MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 18

Paper 2 Mathematics

1. The equation of the circle of radius 3 that lies in the fourth quadrant and touching the lines $x = 0$ and $y = 0$, is

A. $x^2 + y^2 - 6x + 6y + 9 = 0$

B. $x^2 + y^2 - 6x - 6y + 9 = 0$

C. $x^2 + y^2 + 6x - 6y + 9 = 0$

D. $x^2 + y^2 + 6x + 6y + 9 = 0$

Answer: A

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2. If the line $lx + my - 1 = 0$ touches the circle $x^2 + y^2 = a^2$, then prove that (l, m) lies on a circle.

A. $x^2 + y^2 - ax = 0$

B. $x^2 + y^2 = 1/a^2$

C. $y^2 = 4ax$

D. $x^2 + y^2 - ax + a^2 = 0$

Answer: B

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3. Given three straight lines $2x + 11y - 5 = 0, 24x + 7y - 20 = 0,$ and $4x - 3y - 2 = 0$. Then, they form a triangle one line bisects the angle between the other two two of them are parallel

A. from a triangle

B. are only concurrent

C. are concurrent with one line bisecting the angle between the other two

D. None of the above

Answer: C

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4. The line parallel to the X-axis and passing through the point of intersection of the lin $ax + 2by + 3b = 0$ and $bx - 2ay - 3a = 0$ where $(a, b) \neq (0, 0)$ is

A. above the X-axis at a distance of 3/2

B. above the X-axis at a distance of 2/3

C. below the X-axis at a distance of 2/3

D. below the X-axis at a distance of 3/2

Answer: D

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5. The point on the parabola $y^2 = 64x$ which is nearest to the line $4x + 3y + 35 = 0$has coordinates

A. $(9, 24)$

B. $(1, 81)$

C. $(4, -16)$

D. $(-9, -24)$

Answer: A

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6. Integrating factor of $\left(x + 2y^3\right)\frac{dy}{dx} = y^2$ is

A. $e^{\left(\frac{1}{y}\right)}$

B. $e^{-\left(\frac{1}{y}\right)}$

C. y

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

Answer: A

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7. In a ABC, if $b = 20,\ c = 21\ and \sin A = \frac{3}{5}$ find a.

A. 12

B. 13

C. 14

D. 15

Answer: B

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8. If $\int_0^a f(2a-x)dx = m$ and $\int_0^a f(x)dx = n$, then $\int_0^{2a} f(x)dx$ is equal to

A. $2m+n$

B. $m+2n$

C. $m-n$

D. $m+n$

Answer: D

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9. $\lim_{x \to 0} \frac{e^{x^2} - \cos x}{x^2}$ is equal to

A. 0

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

C. 1

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

Answer: D

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10. If $y = \tan^{-1}\left(\frac{a\cos x - b\sin x}{b\cos x + a\sin x}\right)$ then $\frac{dy}{dx} = ?$

A. 2

B. -1

C. $\frac{a}{b}$

D. 0

Answer: B

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11. The Rolle's theorem is applicable in the interval $-1 \leq x \leq 1$ for the function

A. $f(x) = x$

B. $f(x) = x^2$

C. $f(x) = 2x^3 + 3$

D. $f(x) = |x|$

Answer: B

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12. The radius of a cylinder is increasing at the rate of $3ms^{-1}$ and its altitude is decreasing at the rate of $4ms^{-1}$. The rate of change of volume when radius is $4m$ and altitude is 6m is

A. 80π cu m/s

B. 144π cu m/s

C. 80 cu m/s

D. 64 cu m/s

Answer: A

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13. The probability that A speaks truth is $\frac{4}{5}$, while this probability for B is $\frac{3}{4}$. The probability that they contradict each other when asked to speak on a fact is

A. $3/20$

B. $1/5$

C. $7/20$

D. $4/5$

Answer: C

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14. If $A = \begin{bmatrix} 6 & 8 & 5 \\ 4 & 2 & 3 \\ 9 & 7 & 1 \end{bmatrix} then B = \frac{A + A'}{2}$ is

A. $\begin{bmatrix} 6 & 6 & 7 \\ 6 & 2 & 5 \\ 7 & 5 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 0 & 2 & -2 \\ -2 & 5 & -2 \\ 2 & 2 & 0 \end{bmatrix}$

C. $\begin{bmatrix} 6 & 6 & 7 \\ -6 & 2 & -5 \\ -7 & 5 & 1 \end{bmatrix}$

D. $\begin{bmatrix} 0 & 6 & -2 \\ 2 & 0 & -0 \\ -2 & -2 & 0 \end{bmatrix}$

Answer: A

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15. If $\bar{a}, \bar{b}$ and $\bar{c}$ are perpendicular , $\bar{c}+\bar{a}, \bar{b}+\bar{c}$ and $\bar{a}+\bar{b}$ +respectively and if $\left|\bar{a}+\bar{b}\right|=6, \left|\bar{b}+\bar{c}\right|=8$ and $\left|\bar{c}+\bar{a}\right|=10$, then $\left|\bar{a}+\bar{b}+\bar{c}\right|$ is equal to

