MATHS

BOOKS - NTA MOCK TESTS

JEE MOCK TEST 18

Mathematics

1. The function $f(x) = \tan x + \frac{1}{x}, \forall x \in \left(0, \frac{\pi}{2}\right)$ has

A. one local maximum

B. one local minimum

C. one local maximum and one minimum

D. no local maximum of minimum

Answer: B

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2. The possible values of n for which the equation $nx^2 + (2n-1)x + (n-1) = 0$ has roots of opposite sign is/are by

A. no value of n

B. all values of n

C. $-1 < n < 0$

D. $0 < n < 1$

Answer: D

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3. The value of the integral $I = \int_1^2 t^{[\{t\}]+t}(1+\ln t)dt$ is equal to ($[.]$ and $\{.\}$ denotes the greatest integer and fractional part function respectively)

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4. The solution of the differential equation $xdy + \frac{y}{x}dx = \frac{dx}{x}$ is (where, c is an arbitarary constant)

A. $y = 1 + ce^{1/x}$

B. $y = ce^{1/x}$

C. $y = ce^{1/x} - 1$

D. $xy = 1 - ce^{1/x}$

Answer: A

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5. In an experiment with 9 observation on x, the following results are available $\Sigma x^2 = 360$ and $\Sigma x = 34$. One observation that was 8, was found to be wrong and was replaced by the correct value 10, then the corrected variance is

A. $\frac{250}{9}$

B. 28

C. $\frac{240}{9}$

D. 26

Answer: B

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6. If two parabolas $y^2 - 4a(x - k)$ and $x^2 = 4a(y - k)$ have only one common point P, then the equation of normal to $y^2 = 4a(x - k)$ at P is

A. $y + x = 4a$

B. $y + x = 2a$

C. $y + x = 4$

D. $y + x = 2$

Answer: A

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7. If a, b & 3c are in arithmetic progression and a, b & 4c are in geometric progression, then the possible value of $\frac{a}{b}$ are

A. $\left\{\frac{2}{3}, 2\right\}$

B. $\left\{\frac{3}{2}, \frac{1}{2}\right\}$

C. $\left\{\frac{2}{3}, \frac{3}{2}\right\}$

D. $\left\{\frac{1}{2}, 2\right\}$

Answer: B

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8. The number of terms in the expansion of $\left(5^{\frac{1}{6}} + 7^{\frac{1}{9}}\right)^{1824}$ which are integers is

A. 100

B. 101

C. 102

D. 103

Answer: C

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9. The number of ways in which 10 balls can be selected from 10 identical green balls, 10 identical blue balls and 9 idenitcal red balls are

A. 63

B. 64

C. 65

D. 66

Answer: C

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10. Consider the function $f(x) = \cos^{-1}([2^x]) + \sin^{-1}([2^x] - 1)$, then (where $[.]$ represents the greatest integer part function)

A. Domain of f(x) is $x \in (-\infty, 0]$

B. Range of $f(x)$ is singleton

C. $f(x)$ is an even function

D. $f(x)$ is an odd function

Answer: B

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11. If A & B are two sets such that $n(A \times B) = 60 \& n(A) = 12$ also $n(A \cap B) = K$, then the sum of maximum & minimum possible value of K is

A. 17

B. 12

C. 5

D. 7

Answer: C

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12. The value of $\lim_{x \to 0^-} \frac{2^{1/x} + 2^{3/x}}{3\left(2^{1/x}\right) + 5\left(2^{3/x}\right)}$ is

A. $1/3$

B. $1/5$

C. 1

D. $1/4$

Answer: A

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13. If $f(x) = x^3 + 3x + 1$ and $g(x)$ is the inverse function of f(x), then the value of g'(5) is equal to

A. 3

B. $\frac{1}{3}$

C. (1)/(6)`

D. 6

Answer: C

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14. The contrapositive of the statement: "If the weather is fine then my friends will come and we go for a picnic".

