MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

MOCK TEST 1

Mcqs

1. If $p \to (q \wedge r)$ is false, then the truth values of p,q and r are respectively

A. T,F and F

B. F,F and F

C. F, T and T

D. T,T and F

Answer: A

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2. Solve the following equations for X and Y :

$$2X - Y = \begin{bmatrix} 3 & -3 & 0 \\ 3 & 3 & 2 \end{bmatrix}, 2Y + X = \begin{bmatrix} 4 & 1 & 5 \\ -1 & 4 & -4 \end{bmatrix}$$

A. $x + y = \begin{bmatrix} 3 & 0 & -1 \\ 0 & 3 & -2 \end{bmatrix}$

B. $x = \begin{bmatrix} 2 & -1 & 1 \\ 1 & 2 & 0 \end{bmatrix}$

C. $x - y = \begin{bmatrix} 1 & -2 & 3 \\ 2 & 1 & 2 \end{bmatrix}$

D. $y = \begin{bmatrix} 1 & 1 & -2 \\ -1 & 1 & -2 \end{bmatrix}$

Answer: B

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3. The complete solution of the equation $7\cos^2 x + \sin x \cos x - 3 = 0$ is given by

A. $n\pi + \frac{\pi}{2}(n \in l)$

B. $n\pi - \frac{\pi}{4}(n \in l)$

C. $n\pi + \tan^{-1}\left(\frac{4}{3}\right)(n \in l)$

D. $n\pi + \frac{3\pi}{4}, k\pi + \tan^{-1}\left(\frac{4}{3}\right)(k, n \in l)$

Answer: D

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4. If $x + \frac{1}{x} = 2$, the principal value of $\sin^{-1} x$ is

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

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

C. π

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

Answer: B

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5. If the coordinate axes are the bisectors of the angles between the pair of lines $ax^2 + 2hxy + by^2 = 0$, then

A. $a = b$

B. $h = 0$

C. $a^2 + b = 0$

D. $a + b^2 = 0$

Answer: B

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6. Let a,b and c be three unit vectors such that $3a + 4b + 5c = 0.$

Then which of the following statements is true?

A. a is parallel to b

B. a is perpendicular to b

C. a is neither parallel nor perpendicular to b

D. none of these

Answer: D

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7. If $f(x) = \begin{cases} 1 & \text{x is rational} \\ 2 & \text{x is irrational} \end{cases}$ then

A. f(x) is continuous in R~l

B. f(x) is continuous in R~Q

C. f(x) is continuous in R but not differentiable in R

D. f(x) is neither continuous nor differentiable in R

Answer: D

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8. If $y=\sqrt{(a-x)(x-b)}-(a-b)\tan^{-1}\left(\frac{\sqrt{a-x}}{\sqrt{x-b}}\right)$ then $\frac{dy}{dx}=$

A. $\sqrt{(a-x)(x-b)}$

B. $\frac{1}{\sqrt{(a-x)(x-b)}}$

C. $\sqrt{\left(\frac{a-x}{x-b}\right)}$

D. $\sqrt{\left(\frac{x-b}{a-x}\right)}$

Answer: C

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9. If $y^2 = ax^2 + bx + c$, then $y^3 \frac{d^2y}{dx^2}$ is (a) a constant (b) a function of x only (c) a function of y only (d) a function of x and y

A. a constant

B. a function of x only

C. a function of y only

D. a function of x and y

Answer: A

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10. The equation of the tangent to the curve $y = 1 - e^{x/2}$ at the tangent to the curve $y = 1 - e^{x/2}$ at the point of intersection with the y-axis, is

A. $x + 2y = 0$

B. $2x + y = 0$

C. $x - y = 2$

D. None of these

Answer: A

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11. If $\int f(x) \cdot \cos x dx = \frac{1}{2}\{f(x)\}^2 + c$, then $f(0) =$ (A) 1 (B) 0 (C) -1 (D) none of these

