MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

MOCK TEST 2

Mcqs

1. An equivalent expression for $(\pi mpliesq \wedge r) \vee (r \Leftrightarrow s)$ which contains neither the biconditional nor the conditional is

A. $(\sim p \vee q \wedge r) \wedge [(\sim r \vee s) \wedge (r \vee \sim s)]$

B. $(\sim p \wedge q \wedge r) \vee [(\sim r \vee s) \wedge (r \vee \sim s)]$

C. $(\sim p \vee q \wedge r) \wedge [(\sim r \vee s) \vee (r \vee \sim s)]$

D. None of the above

Answer: A

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2. The equation sinx(cos x)=cos(sin x) has

A. only one real solution

B. infinitely many solutions

C. no real solution

D. none of these

Answer: C

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3. The value of $\tan^{-1}(1) + \cos^{-1}\left(-\frac{1}{2}\right) + \sin^{-1}\left(-\frac{1}{2}\right)$ is equal to $\frac{\pi}{4}$ b.$\frac{5\pi}{12}$ c.$\frac{3\pi}{4}$ d. $\frac{13\pi}{12}$

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

B. $\frac{5\pi}{12}$

C. $\frac{3\pi}{4}$

D. $\frac{13\pi}{12}$

Answer: C

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4. The image of the pair of lines represented by $ax^2 + 2hxy + by^2 = 0$ by the line mirror $y = 0$ is

$ax^2 - 2hxy - by^2 = 0$ $bx^2 - 2hxy + ay^2 = 0$

$bx^2 + 2hxy + ay^2 = 0$ $ax^2 - 2hxy + by^2 = 0$

A. $ax^2 - 2hxy - by^2 = 0$

B. $bx^2 - 2hxy + ay^2 = 0$

C. $bx^2 + 2hxy + ay^2 = 0$

D. $ax^2 - 2hxy + by^2 = 0$

Answer: D

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5. The line $\frac{x}{2} = -\frac{y}{3} = \frac{z}{1}$ is vertical. The direction cosines of the line of greatest slope in the plane 3x-2y+z=5 are proportional to

A. (16,11,-1)

B. (-11,16,1)

C. (16,11,1)

D. (11,16,-1)

Answer: D

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6. The perpendicular distance of the origin from the plane which makes intercepts 12,3 and 4 on X, Y, and Z-axes respectively, is

A. 13

B. 11

C. 17

D. $6\sqrt{2}/\sqrt{13}$

Answer: D

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7. If $a_1, a_2, a_3, , a_n$ are an A.P. of non-zero terms, prove that

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

A. $\frac{n-1}{a_1 a_n}$

B. $\frac{n}{a_1 a_n}$

C. $\frac{n+1}{a_1 a_n}$

D. None of these

Answer: A

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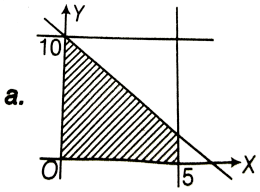
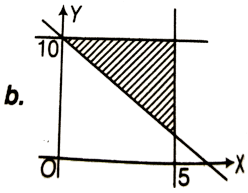
8. Which of the following to is the common region for

$x + y \leq 10, x \geq 5, y \leq 10, x \geq 0$ and $y \geq 0$.

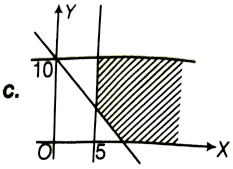
A.



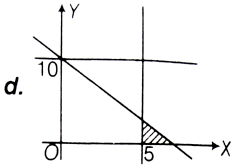
B.



C.



D.



Answer: D

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9. The function $f(x) = \frac{e^{\tan x} - 1}{e^{\tan x} + 1}$ is discontinuous at x is equal to

A. $n\pi + \pi, n \in l$

B. $n\pi + \pi/2, n \in l$

C. $n\pi + \pi/4, n \in l$

D. $n\pi + \pi/8, n \in l$

Answer: B

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10. Without rotating the original coordinate axes, to which point should origin be transferred, so that the equation $x^2 + y^2 - 4x + 6y - 7 = 0$ is changed to an equation which contains no term of first degree?

