MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 41

Mathematics

1. The sun of the coefficient of all the terms in the expansion of $(2x - y + z)^{20}$ in which y do not appear at all while x appears in even powers and z appears in odd powers is

A. 0

B. $\dfrac{2^{20}-1}{2}$

C. 2^{19}

D. $\dfrac{3^{20}-1}{2}$

Answer: A

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2. Let $\alpha_r = e^{\frac{2\pi r}{n}}(1 \leq r \leq n)$ be the complex number associated with the point A_r on Argand oalne, and point B is (2,0) then the value of $BA_1.\,BA_2.\,BA_3.\ldots\ldots\ldots BA_n$ is equal to

A. n

B. $2^n - 1$

C. $2n$

D. $2n - 1$

Answer: B

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3. Let matrix $A = \begin{bmatrix} x & y & 2 \\ 1 & 2 & 3 \\ 1 & 1 & 2 \end{bmatrix}$ where $x, y \in N$. If $|adj(adj(adj(adjA)))| = 3^{32}.5^{16}$, then number of such matrix A is equal to

A. 46

B. 47

C. 48

D. None of these

Answer: A

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4. If M is the number of words that can be formed using letters of word EXCELLECE and N is the number of such words in which no two vowels are together then $\frac{M}{N}$ is equal to

A. $\frac{1}{4}$

B. 6

C. 4

D. None of these

Answer: B

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5. If the roots of $a(b-c)x^2 + b(c-a)x + c(a-b) = 0$ are equal then a,b,c are in:

A. A.P

B. G.P

C. H.P

D. None of these

Answer: C

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6. The sum of the series $\frac{3}{1^3}+\frac{5}{1^3+2^3}+\frac{7}{1^3+2^3+3^3}+\ldots\ldots\ldots\ldots\ldots.\text{to}\infty$ is

A. 1

B. 4

C. 5

D. 6

Answer: B

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7. Let $E = (1, 2, 3, 4)$ and $F = (1, 2)$. Then the number of onto functions from E and F is

A. 14

B. 16

C. 12

D. 8

Answer: A

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8. If real numbers x and y satisfy $x^2 + y^2 - 16x + 30y + 280 = 0$ then maximum value of $(x^2 + y^2)^{\frac{1}{2}}$ is

A. 15

B. 20

C. 25

D. 30

Answer: B

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9. What is the eccentricity of the conic expressed by

$x^2 + 2y^2 - 2x + 3y + 2 = 0$

A. 0

B. $\frac{1}{2}$

C. $\frac{1}{\sqrt{2}}$

D. $\sqrt{2}$

Answer: C

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10. The minimum value of the expression $\left(t^2+1-\alpha\right)^2+(2t-\alpha-4)^2$ is $(t, \alpha \in R)$

A. 2

B. 3

C. 8

D. 10

Answer: C

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11. For an isosceles triangle, the ends of the base are given by the points (2a,0) and (0,a). If the equation of one side is $x = 2a$ then the equation of the othe side is

A. $x + 2y - a = 0$

B. $x + 2y = 2a$

C. $3x + 4y - 4a = 0$

D. $3x - 4y + 4a = 0$

Answer: D

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12. If the line $\frac{x-2}{3} = \frac{y+1}{2} = \frac{z-1}{-1}$ intersects the plane $2x + 3y - z + 13 = 0$ at a point P and the plane $3x + y + 4z = 16$ at a point Q , then PQ is equal to

A. $2\sqrt{14}$

B. $\sqrt{14}$

C. $2\sqrt{7}$

D. 14

Answer: A

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13. If the volume of parallelepiped formed by the vectors $\hat{i} + \lambda\hat{j} + \hat{k}, \hat{j} + \lambda\hat{k}$ and $\lambda\hat{i} + \hat{k}$ is minimum then λ is equal to

A. $\sqrt{3}$

B. $-\dfrac{1}{\sqrt{3}}$

C. $\dfrac{1}{\sqrt{3}}$

D. $-\sqrt{3}$

Answer: C

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14. If f(x) is a differentials function such that $f'(1) = 4$ and $f'(4) = \frac{1}{2}$, the value of $\lim_{x \to 0} \dfrac{f(x^2 + x + 1) - f(1)}{f(x^4 - x^2 + 2x + 4) - f(4)}$ is

A. 8

B. 16

C. 4

D. Does not exist

Answer: C

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15. The probability that the screws are defective in three boxes of screws A,B and C are $\frac{1}{5}, \frac{1}{6}$ and $\frac{1}{7}$ respectively. A box is selected at random and a screw drawn from it randomly is found to be defective. The probability that the defective screw is drawn from the box A is

