MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

MOCK TEST 4

Mcqs

1. If $A = \begin{bmatrix} 1 & 2 & -1 \\ -1 & 1 & 2 \\ 2 & -1 & 1 \end{bmatrix}$, then det (adj (A)) is

A. $(14)^2$

B. $(13)^2$

C. $(14)^3$

D. $(13)^3$

Answer: A

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

A. $\pi mpliesq$

B. $q \Rightarrow p$

C. $\sim(\pi mpliesq)$

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

Answer: D

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3. The value of $\tan^{-1}\left(\frac{x\cos\theta}{1-x\sin\theta}\right) - \cot^{-1}\left(\frac{\cos\theta}{x-\sin\theta}\right)$ is

A. 2θ

B. θ

C. $\theta/2$

D. independent θ

Answer: B

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4. If $\tan^2\theta - \left(1+\sqrt{3}\right)\tan\theta + \sqrt{3} = 0$, then the general value of theta is

A. $n\pi + \frac{\pi}{4}, n\pi + \frac{\pi}{3}$

B. $n\pi - \frac{\pi}{4}, n\pi + \frac{\pi}{3}$

C. $n\pi + \frac{\pi}{4}, n\pi - \frac{\pi}{3}$

D. $n\pi - \frac{\pi}{4}, n\pi - \frac{\pi}{3}$

Answer: A

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5. The equation of second degree $x^2 + 2\sqrt{2}x + 2y^2 + 4x + 4\sqrt{2}y + 1 = 0$ represents a pair of straight lines.The distance between them is a. 4 b. $\frac{4}{\sqrt{3}}$ c. 2 d. $2\sqrt{3}$

A. 4

B. $4/\sqrt{3}$

C. 2

D. $2\sqrt{3}$

Answer: C

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6. The distance of the point $3\hat{i} + 5\hat{k}$ from the line parallel to $6\hat{i} + \hat{j} - 2\hat{k}$ and passing through the point $8\hat{i} + 3\hat{j} + \hat{k}$ is

A. 1

B. 2

C. 3

D. 4

Answer: C

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7. If $a, b, andc$ are in G.P., then the equations $ax^2 + 2bx + c = 0anddx^2 + 2ex + f = 0$ have a common root if $\frac{d}{c}, \frac{e}{b}, \frac{f}{c}$ are in a. A.P. b. G.P. c. H.P. d. none of these

A. GP

B. AP

C. HP

D. None of these

Answer: B

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8. The point on the line $\frac{x-2}{1}=\frac{y+3}{-2}=\frac{z+5}{-2}$ at a distance of 6 from the point $(2,-3,-5)$ is a. $(3,-5,-3)$ b. $(4,-7,-9)$ c. $0,2,-1$ d. none of these

A. (3,-5,-3)

B. (4,-7,-9)

C. (0,2,-1)

D. (-3,5,3)

Answer: B

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9. If from the point P(f,g,h) perpendiculars PI,PM br drawn to yz and zx planes then the equation of the plane OLM is

A. $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=0$

B. $\frac{x}{a}-\frac{y}{b}+\frac{z}{c}=0$

C. $\frac{x}{a}+\frac{y}{b}-\frac{z}{c}=0$

D. $\frac{x}{a}-\frac{y}{b}-\frac{z}{c}+0$

Answer: C

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10. A plane meets the coordinate axes in A,B,C such that the centroid of triangle ABC is the point (p, q, r). If the equation of the plane is $\frac{x}{p} + \frac{y}{q} + \frac{z}{r} = k$ then $k =$

A. 3

B. 2

C. 1

D. 5

Answer: A

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11. Every gram of wheat provides 0.1 g of proteins and 0.25g of carbohydrates the correspondin values of rice are 0.05 g and 0.5 , respectively. Wheat costs Rs. 4 per kg and rice Rs. 6. the minimum daily requirements of proteins and carbohydrtes for an average child are 50g annd 200g respectively. then, in what quantities should wheat and rice be mixed in the daily diet to provide minimum daily requirements of proteins and carbohydrates at minimum cost ?