A. x+C

B. sin x+C

C. cos x+C

D. C

Answer: B

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12. If t_1, t_2 and t_3 are distinct, the points $(t_1 2at_1 + at_1^3)$, $(t_2, 2\text{at}_2 + at_2^3)$ and $(t_3, 2at_3 + at_3^3)$

A. $t_1t_2t_3 = 1$

B. $t_1 + t_2 + t_3 = t_1t_2t_3$

C. $t_1 + t_2 + t_3 = 0$

D. $t_1 + t_2 + t_3 = 1$

Answer: C

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13. Solution of the differential equation $\left(\frac{x+y-1}{x+y-2}\right)\frac{dy}{dx} = \left(\frac{x+y+1}{x+y+1}\right)$, given that y = 1 when x = 1, is

A. $\ln\left|\frac{(x-y)^2 - 2}{2}\right| = 2(x+y)$

B. $\ln\left|\frac{(x+y)^2-2}{2}\right| = 2(x-y)$

C. $\ln\left|\frac{(x-y)^2+2}{2}\right| = 2(x+y)$

D. $\ln\left|\frac{(x+y)^2+2}{2}\right| = 2(x-y)$

Answer: B

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14. Find the coordinates of a point on the $\frac{x-1}{2} = \frac{y+1}{-3} = z$ atg a distance $4\sqrt{14}$ from the point $(1, -1, 0)\cdot$

A. (9,-13,4)

B. $\left(8\sqrt{14}, -12, -1\right)$

C. $\left(-8\sqrt{14}, 12, 1\right)$

D. $(-7, 11, -4)$

Answer: D

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15. By graphical method, the solutions of linear programming problem maximise $Z = 3x_1 + 5x_2$ subject to constraints $3x_1 + 2x_2 \leq 18$, $x_1 \leq 4$, $x_2 \leq 6x_1 \geq 0$, $x_2 \geq 0$ are

A. $x_1 = 2, x_2 = 0, Z = 6$

B. $x_1 = 2, x_2 = 6, Z = 36$

C. $x_1 = 4, x_2 = 3, Z = 27$

D. $x_1 = 4, x_2 = 6, Z = 42$

Answer: B

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16. $(p \wedge \text{~}q) \wedge (\text{~}p \vee q)$ is

A. a tautology

B. a contradication

C. Both a tautology and a contradiction

D. Neigher a tautology nor a contradiction

Answer: B

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17. 26, The distance between the lines 3x + 4y = 9 and 6x + 8y + 15-0 is 3

10 10 (d) none of these

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

B. $\frac{2}{9}$

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

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

Answer: A

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18. In $\Delta ABC\ 2a^2+4b^2+c^2=2ab+2ac$ then numerical value of $\cos B$ is

A. 0

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

C. $\frac{5}{8}$

D. $\frac{7}{8}$

Answer: D

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19. For real x, if $f(x)=x^3+5x+1$, then

A. f is one-one but not onto R

B. f is onto R but not one-one

C. f is one-one and onto R

D. f is neither one-one nor onto R

Answer: C

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20. If $x = \sec\theta - \cos\theta, y = \sec^{10}\theta - \cos^{10}\theta$ and $(x^2 + 4)\left(\frac{dy}{dx}\right)^2 = k(y^2 + 4)$. Then k is equal to

A. $\frac{1}{100}$

B. 1

C. 10

D. 100

Answer: D

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21. If the lines joining the focii of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, where $a>b$ and an extermity of its minor axis are inclined at an angle 60°, then the eccentricity of the ellipse is

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

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

C. $\frac{\sqrt{5}}{2}$

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

Answer: B

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22. If $\int(\sin 2x-\cos 2x)dx=\frac{1}{\sqrt{2}}\sin(2x-a)+b$ then