A. (3,2)

B. $(-3, 2)$

C. $(2, -3)$

D. $(-2, -3)$

Answer: C

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11. if $x^y . y^x = 16$ then $\frac{dy}{dx}$ at $(2, 2)$is equal to

A. -1

B. 0

C. 1

D. None of these

Answer: A

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12. A spherical balloon is punped at the rate of $10\text{inch}^3 \text{ min}^{-1}$, the rate of increase of its radius if its

radius is 15 inch is

A. $\frac{1}{30\pi}$ inch/min

B. $\frac{1}{60\pi}$ inch/min

C. $\frac{1}{90\pi}$ inch/min

D. $\frac{1}{120\pi}$ inch/min

Answer: C

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13. $\int \frac{3+2\cos x}{(2+3\cos x)^2} dx$ is equal to

A. $\left(\frac{six}{2+3\cos x}\right)+C$

B. $\left(\frac{2\cos x}{2+3\sin x}\right)+C$

C. $\left(\frac{2\cos x}{2+3\cos x}\right)+C$

D. $\left(\frac{2\sin x}{2+3\sin x}\right)+C$

Answer: A

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14. If $\int \frac{\left(\sqrt{x}\right)^5}{\left(\sqrt{x}\right)^7+x^6}dx=\lambda\frac{\ln(1+2\cos x)}{(2+\cos x)^2}+C$, then a+$\lambda$ is

A. $=2$

B. >2

C. < 2

D. $= 1$

Answer: B

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15. The value of $\int_0^{\pi/2} \frac{1+2\cos x}{(2+\cos x)^2} dx$ is

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

B. 2

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

D. None of these

Answer: C

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16. The circumcentre of the triangle formed by the lines, $xy + 2x + 2y + 4 = 0$ and $x + y + 2 = 0$ is-

A. $(-1, -1)$

B. $(0, -1)$

C. $(1, 1)$

D. $(-1, 0)$

Answer: A

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17. If $\sin\theta = \sin\alpha$, then

A. $\frac{\theta+\alpha}{2}$ is any odd multiple of $\frac{\pi}{2}$ and $\frac{\theta-\alpha}{2}$ is any multiple of π

B. $\frac{\theta+\alpha}{2}$ is any odd multiple of π and $\frac{\theta-\alpha}{2}$ is any multiple of π.

C. $\frac{\theta+\alpha}{2}$ is any multiple of $\frac{\pi}{2}$ and $\frac{\theta-\alpha}{2}$ is any even multiple of π.

D. $\frac{\theta+\alpha}{2}$ is any even multiple of $\frac{\pi}{2}$ and $\frac{\theta-\alpha}{2}$ is any odd multiple of π.

Answer: A

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18. The sum of of the mean and variance of a binomial distribution is 15 and the sum of their squares is 117. the mean of the distribution is

A. 6

B. 9

C. 3

D. 12

Answer: B

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19. . Which one of the following is possible (a) $\sin\theta = \frac{a^2+b^2}{a^2-b^2}(a \neq b)$ (b) $\sec\theta = \frac{4}{5}$ (c) $\tan\theta = 45$ (d) $\cos\theta = \frac{7}{3}$

A. $\sin\theta = \frac{a^2-b^2}{a^2-b^2}, (a \neq b)$

B. $\sec\theta = \frac{4}{5}$

C. $\tan\theta = 45$

D. $\cos\theta = 7/3$

Answer: C

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20. Let α and β be such that $\pi < \alpha - \beta < 3\pi$. If $\sin\alpha + \sin\beta = -\frac{21}{65}$ and $\cos\alpha + \cos\beta = -\frac{27}{65}$, then the value of $\cos\frac{(\alpha-\beta)}{2}$ is

A. $-\frac{3}{\sqrt{130}}$

B. $\frac{3}{\sqrt{130}}$

C. $\frac{6}{65}$

D. $-\frac{6}{65}$

Answer: A

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21. If A is a square matrix of order 2×2 such that $A^2 = O$ then,

A. $A = \begin{pmatrix} \alpha & \beta \\ \gamma & -\alpha \end{pmatrix}$, where α, β, γ are numbes such that $\alpha^2 + \beta\gamma = 0$

B. $A = \begin{pmatrix} \alpha & \beta \\ \beta & -\alpha \end{pmatrix}$ with $\alpha = \pm \beta$

C. $A = \begin{pmatrix} \alpha & -\alpha \\ -\beta & \beta \end{pmatrix}$ with $\alpha^2 + \beta^2 = 1$

D. None of these

Answer: A

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22. If G is the centroid of a ΔABC, then $GA^2 + GB^2 + GC^2$ is equal to

