MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 07

Paper 2 Mathematics

1. If $-5, k \text{ and } -1$ are in AP, then the value of k is equal to

A. -5

B. -3

C. -1

D. 3

Answer: B

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2. Which term of the series $\sqrt{2}, \frac{2}{3}, \frac{2\sqrt{2}}{9}, \ldots\ldots$ is $\frac{16}{2187}$?

A. 10th term

B. 8th term

C. 9th term

D. 11th term

Answer: B

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3. If a striaght line passes through the points $\left(-\frac{1}{2}, 1\right)$ and (1,2) then its x-intercept is

A. -2

B. -1

C. 2

D. 1

Answer: A

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4. The slopes of the lines which make an angle 45° with the line $3x - y = -5$ is

A. $1, -1$

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

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

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

Answer: D

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5. The length of the latusrectum of the ellipse $16x^2 + 25y^2 = 400$ is

A. 5/16 units

B. 32/5 units

C. 16/5 units

D. 5/32 units

Answer: B

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6. The derivative of $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ with respect to $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ is

A. -1

B. 1

C. 2

D. -2

Answer: B

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7. If the function $y = \sin^{-1} x$, then $(1 - x^2)\frac{d^2y}{dx^2}$ is equal to

A. $-x\frac{dy}{dx}$

B. 0

C. $x\frac{dy}{dx}$

D. $x\left(\frac{dy}{dx}\right)^2$

Answer: C

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8. The function $f(x) = e^{-|x|}$ is

A. continuous everywhere but not differentiable at x=0

B. continuous and differentiable everywhere

C. not continuous at x=0

D. None of above

Answer: A

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9. If X is a binomial variate with the range $\{0, 1, 2, 3, 4, 5, 6\}$ and $P(X = 2) = 4P(X = 4)$, then the parameter p of X is

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

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

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

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

Answer: A

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10. Find the area bounded by the curves $x^2 + y^2 = 25, 4y = |4 - x^2|$, and $x = 0$ above the x-axis.

A. $4 + 25\sin^{-1}(4/5)$

B. $\frac{1}{2}\{8 - 25\sin^{-1}(4/5)\}$

C. $\frac{1}{4}\{425\sin^{-1}(4/5)\}$

D. None of these

Answer: C

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11. $\int\left\{\log(\log x) + \frac{1}{(\log x)^2}\right\}dx = x\{f(x) - g(x)\} + C$, then

A. $f(x) = \log(\log x), g(x) = \frac{1}{\log x}$

B. $f(x) = \log x, g(x) = \frac{1}{\log x}$

C. $f(x) = \frac{1}{\log x}, g(x) = \log(\log x)$

D. $f(x) = \frac{1}{x \log x}, g(x) \frac{1}{\log x}$

Answer: A

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12. $\int \frac{1 + \tan^2 x}{1 - \tan^2 x} dx$

A. $\log\left(\frac{1 - \tan x}{1 + \tan x}\right) + c$

B. $\log\left(\frac{1 + \tan x}{1 - \tan x}\right) + c$

C. $\frac{1}{2}\log\left(\frac{1 - \tan x}{1 + \tan x}\right) + c$

D. $\frac{1}{2}\log\left(\frac{1 + \tan x}{1 - \tan x}\right) + c$

Answer: D

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13. The area (in sq unit) of the triangle formed by $x + y + 1 = 0$ and the pair of straight lines $x^2 - 3xy + 2y^2 = 0$ is

A. $\frac{7}{12}$

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

C. $\frac{1}{12}$

D. $\frac{1}{6}$

Answer: C

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14. The equation $y^2 - x^2 + 2x - 1 = 0$, represents

A. a hyperbola

B. an ellipse

C. a pair of striaght lines

D. a rectangular hyperbola

Answer: C

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15. The value of the integral $\int_0^2 |x^2 - 1| dx$ is

A. 0

B. 2

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

D. -2

Answer: B

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16. If $AB = I$ and $B = A'$, then

A. $A^{-1} = A'$

B. $A^{-1} = A$

C. $A^{-1} = A^{2}$,

D. None of these

Answer: A

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17. If the system of equations $2x - 3y + 5z = 12, 3x + y + \lambda z = \mu x 7 + y + 8z = 17$ has infinitely many real solutions, then $\lambda + \mu$=

A. 5

B. 3

C. 9

D. None of these

Answer: C

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18. The differential equation of all parabolas whose axis are parallel to the y-axis is (a) $(b)(c)(d)\frac{(e)(f)d^{(g)3(h)}(i)y}{j}\Big((k)d(l)x^{(m)3(n)}(o)\Big)(p)(q)=0(r)$ (s) (b) $(t)(u)(v)\frac{(w)(x)d^{(y)2(z)}(aa)x}{bb}\Big((cc)d(dd)y^{(ee)2(ff)}(gg)\Big)(hh)(ii)=C(jj$ (kk) (c) *[Math Processing Error]* (ii) (d) *[Math Processing Error]* (ggg)

