MATHS

BOOKS - MCGROW HILL EDUCATION MATHS (HINGLISH)

JEE (MAIN) 2020 QUESTIONS WITH SOLUTIONS B.ARCH (6TH JAN -MORING)

Question

1. The set of all positive real values of k, for which the equation $x^3 - 9x^2 + 24x - k = 0$ has three distinct real roots, is the interval :

A. (18, 21)

B. (16,20)

C. (14,18)

D. 12, 16)

Answer: B

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2. In a certain town $25\ \%$ families own a phone and $15\ \%$ own a car, $65\ \%$ families own neither a phone nor a car, 2000 families own both a car and a phone . How many families live in the town ?

A. Both (S_1) and (S_2) are false.

B. Both (S_1) and (S_2) are true.

C. (S_1) is true and (S_2) is false.

D. (S_1) is false and (S_2) is true.

Answer: B

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3. Let $I = \int \frac{(2\sin\theta -)\cos\theta}{5 - \cos^2\theta - \sin\theta} d\theta$ then I is equal to : (where C is a constant of integration)

A. $3\log_e(2 - \cos\theta) + \frac{2}{2 - \sin\theta} + C$

B. $2\log_e(2 - \sin\theta) + \frac{3}{2 - \sin\theta} + C$

C. $2\log_e(2 + \cos\theta) + \frac{2}{2 - \cos\theta} + C$

D. $2\log_e(2 + \sin\theta) + \frac{3}{2 - \cos\theta} + C$

Answer: B

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4. $\sim(p \vee q) \vee (\sim p \wedge q)$ is logically equivalent to

A. p

B. $\sim p$

C. q

D. $\sim q$

Answer: B

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5. Let X be a random variable which takes values k with the probability kp. where k = 1, 2, 3, 4 and p $\in$ (0,1) . Then the standard deviation of X is :

A. $\sqrt{7}$

B. $\sqrt{10}$

C. 3

D. 1

Answer: D

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6. If $f(x) = \begin{vmatrix} \sin x & \cos x & \tan x \\ x^3 & x^2 & x \\ 2x & 1 & 1 \end{vmatrix}$, then $\lim_{x \to 0} \frac{f(x)}{x^2}$, is

A. 0

B. 3

C. 1

D. 2

Answer: C

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7. For non-zero numbers, l, m, n and a, let f(x) = $lx^3 + mx + n$ and $f(a) = f(4a)$. Then the value $x \in [a, 4a]$, at which the tangent to the curve y = f(x) is parallel to the x- axis is

A. $\sqrt{5}a$

B. 3a

C. 2a

D. $\sqrt{7}a$

Answer: D

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8. Let C be the circle concentric with the circle , $2x^2 + 2y^2 - 6x - 10y = 183$ and having area $\left(\frac{1}{10}\right)^{th}$ of the area of this circle. Then a tangent to C, parallel to the line, 3x + y = 0 makes an intercept on the y-axis , which is equal to :

A. -10

B. -4

C. 17

D. 14

Answer: A

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9. Let $S = 3 + 55 + 333 + 5555 + 33333 +$ upto 22 terms. If 9s + 88 = $A\left(10^{22} - 1\right)$, then A is equal to :

A. $\frac{450}{99}$

B. $\frac{530}{99}$

C. $\frac{630}{88}$

D. $\frac{350}{88}$

Answer: B

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10. If $x = e^t \sin t$ and $y = e^t$ cos t, t is a parameter , then the value of $\frac{d^2x}{dy^2} + \frac{d^2y}{dx^2}$ at t = 0 , is :

A. -2

B. $1/2$

C. 2

D. 0

Answer: D

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11. If a ellipse has centre at (0,0), a focus at (-3,0) and the corresponding directrix is 3x + 25 = 0 , then it passes through the point :

