MATHS

FOR IIT JEE ASPIRANTS OF CLASS 12 FOR MATHS

JEE MAIN REVISION TEST - 30 | JEE -2020

Mathematics

1. If $y = y(x)$ is the solution of differential equation $\sin y \frac{dy}{dx} - \cos y = e^{-x}$ such that $y(0) = \frac{\pi}{2}$ then $y(A)$ is equal to

A. $\sin^{-1}\frac{1}{e}$

B. $\cos^{-1}\frac{1}{e}$

C. $-\cos^{-1}\frac{1}{e}$

D. $\cos^{-1}\left(-\frac{1}{e}\right)$

Answer: D

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2. The foot of perpendicular from $(-1, 2, 3)$ on the plane passing through the points $(1, -1, 1), (2, 1, -2)$ and $(3, -1, -1)$ is :

A. $(1, 1, -1)$

B. $(2, 1, 2)$

C. $(-2, 1, 2)$

D. $(2, -2, 1)$

Answer: C

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3. The equation of common tangent to Parabola $y^2 = 8x$ and $y = -x^2$ is :

A. $2x - y + 1 = 0$

B. $x - 2y + 1 = 0$

C. $2x + y + 1 = 0$

D. $x + 2y + 1 = 0$

Answer: A

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4. Let α, β be the roots of equation $x^2 - x + 1 = 0$ and the matrix $A = \frac{1}{\sqrt{3}} \begin{vmatrix} 1 & 1 & 1 \\ 1 & \alpha & \alpha^2 \\ 1 & \beta & -\beta^2 \end{vmatrix}$, the value of det $(A.\ A^T)$ is

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

B. 1

C. -1

D. 3

Answer: C

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5. The number of distinct real values of λ for which the system of linear equations $x+y+z=\lambda x, x+y+z=\lambda y, x+y+z+\lambda z$ has non - trival solution.

A. 0

B. 1

C. 2

D. 3

Answer: C

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6. Which one of the following statement is neither a tautology nor a fallacy?

A. $p \vee (p \wedge q)$

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

C. $(p \wedge q) \rightarrow p$

D. $(p \vee q) \rightarrow (p \vee q)$

Answer: D

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7. The area of the region enclosed by $x^2 + y^2 = 2, y^2 = x$ and y - axis is

A. $\frac{\pi}{4} + \frac{1}{3}$

B. $\frac{\pi}{2} + \frac{1}{3}$

C. $\frac{\pi}{4} - \frac{1}{3}$

D. $\frac{\pi}{2} - \frac{1}{3}$

Answer: D

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8. If $z = x + iy, x, y \in R$, then the louts $Im\left(\frac{z-2}{z+i}\right) = \frac{1}{2}$ represents : (where $i = \sqrt{-1}$)

A. Straight line

B. Circle

C. Parabola

D. Hyperbola

Answer: B

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9. If the distance between foci of a hyperbola is twice the distance between its directrices, then the eccentricity of conjugate hyperbola is :

A. 2

B. $\sqrt{3}$

C. $\sqrt{2}$

D. $\frac{3}{2}$

Answer: C

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10. Let α, β be two real roots of the equation $\cot^2 x - 2\lambda \cot x + 3 = 0, \lambda \in R$. If $\cot(\alpha + \beta) = \frac{1}{2}$, then value of λ is :

A. 1

B. 2

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

D. $\frac{3}{2}$

Answer: B

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11. A biased coin with probability of getting head is twice that of tail, is tossed 4 times If a random variable X is number of heads obtained, then expected value of X is :

A. $\frac{2}{3}$

B. $\frac{8}{3}$

C. 2

D. $\frac{16}{3}$

Answer: B

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12. Let $f\left(\frac{x+1}{x-1}\right) = 2x+1$, then integral $\int f(x)dx$ is $(x \neq 1)$.

