MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

MOCK TEST 3

Mcqs

1. $(p \wedge \sim q) \wedge (\sim p \vee q)$ is

A. a contradiction

B. a tautology

C. Either (a) or (b)

D. Neigher (a) nor (b)

Answer: A

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2. If $\sin^{-1}x + \sin^{-1}y + \sin^{-1}z = \pi$, show that $x^4 + y^4 + z^4 + 4x^2y^2z^2 = 2\left(x^2y^2 + y^2z^2 + z^2x^2\right)$

A. 1

B. 2

C. 4

D. None of these

Answer: B

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3. if $y = \log x \cdot e^{(\tan x + x^2)}$, then $\frac{dy}{dx}$ is equal to

A. $e^{(\tan x + x^2)}\left[\frac{1}{x} + (\sec^2 x + x)\log x\right]$

B. $e^{(\tan x + x^2)}\left[\frac{1}{x} + (\sec^2 x - x)\log x\right]$

C. $e^{(\tan x + x^2)}\left[\frac{1}{x}(\sec^2 x + 2x)\log x\right]$

D. $e^{(\tan x + x^2)}\left[\frac{1}{x} + (\sec^2 x - 2x)\log x\right]$

Answer: C

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4. If $y = (\log)_{\sin x}(\tan x)$, then $\left(\left(\frac{dy}{dx}\right)\right)_{\pi/4}$ is equal to.....

A. $\frac{4}{\log 2}$

B. $-\frac{4}{\log 2}$

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

D. 1

Answer: B

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5. Suppose a circle passes through (2,2) and (9,9) and touches the X-axis at P. if O is the origin, then OP is

A. 4

B. 5

C. 6

D. 9

Answer: C

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6. If $\int \frac{f(x)}{\log \sin x} dx = \log \cdot \log \sin x,$ then f(x) is equal to

A. sin x

B. cos x

C. log sin x

D. cot x

Answer: B

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7. The number of solutions of the equation $2\left(\sin^4 2x + \cos^4 2x\right) + 3\sin^2 x \cos^2 x = 0$ is

A. 0

B. 1

C. 2

D. 3

Answer: A

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8. The angle between the pair of straight lines formed by joining the points of intersection of $x^2 + y^2 = 4$ and $y = 3x + c$ to the origin is a right angle. Then c^2 is equal to

A. 20

B. 13

C. $1/5$

D. 5

Answer: A

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9. If a,b,c are vectors such that $a \cdot b = 0$ and $a + b = c$

A. $|a|^2 + |b|^2 = |c|^2$

B. $|a|^2 = |b|^2 + |c|^2$

C. $|b|^2 = |a|^2 + |c|^2$

D. None of these

Answer: A

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10. Find the equation of the circle with centre $(2, 2)$ and passing through the point $(4, 5)$.

A. $x^2 + y^2 + 4x + 4y - 5 = 0$

B. $x^2 + y^2 - 4x - 4y - 5 = 0$

C. $x^2 + y^2 - 4x = 13$

D. $x^2 + y^2 - 4x + 5 = 0$

Answer: D

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11. The direction cosines of the line drawn from $P(-5, 3, 1)$ to Q(1,5,-2) is

A. $(6, -2, -3)$

B. $(2, -4, 1)$

C. $(-4, 8, -1)$

D. $\left(\frac{6}{7}, \frac{2}{7}, -\frac{3}{7}\right)$

Answer: D

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12. The maximum value of Z =x +3y such that $2x + y \leq 20, x + 2y \leq 20, x \geq 0, y \geq 0$ is

A. 10

B. 60

C. 30

D. None of these

Answer: C

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13. Solution of the differential equation $\frac{dy}{dx} = \frac{y(x - y\ln y)}{x(x\ln x - y)}$ is

A. $\frac{\mathrm{x}\ln\mathrm{x} + \mathrm{y}\ln\mathrm{y}}{xy} = C$

B. $\frac{x\ln x - y\ln y}{xy} = C$

C. $\frac{\ln x}{x} + \frac{\ln y}{y} = C$

D. $\frac{\ln x}{x} - \frac{\ln y}{y} = C$

Answer: A

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14. IF the mean and S.D. of binomial distribution are 20 and 4 respectively. Than the number of trials , is

A. 50

B. 25

C. 100

D. 80

Answer: B

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15. The vertices of a triangle are $A(-1, -7), B(5, 1)$ and $C(1, 4)$. The equation of the bisector of the angle ABC

