MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 06

Paper 2 Mathematics

1. The equation of the lines through ((1,1) and making angles of 45° with the line x+y=0 are

A. $x-1=0, x-y=0$

B. $x-y=0, y-1=0$

C. $x+y-2=0, y-1=0$

D. $x-1=0, y-1=0$

Answer: D

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2. If any point P is at the equal distances from points A(a+b,a-b) and B(a-b,a+b), then locus of a point is

A. x-y=0

B. ax+by=0

C. bx+ay=0

D. x+y=0

Answer: A

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3. The straight lines $y = \pm x$ intersect the parabola $y^2 = 8x$ in points P and Q, then length of PQ is

A. 4

B. $4\sqrt{2}$

C. 8

D. 16

Answer: D

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4. For the eliiipse $24x^2 + 9y^2 - 120x - 90y + 225 = 0$, the eccentricity is equal to

A. $\frac{2}{5}$

B. $\frac{3}{5}$

C. $\sqrt{\frac{15}{24}}$

D. $\frac{1}{5}$

Answer: C

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5. The length of the diameter of the circle which touches the x-axis at the point (1, 0) and

passes through the point (2, 3) is (1) $\frac{10}{3}$ (2) $\frac{3}{5}$ (3) $\frac{6}{5}$ (4) $\frac{5}{3}$

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

B. $\frac{3}{5}$

C. $\frac{6}{5}$

D. $\frac{5}{3}$

Answer: A

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6. if $A = \begin{bmatrix} 1 & -1 & 1 \\ 1 & 2 & 0 \\ 1 & 3 & 0 \end{bmatrix}$, then $|adjA|$ is equal to

A. -1

B. 1

C. 4

D. None of these

Answer: B

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7. The maximum value of function $f(x) = \sin x(1 + \cos x), \xi ni R$ is

A. $\frac{3^{3/2}}{4}$

B. $\frac{3^{5/3}}{4}$

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

D. $\frac{3^{7/5}}{4}$

Answer: A

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8. Rolle's theorem is not applicable to the function $f(x) = |x| \text{for } -2 \leq x \leq 2$ becase

A. f is continuous for $-2 \leq x \leq 2$

B. f is not derivable for x=0

C. $f(-2) = f(2)$

D. f is not a constant function

Answer: B

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9. The angle between the lines represented by the equation $2x^2 + 3xy - 5y^2 = 0$, is

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

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

C. $\tan^{-1}\left|\frac{12}{5}\right|$

D. $\tan^{-1}\left|\frac{7}{3}\right|$

Answer: D

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10. The differential coefficient of $f(\log x)$ with respect to x, where $f(x) = \log x,$ is

A. $\frac{x}{\log x}$

B. $(x \log x)^{-1}$

C. $\frac{\log x}{x}$

D. None of these

Answer: B

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11. $\lim_{x \to 0} \left[(1+3x)^{1/x}\right] = k$, then for continuity at x=0, k is

A. 3

B. -3

C. e^3

D. e^{-3}

Answer: C

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12. If 'a' and 'b' are unit vectors and $|a+b|=1$, then $|a-b|$ is equal to

A. $\sqrt{2}$

B. 1

C. $\sqrt{5}$

D. $\sqrt{3}$

Answer: D

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13. If $k\int_0^1 xf(3x)dx = \int_0^3 tf(t)dt$, then the value of k is

A. 9

B. 3

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

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

Answer: A

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14. If a function f(x) satisfies $f'(x) = g(x)$. Then, the value of $\int_a^b f(x)g(x)dx$ is

A. $\frac{1}{2}\left[\left\{(f(b)\right\}^2 - \{f(a)\}^2\right]$

B. $\frac{1}{2}\left[\{f(b)\}^2 + \{f(a)\}^2\right]$

C. $\frac{1}{2}[f(b) - f(a)]^2$

D. None of these

Answer: A

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15. The triangle formed by the tangent to the curve $f(x) = x^2 + bx - b$ at the point $(1, 1)$ and the coordinate axes, lies in the first quadrant. If its area is 2, then the value of b is