A. $x^2 + x + c$

B. $2x + \ln|x+1| + c$

C. $3x + 4\ln|x-1| + c$

D. $2x + 3\ln|x+1| + c$

Answer: C

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13. Let P be a point on parabola $x^2 = 4y$. If the distance of P from the centre of circle $x^2 + y^2 + 6x + 8 = 0$ is minimum, then the equation of tangent at P on parabola $x^2 = 4y$ is :

A. $x + y + 1 = 0$

B. $x + y - 1 = 0$

C. $x - y + 1 = 0$

D. $x - y - 1 = 0$

Answer: A

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14. The value of $\lim_{x \to 2} \frac{2^x + 2^{3-x} - 6}{\sqrt{2^{-x}} - 2^{1-x}}$ is

A. $4\sqrt{2}$

B. 8

C. 6

D. $4\sqrt{3}$

Answer: B

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15. If vector $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{b} = 4\hat{i} + 3\hat{j} + 4\hat{k}$ and $\vec{c} = \hat{i} + \alpha\hat{j} + \beta\hat{k}$ are linearly dependent and $\left|\vec{c}\right| = \sqrt{3}$, then value of $|\alpha| + |\beta|$ is

A. 2

B. 3

C. 1

D. 4

Answer: A

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16. How many 7 digit members using all digits from 1, 1, 2, 2, 3, 3, 4, so that odd digit occupy the odd places :

A. 16

B. 18

C. 21

D. 24

Answer: B

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17. Let $A(0, 2), B(3, 0), C(6, 4)$ be the vertices of triangle and P is a point inside the triangle such that area of triangle APB, BPC and CPA are equal. Equation of circle circumscribing ΔAPB is :

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

B. $x^2 + y^2 - 4x - 3y = 0$

C. $x^2 + y^2 - 3x - 4y = 0$

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

Answer: D

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18. Let $f(x) = [x]$ and $g(x) = |x|, \forall x \in R$ then value of $gof\left(\frac{-5}{3}\right) + fog\left(\frac{-5}{3}\right)$ is equal to: (where $f_0 g(x) = f(g(x))$).

A. 1

B. -1

C. -2

D. 3

Answer: D

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19. $\int_0^1 \cot^{-1}(1 - x + x^2)\,dx$ equals :

A. $\frac{\pi}{2} + \ln 2$

B. $\frac{\pi}{2} - \ln 2$

C. $\pi - \ln 2$

D. $\pi + \ln 2$

Answer: B

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20. Which of the following is incorrect :

A. $(\pi)^{1/\pi} < (e)^{1/e}$

B. $(10)^{1/10} > (11)^{1/11}$

C. $(\ln 2)^{1/\ln 2} < (\ln 3)^{1/\ln 3}$

D. $\left(\tan^{-1} 3\right)^{1/\tan^{-1} 3} < \left(\tan^{-1} 2\right)^{1/\tan^{-1} 2}$

Answer: D

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21. If $x^2 + y^2 + \sin y = 4,$ then the value of $\left|\frac{d^2y}{dx^2}\right|$ at point $(-2, 0)$ is .....

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22. Let

$$\left(1 + x + x^2\right)^5 = a_0 + a_1x + a_2x^2 + \ldots\ldots + a_{10}x^{10}$$

then value of $a_1 + a_4 + a_7 + a_{10}$ is .....

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23. The sum of first 50 term of the series $1+\frac{3}{2}+\frac{7}{4}+\frac{15}{8}+\frac{31}{16}+$ ....is $\left(p+\frac{1}{2^q}\right)$, then value of $(p+q)$ is .....

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24. The standard deviation of first 50 even natural number is λ then value of $[\lambda]$ is (where [.] is gretest interger)...

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25. Let $f(x) = |3 - |2 - |x - 1| \,|\,|$, $\forall x \in R$ be not differentiable at $x_1, x_2, x_3, \ldots . x_n$, then $\sum_{i=1}^{n} x_i^2$ equal to :

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