MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

MOCK TEST 5

Mcqs

1. On a multiple choice examination with three possible answers (out of which only one is correct) for each of the five questions, what is the probability that a candidate would get four or more correct answers just by guessing?

A. $\frac{3}{243}$

B. $\frac{1}{243}$

C. $\frac{25}{243}$

D. $\frac{11}{243}$

Answer: D

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2. The function $f(x) = \log\left(x + \sqrt{x^2 + 1}\right)$ is

A. an even function

B. an odd function

C. a periodic function

D. neither an even nor an odd function

Answer: B

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3. If f is a real valued function such that $f(x+y)=f(x)+f(y)$ and $f(1)=5$, then the value of f(100) is

A. 200

B. 300

C. 400

D. 500

Answer: D

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4. मान लीजिए दो पासों को फेंकने पर प्राप्त संख्याओं के योग को X से व्यक्त किया गया है। X का प्रसारण और मानक विचलन ज्ञात कीजिए।

A. $\frac{31}{6}$ and $\sqrt{\frac{31}{6}}$

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

C. $\frac{17}{6}$ and $\sqrt{\frac{17}{6}}$

D. None of these

Answer: B

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5. If y=f(x) passing through (1,2) satisfies are differential equation y(1+xy)dx-x dy=0, then

A. $f(x) = \frac{2x}{2 - x^2}$

B. $f(x) = \frac{x + 1}{x^2 + 1}$

C. $f(x) = \frac{x - 1}{4 - x^2}$

D. $f(x) = \frac{4x}{1 - 2x^2}$

Answer: A

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6. The sine and cosine curves intersect infinitely many times , bounding regions of equal areas . Sketch one of these regions and find its area .

A. $\sqrt{2}$ sq units

B. $2\sqrt{2}$ sq units

C. $3\sqrt{2}$ sq units

D. $4\sqrt{2}$ sq units

Answer: B

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7. If $A = \int_0^{\pi} \frac{\cos x}{(x+2)^2}\, dx$, then $\int_0^{\pi/2} \frac{\sin 2x}{x+1}\, dx$ is equal to

A. $A - \frac{1}{2} - \frac{1}{\pi+2}$

B. $\frac{1}{2} + \frac{1}{\pi+2} - A$

C. $\frac{1}{\pi+2} - A$

D. $1 + \frac{1}{\pi+2} - A$

Answer: B

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8. The equation of the circumcircle of the triangle formed by the lines x=0, y=0, 2x+3y=5, is

A. $6(x^2+y^2) + 5(3x-2y) = 0$

B. $x^2 + y^2 - 2x - 3y + 5 = 0$

C. $x^2 + y^2 + 2x - 3y - 5 = 0$

D. $6\left(x^2+y^2\right)-5(3x+2y)=0$

Answer: D

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9. $\int_{2-a}^{2+a} f(x)dxisequa < o[wheref(2-\alpha)=f(2+\alpha)\,\forall\alpha\in R]$

$2\int_2^{2+a} f(x)dx$ (b) $2\int_0^a f(x)dx$ $2\int_2^2 f(x)dx$ (d) none of these

A. $2\int_0^{2+a} f(x)dx$

B. $2\int_0^a f(x)dx$

C. $\int_0^2 f(x)dx$

D. None of these

Answer: A

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10. $\int \frac{(1+x)\sin x}{(x^2+2x)\cos^2 x-(1+x)\sin 2x}dx$

A. $\frac{1}{2}\log_e\left|\frac{\sin x-(x+1)\cos x-1}{\sin x-(x+1)\cos x+1}\right|+C$

B. $\frac{1}{2}\tan^{-1}\{\sin x-(x+1)\cos x\}+C$

C. $\frac{1}{2}\sin^{-1}\{\sin x-(x+1)\cos x\}+C$

D. $\frac{1}{2}\sin^{-1}(\cos x+\sin x)+C$

Answer: A

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11. $\int \frac{x\cos x+1}{\sqrt{2x^3e^{\sin x}+x^2}}dx$