A. $\left(a^2 + b^2 + c^2\right)$

B. $\frac{1}{3}\left(a^2 + b^2 + c^2\right)$

C. $\frac{1}{2}\left(a^2 + b^2 + c^2\right)$

D. $\frac{1}{3}(a + b + c)^2$

Answer: B

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23. If the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ represents a

pair of parallel lines, then

A. $2\sqrt{\left(\frac{g^2-ac}{h^2+a^2}\right)}$

B. $2\sqrt{\left(\frac{g^2+ac}{h^2+a^2}\right)}$

C. $3\sqrt{\left(\frac{g^2+ac}{a(a+b)}\right)}$

D. $3\sqrt{\left(\frac{g^2+ac}{a(a+b)}\right)}$

Answer: A

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24. Differentiate $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ with respect to $\tan^{-1}\left(\frac{2x}{1-x^2}\right)$, if `-1

A. 0

B. 1

C. $\frac{1}{1-x^2}$

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

Answer: B

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25. If $y^2 = p(x)$, a polynomial of degree 3, then $2\frac{d}{dx}\left(y^3\frac{d^2y}{dx^2}\right)$ equals :

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

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

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

D. None of these

Answer: C

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26. A bag A contains 4 green and 3 red balls and bag B contains 4 red and 3 green balls. One bag is takenn at random and a ball is drawn and noted to be green. The probability that it comes from bag B is

A. $\frac{2}{7}$

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

C. $\frac{3}{7}$

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

Answer: C

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27. Prove that: $\int_0^{2\pi} \frac{x \sin^{2n} x}{\sin^{2n} + \cos^{2n} x} dx$

A. $\frac{\pi^2}{4}$

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

C. π^2

D. $2\pi^2$

Answer: C

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28. The area bounded by the curve $y = (x-1)(x-2)(x-3)$ and x-axis lying between the ordinates $x = 0$ and $x = 4$ is

A. $\frac{9}{4} sq$ units

B. $\frac{11}{4}$ sq units

C. $\frac{13}{4}$ sq units

D. $\frac{15}{4}$ sq units

Answer: B

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29. The particular solution of the differential equation $y' + 3xy = x$ which passes through (0,4) is

A. $y = 1 - 11e^{-3x^2/2}$

B. $3y = 1 + 11e^{-3x^2/2}$

C. $3y = 1 - 11e^{-3x^2/2}$

D. none of these

Answer: B

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30. logically equivalent to $\sim(\sim p \Rightarrow q)$ is

A. $p \wedge q$

B. $p \wedge \sim q$

C. $\sim p \wedge q$

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

Answer: C

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31. Given a matrix $A = [abcbcacab], where a, b, c$ are real positive numbers $abc = 1 and A^T A = I,$ then find the value of $a^3 + b^3 + c^3.$

A. a+b+c=5

B. $a^2 + b^2 + c^2 = 6$

C. ab+bc+ca=2

D. $a^3 + b^3 + c^3 = 4$

Answer: D

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32. The value of $\cos^{-1}(\cos 12) - \sin^{-1}(\sin 12)$ is

A. 0

B. π

C. $8\pi - 24$

D. None of these

Answer: C

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33. Let $\alpha = \frac{\pi}{5}$ and $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & -\cos\alpha \end{bmatrix}$, then $B = A + A^2 + A^3 + A^4$ is

A. singular

B. non-singular

C. symmetric

D. $|B|=1$

Answer: B

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34. If in a triangle ABC, $a^2 + b^2 + c^2 = ca + ab\sqrt{3}$ then the triangle is

A. equilateral

B. right angled and isosceles

C. right angled with $A = 90^\circ, B = 60^\circ, C = 30^\circ$

D. none of the above

Answer: C

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35. The difference of the tangents of the angles which the lines $x^2\left(\sec^2 - \sin^2\theta\right) - 2xy\tan\theta + y^2\sin^2\theta = 0$ make with X-axis, is

A. $2\tan\theta$

B. 2

C. $2\cot\theta$

D. $\sin 2\theta$.

Answer: B

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36. If

$|a| = |b| = |c| = 1$ and $a \cdot b = b \cdot c = c.\, a = \cos\theta,$

then the maximum value of θ is

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

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

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

D. $\frac{2\pi}{5}$

Answer: C

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37. If α, β, γ be the angles which a line makes with the coordinates axes, then