A. $\frac{d^3y}{dx^3}=0$

B. $\frac{d^2x}{dy^2}=c$

C. $\frac{d^3y}{dx^3}+\frac{d^2x}{dy^2}=0$

D. $\frac{d^2y}{dx^2}+2\frac{dy}{dx}=c$

Answer: A

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19. If $\left(x^2+y^2\right)dy=xydx$ and y(1)=1 and $y(x_o)=e$, then $x_o=$

A. $e\sqrt{2}$

B. $e\sqrt{3}$

C. $e\sqrt{5}$

D. $e/\sqrt{2}$

Answer: B

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20. The integrating factor of $x\frac{dy}{dx} + (1+x)y = x$is

A. x

B. 2x

C. $e^{x\log x}$

D. ex^x

Answer: D

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21. if $0 \leq x \leq \pi$ and $81^{\sin^2 x} + 81^{\cos^2 x} = 30$ then $x =$

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

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

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

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

Answer: A

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22. In ΔABC , a= 6 ,b=3 and cos (A-B) = 4/5 .Then are of triangle is

A. 8 sq units

B. 9 sq units

C. 6 sq units

D. None of these

Answer: B

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23. Find the equation of a normal to the curve $y = x \log_e x$ which is parallel to the line $2x - 2y + 3 = 0$.

A. (0,0)

B. (e,e)

C. $\left(e^2, 2e^2\right)$

D. $\left(e^{-2}, -2e^{-2}\right)$

Answer: D

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24. Area common to the circle $x^2 + y^2 = 9$ an the parbola $y^2 = 8x$ is

A. 0

B. $\frac{2\sqrt{2}}{3} + \frac{9\pi}{2} - 9\sin^{-1}\left(\frac{1}{3}\right)$

C. 16π

D. None of these

Answer: B

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25. If three points A, B and C have position vectors $\hat{i} + x\hat{j} + 3\hat{k}, 3\hat{i} + 4\hat{j} + 7\hat{k}$ and $y\hat{i} - 2\hat{j} - 5\hat{k}$ respectively are collinear, then (x, y) =

A. (2,-3)

B. (-2,3)

C. (2,3)

D. (-2,-3)

Answer: A

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26. If a,b,c are mutually perpendicular unit vectors then $|a+b+c|$=

A. 1

B. 3

C. $\sqrt{3}$

D. 0

Answer: C

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27. In a Boolean Algebra $p \vee p$ is equl to

A. 1

B. 0

C. 2

D. None of these

Answer: A

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28. If P be the point $(2, 6, 3)$ then the equation of the plane through P, at right angles to OP, where 'O' is the origin is

A. $2x + 6y + 3z = 7$

B. $2x - 6y + 3z = 7$

C. $2x + 6y - 3z = 49$

D. $2x + 6y + 3z = 49$

Answer: D

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29. सिद्ध कीजिए की $f(x) = \tan^{-1}(\sin x + \cos x), x > 0$ से प्रदत फलन $f, \left(0, \frac{\pi}{4}\right)$ में निरंतर वर्धमान फलन है |

A. (0π)

B. $\left(0, \frac{\pi}{2}\right)$

C. $\left(0, \frac{\pi}{4}\right)$

D. $\left(0, \frac{3\pi}{4}\right)$

Answer: C

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30. the equation of the circle passing through the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ and having centre at (0,3) is

A. $x^2 + y^2 - 6y - 7 = 0$

B. $x^2 + y^2 - 6y + 7 = 0$

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

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

Answer: A

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31. Equation of tangent to the parabola $y^2 = 16x$ at P(3,6) is

A. $4x - 3y + 12 = 0$

B. $3y - 4x - 12 = 0$

C. $4x - 3y - 24 = 0$

D. $3y - x - 24 = 0$

Answer: B

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32. If $\cos(A-B)=\frac{3}{5}$, $\tan A \cdot \tan B = 2$ which of the following is true

A. $\sin(A+B)=\frac{1}{5}$

B. $\sin(A+B)=-\frac{1}{5}$

C. $\cos(A-B)=\frac{1}{5}$

D. $\cos(A+B)=-\frac{1}{5}$

Answer: D

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33. Find the equation of a circle with centre (h, k) and touching the x - axis.

A. $x^2+y^2-2hx+h^2=0$

B. $x^2+y^2-2hx-2ky+h^2=0$

C. $x^2+y^2-2hx-2ky-h^2=0$

D. $x^2+y^2-2hx-2ky=0$

Answer: B

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34. Angle between tangents drawn to circle $x^2 + y^2 = 20$ from the point $(6, 2)$ is

A. $\pi / 2$

B. π

C. $\pi / 4$

D. 2π

Answer: A

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35. The valume of the parallelopiped whose coterminous edges are $\hat{i} - \hat{j} + \hat{k}, 2\hat{i} - 4\hat{j} + 5\hat{k}$ and $3\hat{i} - 5\hat{j} + 2\hat{k}$, is

A. 4 cu units

B. 3 cu units

C. 2 cu units

D. 8 cu units

Answer: D

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36. Consider the inequalities $x_1 + x_2 \leq , 2, 2x_1 + 5x_2 \geq 10, x_1, x_2 \geq 0.$

Which of the following point lie in the fesible region ?