A. $\frac{16}{29}$

B. $\frac{1}{15}$

C. $27 \cdot 59$

D. $\frac{42}{107}$

Answer: D

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16. The general solution of differential equation $\frac{dy}{dx} + \frac{y \ln y}{x} = \frac{y(\ln y)^2}{x^2}$ is (where C is an arbitrary constant)

A. $\ln y = \frac{1}{2x} + Cx$

B. $\frac{1}{\ln y} = \frac{1}{2x} + C$

C. $\frac{1}{\ln y} = \frac{1}{2x} + Cx$

D. $\ln y = \frac{1}{x} + Cx$

Answer: C

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17. $\int e^{(\log x + ax^2)} \cos(bx^2 + c)\,dx$ is equal to

A. $\frac{1}{\sqrt{a^2b^2}} e^{ax^2} \cos\left(bx^2 + c + \frac{\tan^{-1} b}{a}\right) + A$

B.

$$\frac{1}{2\sqrt{a^2 + b^2}} e^{x^2} \cos\left(bx - c - \tan^{-1}\frac{b}{a}\right) + A$$

C. $\frac{1}{\sqrt{a^2 + b^2}} e^{ax^2} \cos\left(bx + c - \tan^{-1}\frac{b}{a}\right) + A$

D.

$$\frac{1}{2\sqrt{a^2 + b^2}} e^{ax^2} \cos\left(bx + c - \tan^{-1}\frac{b}{a}\right) + A$$

Answer: D

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18. The negation of the compound statement $\sim p \vee (p \vee (\sim q))$ is

A. $(\sim p \cap q) \wedge p$

B. $(\sim p \wedge q) \vee p$

C. $(\sim p \wedge q) \vee \sim p$

D. $(\sim p \wedge \sim q) \wedge \sim q$

Answer: A

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19. The mean and variation of 7 observations are 8 and 16 respectivelh. If 5 of the observations are 2,4,10,12,14 then the remaining two observations are

A. 6,8

B. 5,6

C. 9,10

D. None of these

Answer: A

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20. Which one of the following is incorrect?

A. $\sin^{-1}(\sin 20) = 20 - 6\pi$

B. $\cos^{-1}(\cos 12) = 4\pi - 12$

C. $\cos^{-1}(\cos 22) = 8\pi - 22$

D. $\cot^{-1}\cot(-13) = 4\pi - 13$

Answer: D

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21. In a triangle ABC if

$$\Delta = \begin{vmatrix} e^{i2A} & e^{-iC} & e^{iB} \\ e^{-iC} & e^{i2B} & e^{-iA} \\ e^{-iB} & e^{-iA} & e^{-i2C} \end{vmatrix}$$ then $|\Delta| =$ (where |.| denote absolute value)

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22. Let $f(x)$

$$= \begin{cases} 2 - x + a^2 - 9a - 9 & x < 2 \\ 2x - 3 & x \geq 2 \end{cases}$$

Where a is a positive constnat. If f(x) has local minimum at x=2, then the least integral value of a is

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23. If $y = \cos^{-1}\left[\frac{\cos x + 4\sin x}{\sqrt{17}}\right]$ then $\frac{dy}{dx}$d is

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24. Let the line x=k divide the area enclosed by $(1-x)^2 = y, x = 0, y = 0$ into two parts $R_1(0 \le x \le k)$ and $R_2(k \le x \le 1)$ such that $R_1 = \frac{31}{96} + R_2$ then k=...........

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25. How many real solutions does the equation $2\sin x = x^2 - x\pi + \frac{\pi^2 + 8}{4}$ have ?

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26. If A and B are two independent events such that $P(\overline{A} \cap B) = \frac{2}{15}$ and $P(A \cap \overline{B}) = \frac{1}{6}$ and p_1, p_2 are possible value of P(B), then evaluate $\frac{1}{p_1} + \frac{1}{p_2}$

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27. The function defined by f(x)

$$= \begin{cases} \left(x^2 + e^{\frac{1}{2} - x}\right)^{-1} & x \neq 2 \\ k & x = 2 \end{cases}$$ is continuous from right at the point x=2, then k is equal to

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28. Let $C_1 : y^2 = 4\left[\sqrt{y}\right]x, C_2 : x^2 = 4\left[\sqrt{x}\right]y$ represent two curves where [.] [] represents the greatest integer function. The area enclosed between

C_1 and C_2 within the same square formed by the lines $x = 1, hy = 1, x = 4, y = 4$ is A, then the value of [A] is equal to

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29. If $S_n = \sum_{k=1}^{4n} (-1)^{\frac{k(k+1)}{2}} k^2$, then the values of S_8 is equal to

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30. Evaluate $8\cos 36^\circ \cos 72^\circ \cos 108^\circ \cos 144^\circ$

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