MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 02

Paper 2 Mathematics

1. $\int \sqrt{1+\sin\left(\frac{x}{4}\right)}\,dx$ is equal to

A. $B\left(\sin.\ \frac{x}{8} - \cos.\ \frac{x}{8}\right) + c$

B. $\left(\sin.\ \frac{x}{8} + \cos.\ \frac{x}{8}\right) + c$

C. $\frac{1}{8}\left(\sin.\ \frac{x}{8} - \cos.\ \frac{x}{8}\right) + c$

D. $8\left(\cos.\ \frac{x}{8} - \sin.\ \frac{x}{8}\right) + c$

Answer: A

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2. The angle between two planes $x + 2y + 2z = 3$ and $-5x + 3y + 4z = 9$ is

A. $\cos^{-1}.\frac{0\sqrt{2}}{20}$

B. $\cos^{-1}.\frac{3\sqrt{2}}{5}$

C. $\cos^{-1}.\frac{3\sqrt{2}}{10}$

D. $\cos^{-1}.\frac{19\sqrt{2}}{30}$

Answer: C

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3. What must be the matrix X , is $2X + \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} = \begin{bmatrix} 3 & 8 \\ 7 & 2 \end{bmatrix}$?

A. $\begin{bmatrix} 1 & 3 \\ 2 & -1 \end{bmatrix}$

B. $\begin{bmatrix} 1 & -3 \\ 2 & -1 \end{bmatrix}$

C. $\begin{bmatrix} 2 & 6 \\ 4 & -2 \end{bmatrix}$

D. $\begin{bmatrix} 2 & -6 \\ 4 & -2 \end{bmatrix}$

Answer: A

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4. Let truth values of p be F and q be T. then , truth vlaue of ~$(\sim pvq)$ is

A. T

B. F

C. Either T or F

D. Neither T or F

Answer: B

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5. $\frac{d}{dx}\left[\sin^{-1}\left(x\sqrt{1-x}-\sqrt{x}\sqrt{1-x^2}\right)\right]$ is equal to

A. $\frac{1}{2\sqrt{x(1-x)}} - \frac{1}{\sqrt{1-x^2}}$

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

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

D. $\frac{1}{\sqrt{x(1-x)(1-x)^2}}$

Answer: C

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6. A vertex of common graph of inequalities $2x + y \geq 2$ and $x - y \leq 3$, is

A. $(0, 0)$

B. $\left(\frac{5}{3}, -\frac{4}{3}\right)$

C. $\left(\frac{5}{3}, \frac{4}{3}\right)$

D. $\left(-\frac{4}{3}, \frac{5}{3}\right)$

Answer: B

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7. The derivative of $\sin^2 x$ with respect to $\cos^2 x$ is equal to....

A. $\tan^2 x$

B. $\tan x$

C. $-\tan x$

D. None of these

Answer: D

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8. If $A \times (B \times C) = B \times (C \times A)$ and [ABC] = 0, then $A \times (B \times C)$ is equal to

A. 0

B. $A \times B$

C. $B \times C$

D. $C \times A$

Answer: A

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9. $\int \cos(\log_e x) dx$ is equal to

A. $\frac{1}{2} \times [\cos(\log_e x) + \sin(\log_e x)]$

B. $(x)[\cos(\log_e x) + \sin(\log_e x)]$

C. $\frac{1}{2}x[\cos(\log_e x) - \sin(\log_e x)]$

D. $x[\cos(\log_e x) - \sin(\log_e x)]$

Answer: A

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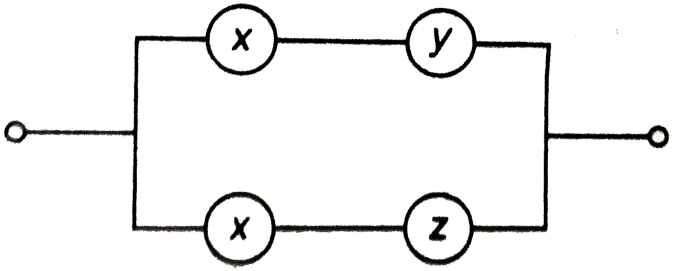
10. The switching function ffor switching network is



A. $x + y + z$

B. $x.y + x.z$

C. $x + y + x.z$

D. None of these

Answer: B

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11. The difference of the slopes of the lines given by the equation $x^2\left(\sec^2\theta - \sin^2\theta\right) - 2xy\tan\theta + y^2\sin^2\theta = 0$ is.