A. $5\sqrt{2}$

B. 50

C. $10\sqrt{2}$

D. 10

Answer: D

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16. The angle between the lines $x^2 + 4xy + y^2 = 0$ is

A. 60°

B. $15\%^\circ$

C. 30°

D. 45°

Answer: A

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17. Let f(x) be given that

$$f(x) = \begin{cases} x & \text{if x is rational} \\ 1 - x & \text{if x is irrational} \end{cases}$$

The number of points at which f(x) is continuous, is

A. $\propto$

B. 1

C. 0

D. None of these

Answer: C

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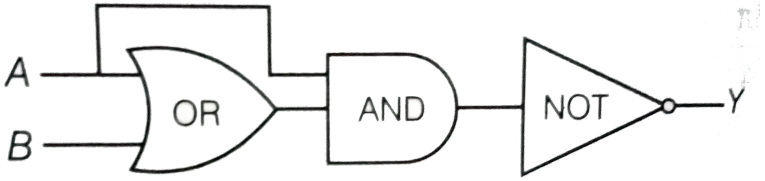
18. If in the figure shown $A = 1$ and $B = 0$, then oupput will be



A. 1

B. 0

C. uncertain

D. $\propto$

Answer: B

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19. If $\vec{a}$, $\vec{b}$, $and\,\vec{c}$ be non-zero vectors such that no tow are collinear or $\left(\vec{a}\times\vec{b}\right)\times\vec{c}=\frac{1}{3}\left|\vec{b}\right|\left|\vec{c}\right|\vec{a}$.

If θ is the acute angle between vectors $\vec{b}\, and\, \vec{c}$, then find the value of $s\int h\eta$.

A. $1/3$

B. $\sqrt{2}/3$

C. $2/3$

D. $2\sqrt{2}/3$

Answer: D

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20. Area of the region bounded by the curve $y = \begin{cases} x^2, & x < 0 \\ x, & x \geq 0 \end{cases}$ and the line $y = 4$ is

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

B. $\frac{20}{3}$ sq unit

C. $\frac{40}{3}$ sq unit

D. None of these

Answer: C

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21. The critical points of the function

$$f(x) = 2\sin^2\left(\frac{x}{6}\right) + \sin\left(\frac{x}{3}\right) - \left(\frac{x}{3}\right)$$

whose coordinates satisfy the inequality

$x^2 - 10 < -19.5x$ is

A. -6π

B. 6π

C. $\frac{9\pi}{2}$

D. -4π

Answer: A

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22. $\int_2^3 \{x\}\, dx$ is equal to (where {.} denotes, fractional part of x)

A. $\frac{17}{2}$

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

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

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

Answer: D

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23. Let $\vec{V} = 2\hat{i} + \hat{j} - \hat{k}$ and $\vec{W} = \hat{i} + 3\hat{k}$. It $\vec{U}$ is a unit vector, then the maximum value of the scalar triple product $\left[\vec{U} \quad \vec{V} \quad \vec{W}\right]$ is

A. -1

B. $\sqrt{10} + \sqrt{6}$

C. $\sqrt{59}$

D. $\sqrt{60}$

Answer: C

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24. $\lim_{x \to \infty} \left(1 - \frac{4}{x-1}\right)^{3x-1}$ is equal to

A. e^{12}

B. e^{-12}

C. e^{4}

D. e^{3}

Answer: B

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25. The middle point of chord $x + 3y = 2$ of the conic $x^2 + xy - y^2 = 1,$ is

A. $(5, -1)$

B. $(1, 1)$

C. $(2, 0)$

D. $(-1, 1)$

Answer: D

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26. If the sum of n terms of an A.P is $2n + 3n^2$, find the r^{th} term

A. $2r + 3r^2$

B. `3r^(2)-4r+1

C. $6r - 1$

D. $4r + 1$

Answer: C

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27. Find the value of $\left(320(32)^{1/6}(32)^{1/36}\infty\cdot\right.$

A. 16

B. 32

C. 64

D. 0

Answer: C

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28. Let $S = \{1, , 2, 34\}$. The total number of unordered pairs of disjoint subsets of S is equal a.25 b. 34 c. 42 d. 41

A. 25

B. 34

C. 42

D. 41

Answer: D

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29. If $n(A) = 4$ and $n(B) = 6$. Then, the number of one-one function from A to B is

A. 24

B. 60

C. 120

D. 360

Answer: D

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30. Let $f(x) = \left(x^2 - 1\right)^{n+1} + \left(x^2 + x + 1\right)$. Then f(x) has local extremum at $x = 1$, when n is (A) $n = 2$ (C) $n = 4$ (B) $n = 3$ (D)$n = 5$

A. $n = 2$

B. $n = 6$

C. $n = 4$

D. $n = 5$

Answer: D

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31. Find the differential equation of all parabolas whose axes are parallel to the x-axis an having latus rectum a.

A. 3

B. 1

C. 4

D. 2

Answer: A

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32. If

$$\int \frac{1}{x\sqrt{1-x^3}}dx = a\log\left|\frac{\sqrt{1-x^3}-1}{\sqrt{1-x^3}+1}\right| + b, thenaisequal$$

$\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $-\frac{1}{3}$ (d0 $-\frac{2}{3}$

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

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

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

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

Answer: B

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

A. F, T,T

B. T,T,F

C. T,F,F,

D. F,F,F

Answer: C

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34. Which of the following is not a proposition ?

