MATHS

BOOKS - MCGROW HILL EDUCATION MATHS (HINGLISH)

JEE (Main) 2020 QUESTION PAPER (8TH JAN-AFTERNOON)

Multiple Choice Questions

1. Let A and B two events such that the probgability that exactly one of them occurs is $\frac{2}{5}$ and the probability that A or B occurs is $\frac{1}{2}$, then probability of both of them occur together is :

A. 0.10

B. 0.20

C. 0.01

D. 0.02

Answer: A

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2. Let S be the set of all real roots of the equation, $3^x(3^x - 1) + 2 = |3^x - 1| + |3^x - 2|$

A. is a singleton

B. is an empty set

C. contains at least four elements

D. contains exactly two elements

Answer: A

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3. The mean and variance of 20 observations are found to be 10 and 4 respectively. On rechecking, it was found that an observation 8 is incorrect. If the wrong observation is omitted, then the correct variance is

A. 4.01

B. 3.99

C. 3.98

D. 4.02

Answer: B

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4. Let a = i- 2j + k and b = i-j+k be two vectors. If c is a vector such that b x c = b x a and c.a = 0, then c . b is equal to:

A. $1/2$

B. $-3/2$

C. $-1/2$

D. -1

Answer: C

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5. Let $f:(1,3) \to R$ be a function defined by $f(x) = \frac{x[x]}{1+x}$, where [x] denotes the greatest integer $\leq x$. Then the range of f is :

A. $\left(\frac{2}{5}, \frac{3}{5}\right] \cup \left(\frac{3}{4}, \frac{4}{5}\right)$

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

C. $\left(\frac{3}{5}, \frac{4}{5}\right)$

D. $\left(\frac{2}{5}, \frac{1}{2}\right) \cup \left(\frac{3}{5}, \frac{4}{5}\right]$

Answer: D

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6. If α and β be the coefficients of x^4 and x^2 respectively in the expression of $\left(x+\sqrt{x^2-1}\right)^6+\left(x-\sqrt{x^2-1}\right)^6$, then :

A. $\alpha+\beta=-30$

B. $\alpha-\beta=-132$

C. $\alpha+\beta=60$

D. $\alpha-\beta=60$

Answer: B

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7. If a hyperbola passes through the point $P(10, 16)$ and it has vertices at $(\pm 6, 0)$,then the equation of the normal to it at P is

A. 3x+4y=94

B. x+2y=42

C. 2x+5y=100

D. x=3y=58

Answer: C

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8. $\lim_{x \to 0} \frac{\int_0^x t \sin(10t) dt}{x}$ is equal to

A. 0

B. $\frac{1}{10}$

C. $-\frac{1}{10}$

D. $-\frac{1}{5}$

Answer: A

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9. If $y = mx + c$ is a tangent to the circle $(x-3)^2 + y^2 = 1$ and also the perpendicular to the tangent to the circle $x^2 + y^2 = 1$ at $\left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$, then

A. $c^2 + 7c + 6 = 0$

B. $c^2 - 6c + 7 = 0$

C. $c^2 - 7c + 6 = 0$

D. $c^2 + 6c + 7 = 0$

Answer: D

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10. Let $\alpha = \frac{-1 + i\sqrt{3}}{2}$ and $a = (1+\alpha)\sum_{k=0}^{100} \alpha^{2k}, b = \sum_{k=0}^{100} \alpha^{3k}$. If a and b are roots of quadratic equation then quadratic equation is

A. $x^2 + 101x + 100 = 0$

B. $x^2 + 102x + 101 = 0$

C. $x^2 - 102x + 101 = 0$

D. $x^2 - 101x + 100 = 0$

Answer: C

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11. The mirror image of the point (1,2,3) in plane is $\left(-\frac{7}{3}, -\frac{4}{3}, -\frac{1}{3}\right)$. Which of the following points lies on this plane ?