A. $a=\frac{5\pi}{4}, b\in R$

B. $a = -\frac{5\pi}{4}, b \in R$

C. $a = \frac{\pi}{4}, b \in R$

D. none of these

Answer: B

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23. Value of $\int_2^3 \frac{dx}{\sqrt{(a + x^3)}}$ is

A. less than 1

B. greater than 2

C. lies between 3 and 4

D. none of these

Answer: A

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24. If X follows a binomial distribution with parameters $n = 8$ and $p = 1/2$, then $p(|X - 4| \leq 2)$ equals

A. $\frac{118}{128}$

B. $\frac{119}{128}$

C. $\frac{117}{128}$

D. none of these

Answer: B

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25. A fair die is tossed eight times. The probability that a third six is observed in eight throw is $\frac{{}^7C_{10} \times 5^7}{6^7}$ b. $\frac{{}^7C_2 \times 5^2}{6^8}$ c. $\frac{{}^7C_2 \times 5^5}{6^6}$ d. none of these

A. $\frac{.^7 C_2 \times 5^5}{6^7}$

B. $\frac{.^7 C_2 \times 5^5}{6^8}$

C. $\frac{.^7 C_2 \times 5^5}{6^6}$

D. none of these

Answer: B

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26. Box A contains 2 black and 3 red balls while box B contains 3 black and 4 red balls. Out of the setwo boxes one is selected at random and the probability of choosing box A is double that of box B. If a red ball is drawn from the selected box, then the probability that it has come from box B is

A. $\frac{21}{41}$

B. $\frac{10}{31}$

C. $\frac{12}{31}$

D. $\frac{13}{41}$

Answer: B

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27. Find the value of the expression

$$3\left[\sin^4\left(\frac{3\pi}{2}-\alpha\right)+\sin^4(3\pi+\alpha)\right]-2\left[\sin^6\left(\frac{\pi}{2}+\alpha\right)+\sin^6(5\pi-\alpha)\right]$$

.

A. 0

B. 1

C. 3

D. $\sin 4\alpha+\sin 6\alpha$

Answer: B

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28. If

$\alpha, \beta > 0$ and $\alpha <$ and $ax^2 + 4\gamma xy + \beta y^2 + 4p(x + y + 1) = 0$

represent a pair of straight lines, then

A. $a \leq p \leq \beta$

B. $p \leq \alpha$

C. $p \geq \alpha$

D. $p \leq \alpha$ or $p \geq \beta$

Answer: D

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29. The area bounded by the graph x=|x-3|, thee X-axis and the lines x=-2 and x=3 is ([.] denotes the greatest integer function)

A. 7 sq units

B. 15 sq units

C. $\frac{25}{2}$ sq units

D. 28 sq units

Answer: C

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30. The vector (s) which is (are) coplanar with vectors $\hat{i} + \hat{j} + 2\hat{k}$ and $\hat{i} + 2\hat{j} + \hat{k}$, and perpendicular to the vector $\hat{i} + \hat{j} + \hat{k}$, is/are

A. $-\hat{j} + \hat{k}$

B. $\hat{i} - \hat{k}$

C. $\hat{i} - \hat{j}$

D. $\hat{i} - 2\hat{j} + \hat{k}$

Answer: A

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31. If the coordinates of the points A, B, C be $(-1, 3, 2), (2, 3, 5)$ and $(3, 5, -2)$ respectively then $\angle A =$

A. 45°

B. 60°

C. 90°

D. 30°

Answer: C

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32. If the positive numbers a, b and c are the pth, qth and rth terms of GP, then the vectors $(\log a)\hat{i} + (\log b)\hat{j} + (\log c)\hat{k}$ and $(q-r)\hat{i} + (r-p)\hat{j} + (p-q)\hat{k}$ are

A. equal

B. parallel

C. perpendicular

D. none of the above

Answer: C

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33. The shortest distance between the lines $\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1} and \frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$ is a. $\sqrt{30}$ b. $2\sqrt{30}$ c. $5\sqrt{30}$ d. $3\sqrt{30}$

