2) (4) (2, 4]

Official Ans. by NTA (2)

19. If the term independent of x in the expansion

$$\text{of } \left(\frac{3}{2}x^2 - \frac{1}{3x}\right)^9 \text{ is } k, \text{ then } 18k \text{ is equal to :}$$

(1) 9 (2) 11

(3) 5 (4) 7

Official Ans. by NTA (4)

20. Let p, q, r be three statements such that the truth value of $(p \wedge q) \rightarrow (\neg q \vee r)$ is F. Then the truth values of p, q, r are respectively :

(1) T, F, T (2) F, T, F

(3) T, T, F (4) T, T, T

Official Ans. by NTA (3)

21. If m arithmetic means (A.Ms) and three geometric means (G.Ms) are inserted between 3 and 243 such that 4th A.M. is equal to 2nd G.M., then m is equal to _____.

Official Ans. by NTA (39)

22. If the tangent of the curve, $y = e^x$ at a point (c, e^c) and the normal to the parabola, $y^2 = 4x$ at the point $(1, 2)$ intersect at the same point on the x -axis, then the value of c is _____.

Official Ans. by NTA (4)

23. Let a plane P contain two lines

$$\vec{r} = \hat{i} + \lambda(\hat{i} + \hat{j}), \lambda \in \mathbb{R} \text{ and}$$

$$\vec{r} = -\hat{j} + \mu(\hat{j} - \hat{k}), \mu \in \mathbb{R}$$

If $Q(\alpha, \beta, \gamma)$ is the foot of the perpendicular drawn from the point $M(1, 0, 1)$ to P , then $3(\alpha + \beta + \gamma)$ equals _____.

Official Ans. by NTA (5)

24. Let S be the set of all integer solutions, (x, y, z) , of the system of equations

$$x - 2y + 5z = 0$$

$$-2x + 4y + z = 0$$

$$-7x + 14y + 9z = 0$$

such that $15 \leq x^2 + y^2 + z^2 \leq 150$. Then, the number of elements in the set S is equal to _____.

Official Ans. by NTA (8)

25. The total number of 3-digit numbers, whose sum of digits is 10, is _____.

Official Ans. by NTA (54)