A. $\sqrt{3}$ is a prime

B. $\sqrt{2}$ is irrational

C. Mathematics is interesting

D. 5 is an even interge

Answer: C

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35. The maximum value of Z = 4x + 2y subject to the constraints $2x + 3y \leq 18, x + y \geq 10, x, y \geq 0$ is

A. 36

B. 40

C. 20

D. None of these

Answer: D

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36. If $|a| < 1|b| < 1$ and $|x| < 1$ then the solution of $\sin^{-1}\left(\frac{2a}{1+a^2}\right) - s\frac{\cos^{-1}\left(1-b^2\right)}{1+b^2} = \frac{\tan^{-1}(2x)}{1-x^2}$ is

A. a

B. b

C. $\frac{a+b}{1-ab}$

D. $\frac{a-b}{a+ab}$

Answer: D

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37. In a ΔABC if $\begin{vmatrix} 1 & a & b \\ 1 & c & a \\ 1 & b & c \end{vmatrix} = 0,$ then $\sin^2 A + \sin^2 B + \sin^2 C$ is

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

B. $\frac{9}{4}$

C. $3\sqrt{3}$

D. 1

Answer: B

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38. The probability that in the toss of two dice, we obtain the sum 7 or 11 is

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

B. $\frac{1}{18}$

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

D. 23.108

Answer: C

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39. $\int \frac{x^{e-1}+e^{x-1}}{x^e+e^x}$ dx is equal to

A. $\log(x^e+e^x)+c$

B. $e\log(x^e+e^x)+c$

C. $\frac{1}{e}\log(x^e+e^x)+c$

D. None of these

Answer: C

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40. The area of the quadrilateral formed by the tangents at the end points of latus rectum of the

ellipse $5x^2 + 9y^2 = 45$ is

A. 9

B. 27/2

C. 27/4

D. None of these

Answer: D

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41. $\lim_{n \to \infty} \left(\frac{1}{n} + \frac{1}{n+1} + \ldots + \frac{1}{3n} \right)$ is equal to

A. $\log 2$

B. $\log 3$

C. log 5`

D. 0

Answer: B

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42. $\lim_{x \to 0} \left(\frac{x}{\sqrt{1+x} - \sqrt{1-x}} \right)$ is equal to

A. 0

B. 1

C. 2

D. -1

Answer: B

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43. The equations

$2x - 3y + 6z = 4, 5x + 7y - 14z = 13x + 2y - 4z = 0,$

have

A. unique solution

B. no solution

C. infinitely many solutions

D. None of the above

Answer: B

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44. The equation of the plane containing the two lines $\frac{x-1}{2}=\frac{y+1}{-1}=\frac{z}{3}$ and $\frac{x}{-1}=\frac{y-2}{3}=\frac{z+1}{-1}$ is

A. $8x-y+5z-8=0$

B. $8x+y-5z-7=0$

C. $x+8y+3z+6=0$

D. $8x+y-5z+7=0$

Answer: B

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45. If $2\tan^{-1}(\cos x) = \tan^{-1}(2\cos ecx)$, then the value of x is

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

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

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

D. None of these

Answer: B

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46. The value of $\int \frac{2x+2}{(x-2)^2(x-3)}dx$ is

A. $11\frac{\log(x-3)}{x-2} - \frac{8}{x-2}$

B. $11\frac{\log(x+3)}{x+2} - \frac{8}{x-2} + c$

C. $11\frac{\log(x-3)}{x-2} + \frac{8}{x-2} + c$

D. $11\frac{\log(x+30)}{x+2} + \frac{8}{x-2} + c$

Answer: C

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47. Find the intervals in which the function $f(x) = \log(1+x) - \frac{2x}{2+x}$ is increasing or

decreasing.

A. $(0, \infty)$

B. $(-\infty, 0)$

C. $(-\infty, \infty)$

D. None of these

Answer: A

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48. The equation to the perpendicular from the point $(\alpha, \beta\gamma)$ to the plane $ax + by + cz + d = 0$ is

A. $\frac{x-a}{a\alpha} = \frac{y-b}{b\beta} = \frac{z-c}{c\gamma}$

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

C. $\frac{x-\alpha}{a} = \frac{y-\beta}{b} = \frac{z-\lambda}{©}$

D. $\frac{x}{\alpha} = \frac{y}{\beta} = \frac{z}{\gamma}$

Answer: C

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49. The solution of the differential equation $\frac{dy}{dx} - y\tan x = e^x \sec x$ is

A. $y = e^x \cos x + c$

B. $y\cos x = e^x + c$

C. $y = e^x \sin x + c$

D. $y \sin n = e^x + c$

Answer: B

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50. The value of $\int_0^{\pi/2} \frac{\sin^2 x - \cos^2 x}{\sin^3 x + \cos^3 x} dx$ is

A. 0

B. 1

C. 2

D. 3

Answer: A

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