A. $\sqrt{30}$

B. $2\sqrt{30}$

C. $5\sqrt{30}$

D. $3\sqrt{30}$

Answer: D

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34. If $\widehat{a}, \hat{b}$ and $\hat{c}$ are three unit vectors inclined to each other at an angle θ. The maximum value of θ is

A. $\cos^{-1}\left[\frac{\cos\theta}{\cos(\theta/2)}\right]$

B. $\sin^{-1}\left[\frac{\sin\theta}{\sin(\theta/2)}\right]$

C. $\sin^{-1}\left[\frac{\cos\theta}{\cos(\theta/2)}\right]$

D. $\cos^{-1}\left[\frac{\sin\theta}{\sin(\theta/2)}\right]$

Answer: A

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35. The length of the perpendicular drawn from $(1, 2, 3)$ to the line $\frac{x-6}{3} = \frac{y-7}{2} = \frac{z-7}{-2}$ is a. 4 b. 5 c. 6 d. 7

A. 4

B. 5

C. 6

D. 7

Answer: D

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36. if $\sin A - \sqrt{6} \cos A = \sqrt{7} \cos A$, then $\cos A + \sqrt{6} \sin A$ is equal to

A. $\sqrt{6}\sin A$

B. $-\sqrt{7}\sin A$

C. $\sqrt{6}\cos A$

D. $\sqrt{7}\cos A$

Answer: B

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37. $Let\ f(x)=\frac{1-\tan x}{4x-\pi}, x\neq\frac{\pi}{4}, x\in\left[0,\frac{\pi}{2}\right]$, If $f(x) is$ continuous in $\left[0,\frac{\pi}{4}\right]$, then find the value of $f\left(\frac{\pi}{4}\right)$.

A. 1

B. $1/2$

C. $-1/2$

D. None of these

Answer: C

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38. if $\sin y = x\sin(a+y)$ and $\sec^2 y\frac{dy}{dx} = \frac{A}{1+x^2-2x\cos a}$ then the value of A is

A. 2

B. cos a

C. sin a

D. none of these

Answer: C

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39. Let f(x) be a differentiable function such that

$f'(x) = \sin x + \sin 4x \cos x$. Then $f'\left(2x^2 + \frac{\pi}{2}\right)$ at $x = \sqrt{\frac{\pi}{2}}$ is equal to

A. -1

B. 0

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

D. None of these

Answer: C

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40. If $x \sin\theta = y \cos\theta = \frac{2z\tan\theta}{1-\tan^2\theta}$, then $4z^2(x^2+y^2) =$

A. $(x^2+y^2)^3$

B. $(x^2-y^2)^3$

C. $\left(x^2 - y^2\right)^3$

D. $\left(x^2 + y^2\right)^2$

Answer: C

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41. Assuming the petrol burnt (per hour) in driving a motor boat veries as the cube of its velocity, show that the most economical speed when going against the current of c miles per hour is $\left(\frac{3c}{2}\right)$ miles per hour.

A. $\frac{c}{2}m/h$

B. $\frac{2c}{3}m/h$

C. $\frac{3c}{2}m/h$

D. 2c m/h

Answer: C

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42. $\int \frac{xe^x}{(1+x)^2}\,dx$ is equal to

A. $\frac{e^x}{x+1} + C$

B. $e^x(x+1) + C$

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

D. $\frac{e^x}{1+x^2} + C$

Answer: A

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43. $\int x^{-2/3}\left(1+x^{1/2}\right)^{-5/3}$ dx is equal to

A. $3\left(1+x^{-1/2}\right)^{-5/3} + C$

B. $3\left(1+x^{-1/2}\right)^{-2/3} + C$

C. $3\left(1+x^{1/2}\right)^{-2/3}+C$

D. None of these

Answer: B

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44. The harmonic mean of two numbers is 4. Their arithmetic mean A and the geometric mean G satisfy the relation $2A+G^2=27$. Find two numbers.