(a) -1 (b) 3 (c) -3 (d) 1

A. -1

B. $-\frac{5}{2}$

C. -3

D. 1

Answer: C

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16. $\int \cos^{-3/7} x \sin^{-11/7} x dx$ is equal to

A. $\log\left|\sin^{4/7} x\right| + c$

B. $\frac{4}{7}\tan^{4/7} x + c$

C. $-\frac{7}{4}\tan^{-4/7} x + c$

D. $\log\left|\cos^{3/7} x\right| + c$

Answer: C

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17. If $\int \frac{dx}{x \log x} = f(x) + \text{constant}$, then f(x) is equal to

A. $\frac{1}{\log x}$

B. $\log x$

C. $\log(\log x)$

D. $\frac{x}{\log x}$

Answer: C

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18. Five horses are in a race. Mr. A selects two of the horses at random and bets on them. The probability that Mr. A selected the winning horse is $3/5$ b. $1/5$ c. $2/5$ d. $4/5$

A. $\frac{4}{5}$

B. $\frac{3}{5}$

C. $\frac{1}{5}$

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

Answer: D

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19. Two numbers are selected randomly from the set $S = \{1, 2, 3, 4, 5, 6\}$ without replacement one by one. The probability that minimum of the two numbers is less than 4 is $1/15$ b. $14/15$ c. $1/5$ d. $4/5$

A. $1/15$

B. $14/15$

C. $1/5$

D. $4/5$

Answer: D

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20. If X follows a binomial distribution with parameters $n = 100$ and $p = \frac{1}{3}$, then $P(X = r)$ is maximum when

A. 16

B. 32

C. 33

D. None of these

Answer: C

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21. In any ΔABC, $\dfrac{\tan\frac{A}{2}-\tan\frac{B}{2}}{\tan\frac{A}{2}+\tan\frac{B}{2}}$ is equal to

A. $\dfrac{a-b}{a+b}$

B. $\dfrac{a-b}{c}$

C. $\dfrac{a-b}{a+b+c}$

D. $\dfrac{c}{a+b}$

Answer: B

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22. The value of $\sin\left[2\cos^{-1}\frac{\sqrt{5}}{3}\right]$ is

A. $\frac{\sqrt{5}}{3}$

B. $\frac{2\sqrt{5}}{3}$

C. $\frac{4\sqrt{5}}{9}$

D. $\frac{2\sqrt{5}}{9}$

Answer: C

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23. The equation of the two tangents from (-5,-4) to the circle $x^2 + y^2 + 4x + 6y + 8 = 0$ are

A. $x + 2y + 13 = 0, 2x - y + 6 = 0$

B. $2x + y + 13 = 0, x - 2y = 6$

C. $3x + 2y + 23 = 0, 2x - 3y + 4 = 0$

D. $x - 7y = 23, 6x + 13y = 4$

Answer: A

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24. If the sequence (a_n) is in GP, such that $a_4/a_6 = 1/4$ and $a_2 + a_5 = 216$, then a_1 is equal to

A. 12 or 108/7

B. 10

C. 7 or 54/7

D. None of these

Answer: A

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25. If the sum of first n terms of an AP 2,4,6, . . . 240, then the value of n is

A. 14

B. 15

C. 16

D. 17

Answer: B

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26. The value of $\frac{\sin 55^\circ - \cos 55^\circ}{\sin 10^\circ}$ is

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

B. 2

C. 1

D. $\sqrt{2}$

Answer: D

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27. Number of solutions of $|x-1| = \cos x$ is

A. 2

B. 3

C. 4

D. None of these

Answer: A

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28. The equation of family of a curve is $y^2 = 4a(x + a)$, then differential equation of the family is