A. a+7y-2=0

B. x-7y-2=0

C. x-7y+2=0

D. None of these

Answer: C

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16. Let $A = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$ .If $A^6 = kA - 205I$ then then numerical quantity of $k - 40$ should be

A. K=11

B. K=22

C. K=33

D. K=44

Answer: D

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17. if $\sqrt{x^2+y^2}=ae^{\tan^{-1}\left(\frac{y}{x}\right)}, a>0, (y(0)>0)$ then $y(0)$ equals

A. $\frac{2}{a}e^{-\pi/2}$

B. $-\frac{2}{a}e^{\pi/2}$

C. $-\frac{2}{a}e^{-\pi/2}$

D. e

Answer: C

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18. $\int(\cos 2\theta).\log\left(\frac{\cos\theta+\sin\theta}{\cos\theta-\sin\theta}\right)d\theta$ is equal to

A. $(\cos\theta-\sin\theta)^2\log\left(\frac{\cos\theta+\sin\theta}{\cos\theta-\sin\theta}\right)+C$

B. $(\cos\theta+\sin\theta)^2\log\left(\frac{\cos\theta+\sin\theta}{\cos\theta-\sin\theta}\right)+C$

C. $\frac{(\cos\theta-\sin\theta)^2}{2}\log\left(\frac{\cos\theta-\sin\theta}{\cos\theta+\sin\theta}\right)+C$

D. $\frac{1}{2}\sin 2\theta\log\tan\left(\frac{\pi}{4}+\theta\right)-\frac{1}{2}\log\sec 2\theta+C$

Answer: D

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19. $\int_{\pi/2}^{\pi/2}\frac{\cos x}{1+e^x}dx$ is equal to

A. 1

B. 0

C. -1

D. None of these

Answer: A

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20. Two of the straight lines given by $3x^3 + 3x^2y - 3xy^2 + dy^3 = 0$ are at right angles, if

A. $d = -1/3$

B. $d = 1/3$

C. $d = -3$

D. $d = 3$

Answer: D

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21. 18. The straight lines joining the origin to the points of intersection of the line $4x + 3y = 24$ with the curve $(x-3)^2 + (y-4)^2 = 25$:

A. are coincident

B. are perpendicular

C. make equal angle with X-axis

D. None of the above

Answer: B

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22. The lines $\frac{x+1}{1} = \frac{y-1}{2} = \frac{z-2}{1}, \frac{x-1}{2} = \frac{y}{1} = \frac{z+1}{4}$ are

A. parallel lines

B. intersecting lines

C. skew lines

D. none of the above

Answer: C

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23. The slope of the tangent to a curve $y = f(x)$ at $(x, f(x))$ is $2x + 1$. If the curve passes through the point $(1, 2)$ then the area of the region bounded by the curve, the x-axis and the line $x = 1$ is (A) $\frac{5}{6}$ (B) $\frac{6}{5}$ (C) $\frac{1}{6}$ (D) 1

A. $\frac{5}{6}$ sq unit

B. $\frac{6}{5}$ sq unit

C. $\frac{1}{6}$ sq unit

D. 6 sq unit

Answer: A

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24. The solution of the differential equation $\{y(1+x^{-1})+\sin y\}dx+(x+\ln x\times x\cos y)dy=0$ is

A. $x+y\ln x+y\sin x=C$

B. $x-y+y\sin x=C$

C. $x+\ln x+y\ln y=C$

D. None of these

Answer: D

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25. if $p \Rightarrow (q \wedge r)$ is false, then the truth values of p, q and r are respectively

A. F,T and T

B. T,T and F

C. T,F and F

D. F,F and F

Answer: C

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26. Find the value of expression $\frac{1}{\cos 290^\circ} + \frac{1}{\sqrt{3}\sin 250^\circ}$

A. $\frac{\sqrt{3}}{4}$

B. $\frac{4}{\sqrt{3}}$

C. $\frac{2}{\sqrt{3}}$

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

Answer: B

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27. If I_n is the identity matrix of order n then $(I_n)^{-1} =$

A. does not exist

B. l_n

C. 0

D. nl_n

Answer: B

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28. The value of

$\tan^2\left(\sec^{-1}2\right) + \cot^2\left(\cos ec^{-1}3\right)$ is

A. 13

B. 15

C. 11

D. None of these

Answer: C

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29. If in ΔABC, $\tan. \frac{A}{2} = \frac{5}{6} = \frac{2}{5}$, then prove that a, b, and c are in A.P.