A. 400, 200

B. 300, 400

C. 200, 400

D. 400, 300

Answer: A

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12. Let $f: R \to R$ be a function such that $f\left(\frac{x+y}{3}\right) = \frac{f(x)+f(y)}{3}$, $f(0) = 0$ and $f'(0) = 3$,then

A. $\frac{f(x)}{x}$ is differentiable in R

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

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

D. f((x) is bounded in R

Answer: C

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13. If $y = (1+x)\left(1+x^2\right)\left(1+x^4\right)\ldots\left(1+x^{2^n}\right)$ then $\frac{dy}{dx}$ at $x = 0$ is

A. 0

B. -1

C. 1

D. None of these

Answer: C

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14. 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. None of these

Answer: B

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15. If f(x) satifies of conditiohns of Rolle's theorem in [1,2] and f(x) is continuous in [1,2] then $\therefore \int_1^2 f'(x)dx$ is equal to

A. 3

B. 0

C. 1

D. 2

Answer: C

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16. The function $f(x) = \frac{ax + b}{(x - 1)(x - 4)}$ has a local maxima at (2,-1), then

A. b=1,a=0

B. a=1,b=0

C. b=-1,a=0

D. a=-1,b=0

Answer: B

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17. $\int \frac{1}{\left((x - 1)^3 (x + 2)^5\right)^{\frac{1}{4}}} dx$ is equal to

A. $\frac{4}{3}\left(\frac{x-1}{x+2}\right)^{1/4}+C$

B. $\frac{4}{3}\left(\frac{x+2}{x-1}\right)^{1/4}+C$

C. $\frac{1}{3}\left(\frac{x-1}{x+2}\right)^{1/4}+C$

D. $\frac{1}{3}\left(\frac{x+2}{x-1}\right)^{1/4}+C$

Answer: A

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18. $l=\int_{-2}^{1}\left(\tan^{-1}x+\cot^{-1}\frac{1}{x}\right)dx$ is equal to

A. $\frac{5\pi}{2}+4\tan^{-1}2\ln\frac{5}{2}$

B. $\frac{5\pi}{2}-4\tan^{-1}2+\ln\frac{5}{2}$

C. $\frac{5\pi}{2} - 3\tan^{-1}2 - \ln\frac{5}{2}$

D. $\frac{5\pi}{2} - 3\tan^{-1}2 + \ln\frac{5}{2}$

Answer: B

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19. $i\int_0^{\pi} \sin^4 x \cos^6 x dx$ is equal to

A. $\frac{3\pi}{64}$

B. $\frac{3\pi}{572}$

C. $\frac{3\pi}{256}$

D. $\frac{3\pi}{128}$

Answer: C

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20. The solution of the differential equation

$$\left\{\frac{1}{x}-\frac{y^2}{(x-y)^2}\right\}dx+\left\{\frac{x^2}{(x-y)^2}-\frac{1}{y}\right\}dx=0 \text{ is}$$

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

B. $\ln|xy|+\frac{xy}{(x-y)}=C$

C. $\frac{xy}{(x-y)}=Ce^{x/y}$

D. $\frac{xy}{(x-y)}=Ce^{xy}$

Answer: A

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21. Sum of the series $1 + 2.2 + 3.2^2 + 4.2^3 + \ldots . + 100.2^{99}$ is

A. $100 \cdot 2^{100} + 1$

B. $99 \cdot 2^{100} + 1$

C. $99 \cdot 2^{99} - 1$

D. $100 \cdot 2^{100} - 1$

Answer: B

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22. Suppose X has a binomial distribution $B\left(6, \frac{1}{2}\right)$. Show that $X = 3$is the most likely outcome.(Hint: $P(x = 3)$is the maximum among all $P(x_i), x_i = 0, 1, 2, 3, 4, 5, 6)$

A. X=0 and X=6

B. X=3

C. X=0

D. X=6

Answer: B

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23. A discret random variable X has the following probability distribution: $X: 1234567$ $P(X): c2c2c3 \hat{} 22c^{27}c^2 + c$ Find the value of $\cdot$ Also, find the mean of the distribution.