A. The weather is fine but my friends will not come or we do not go for a picnic.

B. If my friends do not come or we do not go for picnic then weather will not be find.

C. If the weather is not fine then my friends will not come or we do not go for a picnic.

D. The weather is not fine but my friends will come and we go for a picnic.

Answer: B

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15. Lines $L_1 \& L_2$ are rotating in an anticlockwise direction about the points $A(-2,)$ and $B(2,0)$ respectively in such a way that the speed of angle of rotation of line L_2 is double as that of L_1. Initially equations of both lines are y = 0. If the angle of rotation of line L_2 varies between 0 to $\frac{\pi}{2}$, then the locus of point of intersection P of lines $L_1 \& L_2$ is part of a circle whose radius is equal to

A. 2 units

B. 4 units

C. 6 units

D. 8 units

Answer: B

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16. The value of the integral $\int e^{3\sin^{-1}x}\left(\frac{1}{\sqrt{1-x^2}}+e^{3\cos^{-1}x}\right)dx$ is equal to (where, c is an arbitrary constant)

A. $\frac{e^{3\sqrt{\sin^{-1}x}}}{3}+xe^{\frac{3\pi}{2}}+c$

B. $e^{\sqrt{\sin^{-1}x}} + e^{\pi/2} + c$

C. $\frac{e^{3\sin^{-1}x}}{3} + xe^{\frac{3\pi}{2}} + c$

D. $e^{\frac{\pi}{2}} + e^{x}\left(\frac{\pi}{2}\right) + c$

Answer: C

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17. If the locus of the foot of the perpendicular drawn from centre upon any tangent to the ellipse $\frac{x^2}{40} + \frac{y^2}{10} = 1$ is $\left(x^2 + y^2\right)^2 = ax^2 + by^2$, then $(a - b)$ is equal to

A. 10

B. 20

C. 25

D. 30

Answer: D

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18. Let $M = \begin{bmatrix} a & b & c \\ d & e & f \\ 1 & 1 & 1 \end{bmatrix}$ and $N = \frac{M^2}{2}$. If

$(a-b)^2 + (d-e)^2 = 36,$

$(b-c)^2 + (e-f)^2 = 64,$

$(a-c)^2+(d-f)^2=100$, then value of $|N|$ is equal to

A. 1152

B. 48

C. 144

D. 288

Answer: D

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19. A small pack of cards consists of 5 green cards 4 blue cards and 3 black cards. The pack is shuffled through and first three cards are turned face up. The probability that there is exactly one card of each colour is :

A. $\frac{9}{55}$

B. $\frac{4}{11}$

C. $\frac{3}{11}$

D. $\frac{8}{55}$

Answer: C

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20. Let $\vec{a}, \vec{b}, \vec{c}$ be three vectors of magntiude 3, 4, 5 respectively, satisfying $\left|\left[\vec{a} \quad \vec{b} \quad \vec{c}\right]\right| = 60$. If $\left(\vec{a} + 2\vec{b} + 3\vec{c}\right).\left(\left(\vec{a} \times \vec{c}\right) \times \vec{b} + \vec{b}\right) = \lambda$ then λ is equal to

A. 16

B. 32

C. 20

D. 40

Answer: B

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21. Let $Z = re^{i\theta}(r > 0 \text{ and } \pi < \theta < 3\pi)$ is a root of the equation $Z^8 - Z^7 + Z^6 - Z^5 + Z^4 - Z^3 + Z^2 - Z + 1 = 0$.

the sum of all values of θ is $k\pi$. Then k is equal to

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22. If $I_n = \int_0^{n\pi} \max\left(|\sin x|, \left|\sin^{-1}(\sin x)\right|\right) dx$, the $I_2 + I_4$ has the value $\frac{\lambda\pi^2}{2}$, where λ is

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23. If $x \in [0, 2\pi]$ then the number of solution of the equation $81^{\sin^2 x} + 81^{\cos^2 x} = 30$

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24. If

$$f(x) = \begin{cases} \frac{\sin 2x}{cx} + \frac{x}{\left(\sqrt{x+a^2}-a\right)} & x \neq 0, (a < 0) \\ b & x = 0, (b \neq 0) \end{cases}$$

and f(x) is continuous at x = 0, then the value of bc is equal to

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25. A harbour lies in a direction 60° south - west from a fort and at a distance 30 km from it .A ship sets from the habour at noon and sails due east at 10 km / hour .The ship will be 70 km from the fort at

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