A. (2,2)

B. (1,2)

C. (2,1)

D. (4,2)

Answer: C

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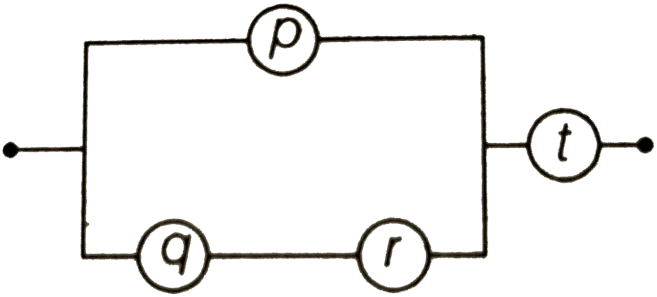
37. The switching function for the following network is



A. $(p \wedge q \vee r) \vee t$

B. $(p \wedge q \vee r) \wedge t$

C. $p \vee r \wedge q \vee t$

D. None of these

Answer: D

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38. Gien that X is discrete random variable which take the values, $0, 1, 2$ and $P(X=0)=\frac{144}{169}, P(X=1)=\frac{1}{169}$, then the value of $P(X=2)$ is

A. $\frac{145}{169}$

B. $\frac{24}{169}$

C. $\frac{2}{169}$

D. $\frac{143}{169}$

Answer: B

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39. The degree of the differential equation $\frac{d^3y}{dx^3}+2\sin\frac{dy}{dx}+y=0$ is

A. 3

B. 2

C. 1

D. not defined

Answer: D

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40. if $x = a\cos^4\theta, y = a\sin^4\theta, \text{then}\frac{dy}{dx}\text{at}\theta = \frac{3\pi}{4}$ is

A. -1

B. 1

C. $-a^2$

D. a^2

Answer: A

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41. For any square matrix A, AA^T is a

A. unit matrix

B. symmetric matrix

C. skew-symmetric matrix

D. diagonal matrix

Answer: B

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42. If the pair of straight lines $xy - x - y + 1 = 0$ & the line $ax + 2y - 3 = 0$ are concurrent then $a =$

A. -1

B. 0

C. 3

D. 1

Answer: D

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43. If $y = \sqrt{xs \in x + \sqrt{\sin x + \sqrt{\sin x + \ \to \infty}}}, provethat \frac{dy}{dx} = \frac{\cos x}{2y - 1}$

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

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

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

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

Answer: A

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44. The differential equation, obtained on eliminating A and B from the equations $y = A\cos \omega wt + B\sin \omega t$ is

A. $y_2 = \ -\omega^2 y$

B. $y_1 + y = 0$

C. $y_2 + y_1 = 0$

D. $y_1 - \omega^2 y = 0$

Answer: A

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45. The equation $\sin^{-1} x - \cos^{-1} x = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$ has

A. non solution

B. unique solution

C. infinite number of solution

D. None of above

Answer: B

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46. $\lim_{x \to 0} \frac{\tan x - \sin x}{x^3}$ is equal to

A. 0

B. 1

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

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

Answer: C

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47. If $2\cos x \neq 2\sin, x$ then the general solution of $\sin^2 x - \cos 2x = 2\sin 2x$ is

A. $n\pi + (-1)^n \frac{\pi}{2}, n \in Z$

B. $\frac{n\pi}{2}, n \in Z$

C. $(4\pi \pm 1)\frac{\pi}{2}, n \in Z$

D. $(2n-1)\pi, n \in Z$

Answer: C

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48. The equation of the plane passing through the points (1,2,3), (-1,4,2) and (3,1,1) is

A. $5x + y + 12z - 23 = 0$

B. $5x + 6y + 2z - 23 = 0$

C. $x + 6y + 2z - 13 = 0$

D. $x + y + z - 13 = 0$

Answer: B

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49. The eqution of the plane which meets the axes in A,B,C such that the centroid of the $\Delta BACis\left(\frac{1}{3}\frac{1}{3}, \frac{1}{3}\right)$ is given by

A. $x + y + z = 1$

B. $x + y + z = 2$

C. $\frac{x}{3} + \frac{y}{3} + \frac{z}{3} = 3$

D. $x + y + z = \frac{1}{3}$

Answer: A

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50. If $a = \hat{i} - \hat{j} - \hat{k}$ and $b = \lambda\hat{i} - 3\hat{j} + \hat{k}$ and the orthogonal projection of b on a is $\frac{4}{3}\left(\hat{i} - \hat{j} - \hat{k}\right)$ then λ is equal to

A. 0

B. 2

C. 12

D. -1

Answer: B

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