A. $\frac{1}{10}$ and 3.66

B. $\frac{1}{20}$ and 2.66

C. $\frac{1}{15}$ ad 1.33

D. none of these

Answer: A

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24. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 3 & 4 & -1 \end{bmatrix}$ and $A^n = I$, then value of n is equal to

A. 2

B. 4

C. 6

D. 3

Answer: A

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25. $(p \wedge \sim q) \wedge (\sim p \wedge q)$ is

A. a tautology

B. a contradication

C. tautology and contradiction

D. neither a tautology nor a contradiction

Answer: B

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26. Let A(h, k), B(1, 1) and C(2, 1) be the vertices of a right angled triangle with AC as its hypotenuse. If the area of the triangle is 1, then the set of values which k can take is given by (1) $\{1, 3\}$ (2) $\{0, 2\}$ (3) $\{-1, 3\}$ (4) $\{-3, -2\}$

A. {1,3}

B. {0,2}

C. $\{-1, 3\}$

D. $\{-3, -2\}$

Answer: C

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27. The equation of straight line passing through (-2,-7) and having an intercept of length 3 between the straight lines : 4x + 3y = 12 , 4x + 3y = 3 are : (A) 7x + 24y + 182 = 0 (B) 7x + 24y + 18 = 0 (C) x + 2 = 0 (D) x - 2 = 0

A. $7x-24y-182=0$

B. $7x+24y+182=0$

C. $7x+24y-182=0$

D. None of these

Answer: B

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28. The line joining the points (1,1,2) and (3,-2,1) meets the plane $3x+2y+z=6$ at the point

A. (1,1,2)

B. (3,-2,1)

C. (2,-3,1)

D. (3,2,1)

Answer: B

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29. एक रेखा, एक घन के विकर्णों के साथ $\alpha, \beta, \gamma, \delta$, कोण बनती है तो सिद्ध कीजिए कि

$$\cos^2\alpha + \cos^2\beta + \cos^2\gamma + \cos^2\delta = \frac{4}{3}$$

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

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

C. 3

D. None of these

Answer: A

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30. If a variable plane forms a tetrahedron of constant volume $64k^3$ with the co-ordinate planes, then the locus of the centroid of the tetrahedron is:

A. $xyz = 6k^3$

B. $xy + yz + zx = 6k^2$

C. $x^2 + y^2 + z^2 = 8k^2$

D. None of these

Answer: A

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31. Prove that $\sin 6^0 \sin 42^0 \sin 66^0 \sin 78^0 - \frac{1}{16}$

A. $\frac{1}{13}$

B. $\frac{1}{14}$

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

D. $\frac{1}{16}$

Answer: D

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32. If $y^2 = P(x)$ is polynomial of degree 3, then $2\left(\frac{d}{dx}\right)\left(y^3 . d^2 \frac{y}{dx^2}\right)$ is equal to

A. $P'''(x) + P'x$

B. $P''(x) \cdot P'''(x)$

C. $P(x) \cdot P'''(x)$

D. None of these

Answer: C

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33. If y is a function of $x and \log(x+y) - 2xy = 0$, then the value of $y'(0)$ is (b) -1 (c) 2 (d) 0

A. 1

B. -1

C. 2

D. 0

Answer: A

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34. $\int |x| \log |x| dx$ is equal to $(x \neq 0)$

A. $\frac{x^2}{2}\log|x| - \frac{x^2}{4} + C$

B. $\frac{1}{2}x|x|\log x + \frac{1}{4}x|x| + C$

C. $-\frac{x^2}{2}\log|x| + \frac{x^2}{4} + C$

D. $\frac{1}{2}x|x|\log|x| - \frac{1}{4}x|x| + C$

Answer: D

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35. 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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36. The parabola $y^2 = 2x$ divides the circle $x^2 + y^2 = 8$ in two parts. Then, the ratio of the areas of these parts is

A. $\frac{3\pi - 2}{10\pi + 2}$

B. $\frac{3\pi + 2}{9\pi - 2}$

C. $\frac{6\pi - 3}{11\pi - 5}$

D. $\frac{2\pi - 9}{9\pi + 2}$

Answer: B

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37. The solution of the differential equation $x^4 \frac{dy}{dx} + x^3 y + \text{cosec}(xy) = 0$ is equal to