A. 2,6

B. 3,6

C. 1,3

D. 1,2

Answer: B

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45. Form the differential equation of family of lines situated at a constant distance p from the origin.

A. $(x^2+y^2)\frac{dy}{dx}=2y\left\{x-p\left(\frac{dy}{dx}\right)^2\right\}$

B. $\left(x\frac{dy}{dx}-y\right)^2-p^2\left\{1+\left(\frac{dy}{dx}\right)^2\right\}=0$

C. $\left(x\frac{dy}{dx}-y\right)^2-\left(p\frac{dy}{dx}+x\frac{dy}{dx}\right)=0$

D. $(x-y)-\left(\frac{dy}{dx}-\frac{dx}{dy}\right)=0$

Answer: B

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46. A curve $y=f(x)$ passes through point $P(1,1)$. The normal to the curve at P is a $(y-1)+(x-1)=0$. If the slope of the tangent at any point on the curve is proportional to the ordinate of the point, then the equation of the curve is (a) $(b)(c)y=(d)e^{(e)(f)K((g)(h)x-1(i))(j)}(k)(l)$ (m) (b) $(n)(o)y=(p)e^{(q)(r)Ke(s)}(t)(u)$ (v) (c) $(d)(e)y=(f)e^{(g)(h)K((i)(j)x-2(k))(l)}(m)(n)$ (o) (d) None of these

A. $y=e^{ax}-1$

B. $y=e^{ax}+1$

C. $y=e^{ax}+a$

D. $y=e^{a(x-1)}$

Answer: D

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47. The solution of the differential equation $x^2\frac{dy}{dx}\frac{\cos 1}{x}-y\frac{\sin 1}{x}=-1$, where $\overrightarrow{-}1$ as$x\overrightarrow{\infty}$ is (a) $(b)(c)y=\sin(d)\frac{1}{e}x(f)(g)-\cos(h)\frac{1}{i}x(j)(k)(l)$ (m) (b)

$(n)(o)y = (p)\frac{(q)x+1}{r}\left((s)x\sin(t)\frac{1}{u}x(v)(w)\right)(x)(y)(z)$ (aa) (c) $(d)(e)y = \cos(f)\frac{1}{g}x(h)(i) + \sin(j)\frac{1}{k}x(l)(m)(n)$ (o) (d) *[Math Processing Error]* (cc)

A. $y = \sin\frac{1}{x} - \frac{\cos^1}{x}$

B. $y = \frac{x+1}{x\sin\frac{1}{x}}$

C. $y = \cos\frac{1}{x} + \sin\frac{1}{x}$

D. $y = \frac{x+1}{x \ \cos\frac{1}{x}}$

Answer: A

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48. The probability distribution of the random variables X is given by

X	1	2	3	4
$P(X=x)$	$1/8$	$1/2$	$1/8$	$1/4$

Then the value of V(X) is equal to

A. 0

B. 1

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

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

Answer: B

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49. If $A=\begin{bmatrix}a & b\\ c & d\end{bmatrix}$ is such that |A|=0 and $A^2-(a+d)A+kI=0$,then k is equal to

A. b+c

B. a+d

C. ad-bc

D. zero

Answer: C

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50. Let PQR be a right - angled isosceles triangle , right angled at P(2,1). If the equation of the line QR is $2x + y = 3$, then the equation representing the pair of lines PQ and PR is

A. $3x^2 - 3y^2 + 8xy + 20x - 10y + 25 = 0$

B. $3x^2 - 3y^2 + 8xy - 20x - 10y + 25 = 0$

C. $3x^2 - 3y^2 + 8xy + 10x + 15y + 20 = 0$

D. $3x^2 - 3y^2 - 8xy - 10x - 15y - 20 = 0$

Answer: B

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