A. $\sin^2\alpha + \sin^2\beta + \sin^2\gamma = 1$

B. $\sin^2\alpha + \sin^2\beta + \sin^2\gamma = 1$

C. $\cos^2\alpha + \cos^2\beta + \cos^2\gamma = 1$

D. $\cos^2\alpha + \sin^2\beta + \sin^2\gamma = 1$

Answer: C

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38. let $|a| = 2\sqrt{2}, |b| = 3$ and the angle between a and b is $\frac{\pi}{4}$. If a parallelogram is constructed with adjacent

sides $2a - 3b$ and $a + b$, then its longer diagonal is of length

A. 10

B. 8

C. $2\sqrt{26}$

D. 6

Answer: C

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39. If $y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \ldots \infty}}}$, then $\frac{dy}{dx}$ is equal to

A. $\frac{2y-1}{\cos x}$

B. $\frac{\cos x}{2y-1}$

C. $\frac{2x-1}{\cos y}$

D. $\frac{\cos y}{2x-1}$

Answer: B

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40. If $y = \sqrt{\left(\frac{1+\cos 2\theta}{1-\cos 2\theta}\right)}$, $\frac{dy}{d\theta}$ at $\theta = \frac{3\pi}{4}$ is

A. -2

B. 2

C. ± 2

D. None of these

Answer: B

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41. $\int \frac{1}{x^2(x^4+1)^{3/4}} dx$ is equal to

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

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

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

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

Answer: D

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42. The solution of the differential equation $\left(y^2dx - 2xydy\right) = x^3y^3dy + x^2y^4dx$ is

A. $\log\left(\frac{x}{y^2}\right) = \frac{(xy)^2}{2} + C$

B. $\frac{x}{Cy^2} = e^{\frac{(xy)^2}{2}}$

C. $\left(\frac{x}{y^2}\right) = 2\log(xy) + C$

D. $\frac{x}{y^2} = e^{(2xy)} + C$

Answer: A

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43. $x^2 = xy$ is a relation which is

A. symmetric

B. reflexive and transitive

C. transitive

D. none of the above

Answer: B

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44. A random variable X takes values 1,2,3 and 4 with probabilities $\frac{1}{6}, \frac{1}{3}, \frac{1}{3}, \frac{1}{6}$ respectively, then its mean and variance is equal to

A. $\frac{5}{2}, \frac{11}{12}$

B. $\frac{5}{2}, \frac{11}{16}$

C. $\frac{5}{3}, \frac{11}{16}$

D. $\frac{5}{3}, \frac{11}{12}$

Answer: A

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45. If the probability mass function of a discrete random variable X is $P(x) = \frac{C}{x^3}, x = 1, 2, 3 = 0,$ otherwise. Then, E(X) is equal to

A. $\frac{343}{297}$

B. $\frac{294}{251}$

C. $\frac{297}{294}$

D. $\frac{251}{294}$

Answer: D

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46. The order and degree of the differential equation

$$\left[1+\left(\frac{dy}{dx}\right)^2\right]^{3/4}=\left(\frac{d^2y}{dx^2}\right)^{1/3}$$

A. (2,4)

B. (2,5)

C. (2,1)

D. None of these

Answer: A

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47. Using integration, find the area bounded by the curves $y = |x - 1|$ and $y = 3 - |x|$.

A. 2 sq units

B. 3 sq units

C. 4 sq units

D. 1 sq units

Answer: C

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48. The pair of lines joining origin to the points of intersection of, the two curves

$ax^2 + 2hxy + by^2 + 2gx = 0$ and $a'x^2 + 2h'xy + b'y^2 + 2g'x = 0$ will be at right angles, if

A. $g(a' + b') = g'(a + b)$

B. $g(a + b) = g'(a' + b')$

C. $gg' = (a + b)(a' + b')$

D. None of these

Answer: A

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49. If

$P(A \cup B) = 3/4$ and $P(\overline{A}) = 2/3$, then $P(\overline{A} \cap B)$ is equal to

A. $\frac{5}{12}$

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

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

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

Answer: A

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50. A conic section is defined by the equations x=-1+sec t, y=3+3 tan t. the coordinates of the foci are

A. $(-1-\sqrt{10},2)$ and $(-1+\sqrt{10},2)$

B. $(-1-\sqrt{8},2)$ and $(-1+sqart(8),2)$

C. $(-1,2-\sqrt{8})$ and $(-1,2+\sqrt{8})$

D. $(-1,2-\sqrt{10})$ and $(-1,2+\sqrt{10})$

Answer: A

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