A. $2\cos(xy) + x^{-2} = C$

B. $2\cos(xy) + y^{-2} = C$

C. $2\sin(xy) + x^{-2} = C$

D. $2\sin(xy) + y^{-2} = C$

Answer: A

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38. The equation of curve in which portion of y-axis cutoff between origin and tangent varies as cube of abscissa of point of contact is

A. $y = \frac{kx^3}{3} + Cx$

B. $y = \frac{kx^2}{2} + C$

C. $y = -\frac{kx^3}{2} + Cx$

D. $y = \frac{kx^3}{3} + \frac{Cx^2}{2}$

Answer: C

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39. ABCD is a trapezium such that AB and CD are parallel and $BC \perp CD$. If $\angle ADB = \theta, BC = p$ and $CD = q$, then AB is equal to

A. $\frac{\left(p^2 + q^2\right)\sin\theta}{p\cos\theta + q\sin\theta}$

B. $\frac{p^2 + q^2\cos\theta}{p\cos\theta + q\sin\theta}$

C. $\frac{p^2 + q^2}{p^2\cos\theta + q^2\sin\theta}$

D. $\frac{\left(p^2 + q^2\right)\sin\theta}{\left(p\cos\theta + q\sin\theta\right)^2}$

Answer: A

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40. If $\sin^{-1} x + \sin^{-1} y = \frac{2\pi}{3}$, then $\cos^{-1} x + \cos^{-1} y$ is equal to

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

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

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

D. π

Answer: B

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41. Three houses are available in a locality. Three persons apply for the houses. Each applies for one houses without consulting others. The probability that all three apply for the same houses is $1/9$ b. $2/9$ c. $7/9$ d. $8/9$

A. $\frac{7}{9}$

B. $\frac{8}{9}$

C. $\frac{1}{9}$

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

Answer: C

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42. If in a ΔABC, $a^2 \cos^2 A = b^2 + c^2$, then

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

B. $\frac{\pi}{4} < A < \frac{\pi}{2}$

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

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

Answer: C

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43. Four numbers are chosen at random from $\{1, 2, 3, ..., 40\}$. The probability that they are not

consecutive is

A. $\frac{1}{2470}$

B. $\frac{4}{7969}$

C. $\frac{2469}{2470}$

D. $\frac{7965}{7969}$

Answer: C

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44. If the direction ratio of two lines are given by $3lm - 4\ln + mn = 0$ and $l + 2m + 3n = 0$, then the angle between the lines, is

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

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

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

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

Answer: D

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45. The maximum value of Z is where, Z=4x+2 subject to constraints 4x+2y $\geq$ 46, x+3y $\leq$ 24 and $x, y \geq 0$, is

A. 46

B. 96

C. 52

D. None of these

Answer: B

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46. If e_1 and e_2 are the eccentricities of a hyperbola $3x^2 - 2y^2 = 25$ and its conjugate, then

A. $e_1^2 + e_2^2 = 2$

B. $e_1^2 + e_2^2 = 4$

C. $e_1 + e_2 = 4$

D. $e_1 + e_2 = \sqrt{2}$

Answer: B

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47. If the derivative of the function $f(x) = \{ax^2 + b, x < -1 \text{ and } bx^2 + ax + 4, x \leq -1$ is everywhere continuous, then-

A. a=2,b=3

B. a=3,b=2

C. a=--2,b=-3

D. a=-3,b=-2

Answer: A

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48. A fair coin is tossed 100 times. The probability of getting tails an odd number of times is $1/2$ b. $1/8$ c. $3/8$ d. none of these

A. $1/2$

B. $1/8$

C. $3/8$

D. None of these

Answer: A

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49. The function $f: X \to Y$ defined by $f(x) = \sin x$ is one-one but not onto, iff X and Y are respectively equal to

A. R and R

B. $[0, \pi]$ and $[0, 1]$

C. $\left[0, \frac{\pi}{2}\right]$ and $[-1, 1]$

D. $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right] a \cap d[-1, 1]$

Answer: C

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50. X is continuous random variable with probability density function $f(x) = \frac{x^2}{8}, 0 \leq x \leq 1$. Then, the value of $P(0.2 \leq X \leq 0.5)$ is

A. $\frac{0.117}{24}$

B. $\frac{0.112}{24}$

C. $\frac{0.113}{36}$

D. $\frac{0.112}{36}$

Answer: A

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