A. $\log\left|\frac{\sqrt{2xe^{\sin x}+1}-1}{\sqrt{2xe^{\sin x}+1}+1}\right)+C$

B. $\log\left|\frac{\sqrt{2xe^{\sin x}-1}+1}{\sqrt{2xe^{\sin x}+1}+1}\right|+C$

C. $\log\left|\frac{\sqrt{2xe^{\sin x}+1}+1}{\sqrt{2xe^{\sin x}-1}+1}\right\}+C$

D. $\log\left|\frac{\sqrt{2xe^{\sin x}+1}+1}{\sqrt{2xe^{\sin x}-1}-1}\right|+C$

Answer: A

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12. in $[0, 1]$, lagrange mean value theorem is NOT applicable to

A. $f(x)=\begin{cases}\frac{1}{2}-x, & x<\frac{1}{2}\\ \left(\frac{1}{2}-x\right)^2, & x\geq\frac{1}{2}\end{cases}$

B. $f(x)=\begin{cases}\frac{\sin x}{x}, & x\neq 0\\ 1, & x=0\end{cases}$

C. $f(x)=x|x|$

D. $f(x)=|x|$

Answer: A

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13. The point in the interval $(0, 2\pi)$ where $f(X) = e^x$ sinx has maximum slope is

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

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

C. π

D. $\frac{\pi}{6}$

Answer: B

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14. If $f(x) = |x|$, then $f'(x)$, where $x \neq 0$ is equal to

A. -1

B. 0

C. 1

D. $\frac{|x|}{x}$

Answer: D

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15. If $y = \tan^{-1}\sqrt{\left(\frac{1+\sin x}{1-\sin x}\right)}, \frac{\pi}{2} < x < \pi,$ then $\frac{dy}{dx}$ equals to

A. $-1/2$

B. -1

C. $1/2$

D. 1

Answer: A

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16. The function `f(x)=|x-1|+|x-2| is

A. continuous and differentiable everywhere

B. continuous at x=1,2, but differentiable anywhere

C. continuous everywhere, but not differentiable at x=1,2

D. None of the above

Answer: C

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17. If $x = 2\cos t - \cos 2t, y = 2\sin t - \sin 2t$, find $\frac{d^2y}{dx^2}$ at $t = \frac{\pi}{2}$.

A. $-5/2$

B. $-3/2$

C. $3/2$

D. $5/2$

Answer: B

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18. Anil wants to invest at the most Rs.12000 in bonds. A and B. According to rules, he has to invest at least Rs.2000 in Bond A is 8% per annum and on Bond B, it is 10% per annum, how should he invest his money for maximum interest ? Solve the problem graphically.

A. Rs 1000 and Rs 2000

B. Rs 2000 and 10000

C. Rs 6000 and Rs 6000

D. None of these

Answer: B

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19. $\sim(p \leftrightarrow q)$ is a

A. $\sim p \wedge \sim q$

B. $\sim p \vee \sim q$

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

D. None of these

Answer: C

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20. Three numbers are chosen from 1 to 20. Find the probability that they are consecutive.

A. $\frac{1}{190}$

B. $\frac{1}{120}$

C. $\frac{3}{190}$

D. $\frac{5}{190}$

Answer: C

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21. The chance of defective screws in three boxes $A, B, Care1/5, 1/6, 1/7,$ respectively. A box is selected at random and a screw draw in from it at random is found to be defective. Then find the probability that it came from box A.

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

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

C. $\frac{27}{59}$

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

Answer: D

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22. Find the perpendicular distasnce of the point (1,0,0) from the lines (x-1)/2=(y+1)/(-3)=(z+10)/8`

A. $(5, -8, -4)$

B. $(3, -4, 2)$

C. $(5, -4, -8)$

D. $(3, 4, -2)$

Answer: A

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23. The equation of the plane through (3,1,-3) and (1,-2,2) are parallel to the line with direction ratios 1,1,-2 is

A. x-y+z+1=0

B. x+y-z+1=0

C. x-y-z-1=0

D. x+y+z-1=0

Answer: D

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24. The projection of the line segment joining (2,5,6) and (3,2,7) on the line with direction rations 2,1,-2 is

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

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

C. 2

D. 1

Answer: D

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25. If the sum of the slopes of the lines given by $4x^2 + 2\lambda xy - 7y^2 = 4$ is equal to the product of the slopes,then λ is equal to?