A. $x = y' + x$

B. $y = y + x$

C. $y = 2y' + yy'^2$

D. $y + y' + y^2 = 0$

Answer: C

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29. Solutio of the differential eqaution $\frac{dy}{dx} + \frac{y}{x} = \sin x$ is

A. $x(y + \cos x) = \sin x + c$

B. $x(y - \cos x) = \sin x + c$

C. $x(y \cos x) = \sin x + c$

D. $x(y - \cos x) = \cos x + c$

Answer: A

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30. The two variables vectors $3x\hat{i} - y\hat{j} - 3\hat{k}$ and $x\hat{i} - 4y\hat{j} + 4\hat{k}$ are orthogonal to each other, then the locus of (x,y) is

A. hyperbola

B. circle

C. straight line

D. ellipse

Answer: A

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31. Let O be the origin and P be the point at a distance 3 units from origin. If direction ratios of OP are (1,-2,-2), then coordinates of P is given by

A. (1,-2-2)

B. (3,-6,-6)

C. (1/3,-2/3,-2/3)

D. (1/9,-2/9,-2/9)

Answer: A

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32. Equation of the plane containing the straight line $\frac{x}{2}=\frac{y}{3}=\frac{z}{4}$ and perpendicular to the plane containing the straight lines $\frac{x}{2}=\frac{y}{4}=\frac{z}{2}$ and $\frac{x}{4}=\frac{y}{2}=\frac{z}{3}$ is

A. x+2y-2z=0

B. 3x+2y-2z=0

C. x-2y+z=0

D. 5x+2y-4z=0

Answer: C

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33. the distance of the point $(2, 3, 4)$ from the line $(1 - x) = \frac{y}{2} = \frac{1}{3}(1 + z)$

A. $\frac{1}{7}\sqrt{35}$

B. $\frac{4}{7}\sqrt{35}$

C. $\frac{2}{7}\sqrt{35}$

D. $\frac{3}{7}\sqrt{35}$

Answer: D

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34. An OR gate is the Boolean functionn defined of

A. $f(x_1, x_2) = x_1 \cdot x_2, x_1, x_2 \in \{0, 1\}$

B. $f(x_1, x_2) = x_1 + x_2, x_1, x_2 \in \{0, 1\}$

C. $f(x_1, x_2) = x_1, x_1, x_2 \in \{0, 1\}$

D. $f(x_1, x_2) = x_2, x_1, x_2 \in \{0, 1\}$

Answer: B

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35. In a college, 25% of the boys and 10% of the girls offer mathematics. The girls constitute 60% of the total number of strudents. If a student is selected at random and is found to be studying Mathematics. The probability that the student is a girl is

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

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

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

D. $\frac{5}{6}$

Answer: B

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36. the area of triangle whose vertices are (1,2,3),(2,5-1) and (-1,1,2) is

A. 150 sq. unit

B. 145 sq unit

C. $\frac{\sqrt{155}}{2}$ sq unit

D. $\frac{155}{2}$ sq unit

Answer: C

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37. If $\lim_{x \to 0} \frac{\log(3+x) - \log(3-x)}{x} = k,$

then value of k is

A. 0

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

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

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

Answer: C

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38. if $a = 2\hat{i} + \hat{j} + 2\hat{t}k$ and $b = 5\hat{i} - 3\hat{j} + \hat{k}$

, then the projection of 'b' and 'a' is

A. 3

B. 4

C. 5

D. 6

Answer: A

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39. Given two mutually exclusive events A and B such that P(A)=0.45 and P(B)=0.35, $P(A \cap B)$ is equal to

A. $\frac{63}{400}$

B. 0.8

C. $\frac{63}{200}$

D. 0

Answer: D

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40. $\int \frac{3^x}{\sqrt{9^x - 1}} dx$ is equal to