A. a,c,b are in AP

B. a,b,c are in AP

C. b,a,c are in AP

D. a,b,c are in GP

Answer: B

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30. If one of the lines of the pair $ax^2 + 2hxy + by^2 = 0$ bisects the angle between positive direction of the axes, then a, b and h

satisfy the relation.

A. a+b=2|h|

B. a+b=-2h

C. a-b=2|h|

D. $(a-b)^2 = 4h^2$

Answer: B

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31. The values of θ in $\left(0, \frac{\pi}{2}\right)$ satisfying

A. $\begin{vmatrix} 1+\sin^2\theta & \cos^2\theta & 4\sin 4\theta \\ \sin^2\theta & 1+\cos^2\theta & 4\sin 4\theta \\ \sin^2\theta & \cos^2\theta & 1+4\sin 4\theta \end{vmatrix} = 0$, are

B. $\frac{7\pi}{24}$

C. $\frac{5\pi}{24}$

D. $\frac{13\pi}{24}$

Answer: A

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32. If A,B,C,D are (2,3,-1),(3,5,-3),(1,2,3),(3,5,7) respectively, then the angel between AB and CD, is

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. $\pi/6$

Answer: A

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33. If $\sin A + \cos B = a$ and $\sin B + \cos A = b$ then $\sin(A + B) =$

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

B. $\frac{a^2 - b^2 + 2}{2}$

C. $\frac{a^2 + b^2 - 2}{2}$

D. none of these

Answer: C

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34. The value of $f(0)$, so that the function $f(x) = \frac{\sqrt{a^2 - ax + x^2} - \sqrt{a^2 + ax + x^2}}{\sqrt{a + x} - \sqrt{a - x}}$ becomes continuous for all x, given by $a^{\frac{3}{2}}$ (b) $a^{\frac{1}{2}}$ (c) $-a^{\frac{1}{2}}$ (d) $-a^{\frac{3}{2}}$

A. $a\sqrt{a}$

B. $\sqrt{a}$

C. $-\sqrt{a}$

D. $-a\sqrt{a}$

Answer: C

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35. In a class, there are 10 boys and 8 girls. When 3 students are selected at random, the probability that 2 girls and 1 boy are selected, is

A. $\frac{35}{102}$

B. $\frac{15}{102}$

C. $\frac{55}{102}$

D. $\frac{25}{102}$

Answer: A

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36. The value of f(0), so that the function

$f(x) = \frac{1 - \cos(1 - \cos x)}{x^4}$ is continuous everywhere is

A. $1/8$

B. $1/2$

C. $1/4$

D. $2/3$

Answer: A

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37. If $y = \sin x$ and $u = \cos x$, then $\frac{dy}{du}$ is equal to

A. $-\operatorname{cosec} x \cdot \cos x$

B. $\frac{\pi}{180}$cosec x.cosx

C. $-\frac{\pi}{180}\operatorname{cosex} \cdot \cos x$

D. None of the above

Answer: C

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38. If the line joining the points $(0, 3) and (5, -2)$ is a tangent to the curve $y = \frac{C}{x+1}$, then the value of c is 1 (b) -2 (c) 4 (d) none of these

A. 1

B. -2

C. 4

D. 5

Answer: C

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39. Evaluate the following integrals:

$$\int e^{2x}\left(\frac{1+\sin 2x}{1+\cos 2x}\right)dx$$

A. $-\frac{1}{a}e^{2ax}\cos\left(\frac{\pi}{4}+ax\right)+C$

B. $-\frac{1}{2a}e^{2ax}\cot\left(\frac{\pi}{4}+ax\right)+C$

C. $-\frac{1}{2a}e^{2ax}\cos\left(\frac{\pi}{4}+ax\right)+C$

D. $-\frac{1}{a}e^{2ax}\operatorname{cosec}\left(\frac{\pi}{4}+ax\right)+C$

Answer: B

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40. If a particle is moving the velocity v(t)=cos πt, along a straight line such that at t=0, s=4, its position function is given by

A. $\frac{1}{\pi}\cos\pi t+2$

B. $-\frac{1}{\pi}\sin\pi t+4$

C. $\frac{1}{\pi}\sin\pi t+4$

D. none of these

Answer: C

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41. If $g(1) = g(2)$, then $\int_1^2 [f\{g(x)\}]^{-1} f'\{g(x)\}g'(x)dx$ is equal to