A. -4

B. 4

C. -2

D. 2

Answer: C

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26. A plane passes through the point (1,-2,3) and is parallel to the plane $2x - 2y + z = 0$. The distance of the point (-1,2,0) from the plane, is

A. 2

B. 3

C. 4

D. 5

Answer: D

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27. let a,b, and c be three unit vectors such that a is perpendicular to the plane off b and c. if the angle betweenn b annd c is $\frac{\pi}{3}$, then $|a \times b - a \times c|$ is equal to

A. $1/3$

B. $1/2$

C. 1

D. 2

Answer: C

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28. If the lines represented by $x^2 - 2pxy - y^2 = 0$ are rotated abouu the origin through ann angle θ, one clockwise direction and

other in anti-clockwise direction, then the equationn of the bisectors of the angle between the lines in the new position is

A. $px^2 + 2xy - py^2 = 0$

B. $px^2 + 2xy + py^2 = 0$

C. $x^2 - 2pxy + y^2 = 0$

D. None of these

Answer: A

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29. The number of solutions of the equation $x^3 + x^2 + 4x + 2\sin x = 0$ in $0 \leq x \leq 2\pi$ is

A. zero

B. one

C. two

D. four

Answer: B

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30. The sum of the infinte series $\sin^{-1}\left(\frac{1}{\sqrt{2}}\right)+\sin^{-1}\left(\frac{\sqrt{2}-1}{\sqrt{6}}\right)+....\sin^{-1}\left(\frac{\sqrt{n}-\sqrt{n-1}}{\sqrt{n(n+1)}}\right)$

A. $\frac{\pi}{8}$

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

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

D. π

Answer: C

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31. The area Δ of a triangle ABC is given by $\Delta = a^2 - (b-c)^2$ then $\tan\left(\frac{A}{2}\right) =$

A. -1

B. 0

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

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

Answer: C

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32. Which of the following statements is a tautology?

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

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

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

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

Answer: D

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33. The value of $\frac{\cot 54^\circ}{\tan 36^\circ} + \frac{\tan 20^\circ}{\cot 70^\circ}$ is

A. 0

B. 2

C. 3

D. 1

Answer: B

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34. With $1, \omega, \omega^2$ as cube roots of unity, inverse of which of the following matrices exists?

A. $\begin{bmatrix} 1 & \omega \\ \omega & \omega^2 \end{bmatrix}$

B. $\begin{bmatrix} \omega^2 & 1 \\ 1 & \omega \end{bmatrix}$

C. $\begin{bmatrix} \omega & \omega^2 \\ \omega^2 & 1 \end{bmatrix}$

D. None of these

Answer: D

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35. The value of a for which $ax^2 + \sin^{-1}(x^2 - 2x + 2) + \cos^{-1}(x^2 - 2x + 2) = 1$ has a real solution is $\frac{\pi}{2}$ (b) $-\frac{\pi}{2}$ (c) $\frac{2}{\pi}$ (d) $-\frac{2}{\pi}$

A. $-\frac{2}{\pi}$

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

C. $-\frac{\pi}{2}$

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

Answer: C

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36. Which of the following is logically equivalent to $\sim(\sim p \rightarrow q)$?

A. $p \wedge q$

B. $p \wedge \sim q$

C. $\sim p \wedge q$

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

Answer: D

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37. The matrices

$P[(u_1, v_1, w_1), (u_2, v_2, w_2), (u_3, v_3 w_3)]$ and $Q = \frac{1}{9}\begin{bmatrix} 2 & 2 & 1 \\ 12 & -5 & m \\ -8 & 1 & 5 \end{bmatrix}$

are such that PQ=I, an identify matrix. Solving the equation $\begin{bmatrix} u_1 & v_1 & w_1 \\ u_2 & v_2 & w_2 \\ u_3 & v_3 & w_3 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 5 \end{bmatrix}$, the value of y comes out to be -3, then the value of m is equal to

A. 27

B. 7

C. -27

D. -7

Answer: D

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38. If A_1 and A_2 are two A.M.s between a and b and G_1 and G_2 are two G.M.s between the same numbers then what is the value of $\frac{A_1 + A_2}{G_1 G_2}$

A. $\frac{a+b}{2ab}$

B. $\frac{2ab}{a+b}$

C. $\frac{a+b}{ab}$

D. $\frac{a+b}{\sqrt{ab}}$

Answer: C

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39. The equation of the pair of lines passing through the origin and having slope $m \in l$ for which equation $(x-3)(x+m)+1=0$ has integral roots is