A. $(-5, -4)$

B. $\left(\frac{5}{2}, 4\right)$

C. $(-5, -4/\sqrt{2})$

D. $(5/\sqrt{2}, 4/\sqrt{2})$

Answer: D

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12. If the roots α and β of the equation , $x^2 - \sqrt{2}x + c = 0$ are complex for some real number $c \neq 1$ and $\left|\frac{\alpha - \beta}{1 - \alpha\beta}\right|$ = 1, then a value of c is :

A. $-2 + \sqrt{6}$

B. $4 - \sqrt{6}$

C. $-1 + \sqrt{2}$

D. $-1 + \sqrt{6}$

Answer: C

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13. If the probability of a shooter A not hitting a target is 0.5 and that for the shooter B is 0.7, then the probability that either A or B fails to hit the target is :

A. 0.20

B. 0.35

C. 0.25

D. 0.85

Answer: D

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14. If θ is the between the line $r = (i + 2j - k) + \lambda(i - j + 2k), \lambda \in R$ and the plane r. (2i - j + k) = 4. then a value of cos θ is :

A. $\frac{\sqrt{11}}{6}$

B. $\frac{\sqrt{35}}{6}$

C. $\frac{\sqrt{13}}{6}$

D. $\frac{\sqrt{7}}{3}$

Answer: A

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15. The area of the figure formed by the lines $ax + by + c = 0, ax - by + c = 0, ax + by - c = 0$ and $ax - by - c = 0$ is

A. $\frac{2b^2}{ac}$

B. $\frac{2a^2}{bc}$

C. $\frac{2c^2}{ab}$

D. $\frac{4c^2}{ab}$

Answer: C

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16. Find the Value of $\frac{\cot \pi}{24}$

A. $1+\sqrt{2}+\sqrt{3}+\sqrt{6}$

B. $1-\sqrt{2}+\sqrt{3}+\sqrt{6}$

C. $2+\sqrt{2}+\sqrt{3}-\sqrt{6}$

D. $2+\sqrt{2}+\sqrt{3}+\sqrt{6}$

Answer: D

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17. Let P be the point of intersection of two lines

$$L_1 : \frac{x+10}{1} = \frac{y-21}{7} = \frac{z+11}{5} \text{ and } L_2 : \frac{x-1}{5} = \frac{y-46}{9} = \frac{z}{3}$$

.

If Q be the point (-10, 21, -11) , then PQ is equal to :

A. 3

B. 5

C. $5\sqrt{3}$

D. $5\sqrt{2}$

Answer: C

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18. The area (in sq. units) of the region, R = {(x,y): y $\leq x^2, y \leq 2x+3, x \leq 1$ and $y+1 \geq$ } is :

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

B. $\frac{13}{3}$

C. $\frac{10}{3}$

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

Answer: A

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19. If α and β are the coefficients of x^8 and x^{-24} respectively, in the expansion of $\left(x^4+2+\frac{1}{x^4}\right)$ in powers of x, then $\frac{\alpha}{\beta}$ is equal to :

A. 39

B. 26

C. $\frac{32}{3}$

D. $\frac{13}{2}$

Answer: B

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20. Let A be a 2×2 matrix such that $3A^2 + 6A - l_2 = O_2$. Then a value of det (A+I) is :

A. $-7/\sqrt{3}$

B. $-7/3$

C. $\sqrt{7/3}$

D. $3/7$

Answer: B

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21. IF y = y (x) is the solution of the differential equation, $x\frac{dy}{dx} = y(\log_e y - \log_e x + 1)$, when y(1) = 2, then y(2) is equal to _____

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22. IF $S = \{z \in C : \bar{z} = iz^2\}$, then the maximum value of $|z - \sqrt{3} - i|^2$ in S is _____

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23. $\lim_{y \to 0} \frac{(y-2) + 2\sqrt{1+y+y^2}}{2y}$ is equal to _____

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24. Interior angle of polygon are in A.P.If the smallest angle is 120° and the common difference is 5°, find the number of sides of polygon.

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25. The largest value of $n \in N$ for which $\frac{74}{{}^{n}P_{n}} > \frac{{}^{n+3}P_{3}}{{}^{n+1}P_{n+1}}$ is _____

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