A. (1,-1,1)

B. (-1,-1,1)

C. (1,1,1)

D. (-1,-1,-1)

Answer: A

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12. The length of the perpendicular from the origin,on the normal to the curve, $x^2 + 2xy - 3y^2 = 0$ at the point $(2, 2)$ is

A. 2

B. $2\sqrt{2}$

C. $4\sqrt{2}$

D. $\sqrt{2}$

Answer: B

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13. Which of the following statements is a tautology?

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

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

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

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

Answer: D

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14. Let $I = \int_1^2 \frac{dx}{\sqrt{2x^3 - 9x^2 + 12x + 4}}$ then

A. $\frac{1}{6} < I^2 < \frac{1}{2}$

B. $\frac{1}{8} < I^2 < \frac{1}{4}$

C. $\frac{1}{9} < I^2 < \frac{1}{8}$

D. $\frac{1}{16} < I^2 < \frac{1}{9}$

Answer: C

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15. If $A = \begin{pmatrix} 2 & 2 \\ 9 & 4 \end{pmatrix}$ and $I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, then $10A^{-1}$ is equal to :

A. 6I-A

B. A-6I

C. 4I-A

D. A-4I

Answer: B

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16. The area (in sq. units) of the region $\{(x, y) \in R^2 : x^2 \leq y \leq 3 - 2x\}$, is :

A. $31/3$

B. $32/3$

C. $29/3$

D. $34/3$

Answer: B

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17. Let the set of all function $f: [0, 1] \to R$, which are containous on $[0, 1]$ and differentiable on $(0, 1)$. Then for every f in S, there exists a c $\in (0, 1)$ depending on f, such that :

A. $\frac{f(1)-f(c)}{1-c}=f'(c)$

B. $|f(c)-f(1)|<|f'(c)|$

C. $|f(c)+f(1)|<(1+c)|f'(c)|$

D. $|f(c)-f(1)|<(1-c)|f'(c)|$

Answer:

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18. The differential equation of the family of curves, $x^2=4b(y+b), b\in R,$ is :

A. xy''=y'

B. $x(y')^2 = x + 2yy'$

C. $x(y')^2 = x - 2yy'$

D. $x(y')^2 = 2yy' - x$

Answer: B

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19. The system of linear equations

$\lambda x + 2y + 2z = 5$

$2\lambda x + 3y + 5z = 8$

$4x + \lambda y + 6z = 10$ has :

A. no solution when λ=2

B. infinitely many solutions when $\lambda = 2$

C. no solution when $\lambda = 8$

D. infinite solution when $\lambda = -8$

Answer: A

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20. It the 10^{th} term of an A. P. is $\frac{1}{20}$ and its 20^{th} term is $\frac{1}{10}$, then the sum of its first 200 terms is :

A. $50\frac{1}{4}$

B. 100

C. 50

D. $100\frac{1}{2}$

Answer: d

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21. Let a line $y = mx(m > 0)$ intersect the parabola, $y^2 = 4x$ at a point P, other than the origin. Let the tangent to it at P meet the x-axis at the point Q. If area $(\Delta OPQ) = 8$ sq. units, then m is equal to _____ .

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22. Let f(x) be a polynomial of degree 3 such that f(-1) = 10, f(1) = -6, f(x) has a critical point at x = -1 and f'(x) has a critical point at x = 1. Then f(x) has a local minima at x = ____

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23.

$If \frac{\sqrt{\sin\alpha}}{\sqrt{1+\cos 2\alpha}} = \frac{1}{7}$ and $\sqrt{\frac{1-\cos 2\beta}{2}} = \frac{1}{\sqrt{10}}$

$\alpha, \beta \in \left(0, \frac{\pi}{2}\right)$ then $\tan(\alpha + 2\beta)$ is equal to

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24. The number of 4 letter words (with or without meaning) that can be formed from the

letter of the work EXAMINATION is

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25. $\sum_{n=1}^{7} \frac{n(n+1)(2n+1)}{4}$ is equal to

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