A. $\frac{1}{\log 3} \log \left| 3^x + \sqrt{9^x - 1} \right| + c$

B. $\frac{1}{\log 3}\log\left|9^x+\sqrt{9^x-1}\right|+c$

C. $\frac{1}{\log 9}\log\left|3^x+\sqrt{9^x-1}\right|+c$

D. $\frac{1}{\log 9}\log\left|3^x-\sqrt{9^x-1}\right|+c$

Answer: A

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41. Angle between the line $r=\left(-\hat{i}+3\hat{j}+3\hat{k}\right)+t\left(2\hat{i}+3\hat{j}+6\hat{k}\right)$ and the plane $r\left(-\hat{i}+\hat{j}+\hat{k}\right)$ is

A. $\sin^{-1}\left(\frac{1}{\sqrt{3}}\right.$

B. $\sin^{-1}\left(\frac{1}{\sqrt{2}}\right.$

C. $\sin^{-1}\left(\frac{2}{\sqrt{3}}\right)$

D. $\sin^{-1}\left(\frac{3}{\sqrt{2}}\right)$

Answer: A

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42. Objective function of an LPP is

A. a constraint

B. a function to be optimised

C. a relation between the variables

D. none of the above

Answer: B

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43. If $f(x) = \sin x - \cos x$, the function decreasing in $0 \leq x \leq 2\pi$ is

A. $\left[\frac{5\pi}{6}, \frac{3\pi}{4}\right]$

B. $\left[\frac{\pi}{4}, \frac{\pi}{2}\right]$

C. $\left[\frac{3\pi}{2}, \frac{5\pi}{2}\right]$

D. none of these

Answer: D

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44. $\int \frac{\cos 2x - 1}{\cos 2x + 1} dx$ is equal to

A. tanx-x+c

B. x+tanx+c

C. x-tanx+c

D. $-x-\cot x+c$

Answer: C

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45. If θ is the angle between the vectors $a=2\hat{i}+2\hat{j}-\hat{k}$ and $b=6\hat{i}-3\hat{j}+2\hat{k}$, then

A. $\cos\theta = \frac{4}{21}$

B. $\cos\theta = \frac{3}{19}$

C. $\cos\theta = \frac{2}{19}$

D. $\cos\theta = \frac{5}{21}$

Answer: A

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46. The area enclosed between the curves $y = x^3$ and $y = \sqrt{x}$ is

A. $5/3$

B. $5/4$

C. $5/12$

D. $12/5$

Answer: C

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47. The equation of the plane passing through the point A(2,3,4) and parallel to the plane $5x - 6y + 7z = 3$, is

A. $5x - 6y + 7z + 20 = 0$

B. $5x - 6y + 7z - 20 = 0$

C. $-5x + 6y - 7z + 3 = 0$

D. $5x + 6y + 7z + 3 = 0$

Answer: B

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48. The value of $\lim_{x \to 2} \frac{3^{x/2} - 3}{x^3 - 9}$ is

A. 0

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

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

D. ln 3

Answer: C

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49. The minimum value of linear objective function z=2x+2y under linear constraints $3x + 2y \geq 12, x + 3y \geq 11$ and $x, y \geq 0$ is

A. 10

B. 12

C. 6

D. 5

Answer: A

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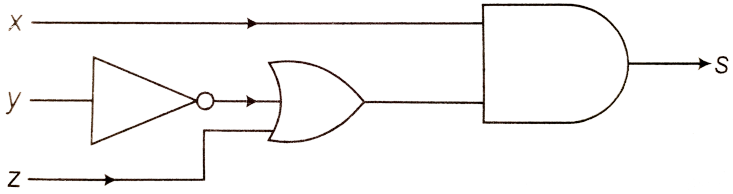
50. In the adjoining circuit, the output of s is



A. $x \cdot (y' + z)$

B. $x \cdot (y' + z')$

C. $x \cdot (y + z)$

D. $(x + y) \cdot z$

Answer: A

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