A. 1

B. 2

C. 0

D. 3

Answer: C

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42. If X and Y are two non-empty sets where $f: X \to Y$,is function is defined such that $f(c) = \{f(x): x \in C\}$ for

$C \subseteq X$ and $f^{-1}(D) = \{x : f(x) \in D\}$ for $D \subseteq Y$,for any $A \subseteq Y$ and $B \subseteq Y$, then

A. $f^{-1}\{f(A)\} = A$ only if $A \subset X$

B. $f^{-1}\{f(A)\} = A$ only if $f(X) = Y$

C. $f\{f^{-1}(B)\} = B$ only if $B \subseteq f(X)$

D. $f\{f^{-1}(B)\} = B$

Answer: A

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43. Let X be a random variable which assumes values x_1, x_2, x_3, x_4 such that $2P(X = x_1) = 3P(X = x_2) = P(X = x_3) = 5P(X = x_4)$.

Find the probability distribution of X.

A. $X: x_1 x_2 x_3 x_4,\ P(X): \frac{5}{16}\ \frac{4}{16}\ \frac{2}{16}\ \frac{6}{16}$

B. $X: x_1 x_2 x_3 x_4,\ P(X): \frac{3}{14}\ \frac{4}{14}\ \frac{7}{14}\ \frac{1}{14}$

C. $X: x_1 x_2 x_3 x_4,\ P(X): \frac{10}{31}\ \frac{15}{31}\ \frac{5}{31}\ \frac{2}{31}$

D.

Answer: A

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44. The solution of $\frac{dy}{dx} + x = xe^{(n-1)y}$

A. $\frac{1}{n-1}\log\left[\frac{e^{(n-1)y}-1}{e^{(-1)y}}\right] = \frac{x^2}{2} + C$

B. $e^{(n-1)y} = Ce^{(n-1)y+(n-1)x^2/2} + 1$

C. $\log\left[\frac{e^{(n-1)y}-1}{(n-1)e^{(n-1)y}}\right] = x^2 + C$

D. $e^{(n-1)y} = Ce^{(n-1)x^2/2+x} + 1$

Answer: B

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45. Let X denote the number of times heads occur in n tosses of a fair coin. If $P(X=4),\ P(X=5)\ and\ P(X=6)$ are in AP; the value of n is $7, 14$ b. $10, 14$ c. $12, 7$ d. $14, 12$

A. 7, 14

B. 10, 14

C. 12, 7

D. 14,12

Answer: A

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46. If the mean and the variance of a binomial variable X are 2 and 1 respectively, then the probability that X takes a value greater than one is equal to:

A. $2/3$

B. $4/5$

C. $7/8$

D. $15/16$

Answer: D

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47. If m is the slope of the tangent to the curve $e^y = 1 + x^2$, then

A. $|m| > 1$

B. $m < 1$

C. $|m| < 1$

D. $|m| \leq 1$

Answer: D

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48. The differential equation of all circles passing through the origin and having their centres on the x-axis is (1) $x^2 = y^2 + xy\frac{dy}{dx}$ (2) $x^2 = y^2 + 3xy\frac{dy}{dx}$ (3) $y^2 = x^2 + 2xy\frac{dy}{dx}$ (4) $y^2 = x^2 - 2xy\frac{dy}{dx}$

A. $x^2 = y^2 + xyy'$

B. $x^2 = y^2 + 3xyy'$

C. $y^2 = x^2 + 2xyy'$

D. $y^2 = x^2 - 2xyy'$

Answer: C

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49. If $a_1, a_2, a_3, , a_n$ are in A.P., where $a_i > 0$ for all i , show that

$$\frac{1}{\sqrt{a_1}+\sqrt{a_2}} + \frac{1}{\sqrt{a_1}+\sqrt{a_3}} + + \frac{1}{\sqrt{a_{n-1}}+\sqrt{a_n}} = \frac{n-1}{\sqrt{a_1}+\sqrt{a_n}}.$$

A. $\frac{n^2(n+1)}{2}$

B. $\frac{n-1}{\sqrt{a_1}+\sqrt{a_n}}$

C. $\frac{n(n-1)}{2}$

D. None of the above

Answer: B

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50. If a square matrix A is such that $\mathrm{AA}^T = l = A^T A$, then $|A|$ is equal to

A. 0

B. ± 1

C. ± 2

D. None of these

Answer: B

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