A. $y^2-6xy+5x^2=0$

B. $y^2+6xy-5x^2=0$

C. $y^2+6xy+5x^2=0$

D. $y^2-6xy-5x^2=0$

Answer: C

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40. Q. the sum of the infinite series $1+\frac{2}{3}\cdot\frac{1}{2}+\frac{2}{3}\cdot\frac{5}{6}\cdot\frac{1}{2^2}+\frac{2}{3}\cdot\frac{5}{6}\cdot\frac{8}{9}\cdot\frac{1}{2^3}+\ldots.$, is

A. $2^{1/3}$

B. $4^{1/3}$

C. $8^{1/3}$

D. $2^{1/5}$

Answer: B

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41. Write the vectorthe vector equation of the line passing through $(1, 2, 3)$ and perpendicular to the plane $\vec{r}.\left(\hat{i}+2\hat{j}-5\hat{k}\right)+9=0.$

A. $r=\left(\hat{i}+2\hat{j}+3\hat{k}\right)+\lambda\left(\hat{i}+2\hat{j}-5\hat{k}\right)$

B. $r=\left(\hat{i}+2\hat{j}-5\hat{k}\right)+\lambda\left(\hat{i}+2\hat{j}+3\hat{k}\right)$

C. $r=\left(\hat{i}+2\hat{j}+3\hat{k}\right)+\lambda\left(-8\hat{k}\right)$

D. None of the above

Answer: A

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42. if $2^x + 2^y = 2^{x+y}$ then the value of $\frac{dy}{dx}$ at $x = y = 1$

A. 0

B. -1

C. 1

D. 2

Answer: B

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43. If $f(x) = \sin^{-1}(\sin x) + \cos^{-1}(\sin x)$ and $\phi(x) = f(f(f(x)))$, then $\phi'(x)$ is equal to

A. 1

B. sin x

C. 0

D. 2

Answer: C

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44. If $5f(x) + 3f\left(\frac{1}{x}\right) = x + 2$ and $y = xf(x)$, then find $\frac{dy}{dx}$ at $x = 1$.

A. 14

B. $7/8$

C. 1

D. 15

Answer: B

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45. A variable straight line is drawn through the point of intersection of the straight lines $\frac{x}{a}+\frac{y}{b}=1$ and $\frac{x}{b}+\frac{y}{a}=1$ and meets the coordinate axes at A and B. Show that the locus of the midpoint of AB is the curve $2xy(a+b)=ab(x+y)$

A. 2xy (a+b)=ab(x+y)

B. 2xy(a-b)=ab(x-y)

C. 2xy(a+b)=ab(x-y)

D. None of the above

Answer: A

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46. In what ratio, the line joining $+(-1, 1) and (5, 7)$ is divided by the line $x + y = 4$?

A. $2:1$

B. $1:2$

C. $1:2$ externally

D. None of the above

Answer: C

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47. If $0 < a < \pi$ then $\int \frac{dx}{1 - 2a\cos 2x + a^2}$ is equal to

A. $\frac{1}{1-a^2}\tan^{-1}\left(t \cdot \frac{1-a}{a+a}\right) + C$

B. $\frac{2}{1-a^2}\tan^{-1}\left(t \cdot \frac{1+a}{1-a}\right) + C$

C. $\frac{1}{1+a^2}\tan^{-1}(t) + C$

D. None of these

Answer:

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48. $\int \frac{\cos ec^2 x - 2005}{\cos^{2005} x} . dx$

A. $\frac{\cot x}{(\cos x)^{2005}} + C$

B. $\frac{\tan x}{(\cos x)^{2005}} + C$

C. $-\frac{\tan x}{(\cos x)^{2005}} + C$

D. $\frac{-\cot x}{(\cos x)^{2005}} + C$

Answer: D

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49. The degree of the differential equation satisfying the relation $\sqrt{1+x^2} + \sqrt{1+y^2} = \lambda\left(x\sqrt{1+y^2} - y\sqrt{1+x^2}\right)$ is

A. 1

B. 2

C. 3

D. 4

Answer: A

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50. Let X denote the number of hours you study during a randomly selected school day The probability that X can take the values x. has the following form, where k is some unknown constant. `P(X=x)= {0. 1 ,"""""if"""""x=0k x ,"""""if""x=1"""""or"""""2k(5-x)

A. 0.35

B. 0.3

C. 0.15

D. 0.2

Answer: C

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