A. $\sin 2\theta$

B. $\cos 2\theta$

C. 1

D. None of these

Answer: D

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12. Let $p \wedge (q \vee r) = (p \wedge q) \vee (p \wedge r)$. Then this law is known as

A. commutative law

B. associative law

C. de-Morgan's law

D. distributive law

Answer: D

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13. If $|a| = |b| = 1$ and $|a + b| = \sqrt{3}$, then the value of $(3a - 4b)(2b + 5b)$ is

A. -21

B. $-\frac{21}{2}$

C. 21

D. $\frac{21}{2}$

Answer: B

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14. A particle moves in a straight line so that $s = \sqrt{t}$, then its acceleration is proportional to

A. $(\text{velocity})^3$

B. velocity

C. $(\text{velocity})^2$

D. $(\text{velocity})^{3/2}$

Answer: A

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15. Le t $f(x) = \begin{cases} \frac{\sin \pi x}{5x}, & x \neq 0 \\ k, & x = 0 \end{cases}$ if (x) is continous at $x = 0$, then k is equal to

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

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

C. 1

D. 0

Answer: A

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16. $\lim_{x \to 0} \frac{\log_e(1+x)}{3^x - 1}$ is equal to

A. $\log_e 3$

B. 0

C. 1

D. $\log_e e$

Answer: D

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17. The differential equation for which $\sin^{-1} x + \sin^{-1} y = c$ is given by

A. $\sqrt{1-x^2}dx + \sqrt{1-y^2} - dx = 0$

B. $\sqrt{1-x^2}dy + \sqrt{1-y^2} - dx = 0$

C. $\sqrt{1-x^2}dy - \sqrt{1-y^2} - dx = 0$

D. $\sqrt{1-x^2}dx - \sqrt{1-y^2} - dx = 0$

Answer: B

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18. The probability that in a family of 5 members,exactly two members have birthday on sunday is:-

A. $\frac{12 \times 5^3}{7^5}$

B. $\frac{10 \times 6^2}{7^5}$

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

D. $\frac{10 \times 6^3}{7^5}$

Answer: D

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19. The solution of $y' - y = 1, y(0) = -1$ is given by $y(x) =$

A. $-\exp(x)$

B. $-\exp(-x)$

C. -1

D. $\exp(x) - 2$

Answer: C

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20. There is a group of 265 persons who like either singing or dancing or painting. In this group 200 like singing, 110 like dancing and 55 like painting. If 60 persons like both singing and dancing, 30 like both singing and painting and10 like all three activities, then the number of persons who like only dancing and painting is

A. 10

B. 20

C. 30

D. 40

Answer: A

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21. Let R be a relation on N defined by $R = \{(x, y) : 2x + y = 10\}$, then domain of R is

A. reflexive

B. symmetric

C. transitive

D. None of these

Answer: B

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22. The period of $\sin^2\theta$ is

A. π^2

B. π

C. 2π

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

Answer: B

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23. Six numbers are in AP such that their sum is 3 . The first term is 4 times the third term . Then , the fifth term is

A. -15

B. -3

C. 9

D. -4

Answer: D

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24. The value of k such that the lines $2x - 3y + k = 0, 3x - 4y - 13 = 0$ and $8x - 11y - 33 = 0$ are concurrent is

A. 20

B. -7

C. 7

D. -20

Answer: B

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25. If one end of a diameter of the circle $x^2 + y^2 - 4x - 6y + 11 = 0$ is (3, 4), then find the coordinates of the other end of the diameter.

A. $(2, 1)$

B. $(1, 2)$

C. $(1, 1)$

D. None of these

Answer: B

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26. A man and his wife appear for an interview for two posts. The probability of the man's slection is 1/5 and that of his wife's slection is

$1/7$. The probability that atleast one of them is selected , is

A. $\frac{9}{35}$

B. $\frac{12}{35}$

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

D. $\frac{11}{35}$

Answer: D

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27. The area bounded by the curve $x = 3y^2 - 9$ and the line $x = 0, y = 0$ and $y = 1$ is

A. $8/3$ sq unit

B. 8 sq unit

C. $3/8$ sq unit

D. 3 sq unit

Answer: B

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28. The vector $\hat{i} + x\hat{j} + 3\hat{k}$ is rotated through an angle θ and doubled in magnitude then it becomes $4\hat{i} + (4x - 2)\hat{j} + 2\hat{k}$. The value of x is

A. $\left\{-\frac{2}{3}, 2\right\}$

B. $\left\{\frac{1}{3}, 2\right\}$

C. $\left\{\frac{2}{3}, 0\right\}$

D. $\{2, 7\}$

Answer: A

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29. If $\lim_{x \to \infty} \left(1 + \frac{a}{x} + \frac{b}{x^2}\right)^{2x} = e^2$, then

A. $a \in R, b \in R$

B. $a = 1, b \in R$

C. $a \in R, b = 2$

D. $a = 1, b = 2$

Answer: B

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30. For the function $f(x) = xe^x$, the point

A. $x = 0$ is a maximum

B. $x = 0$ is a minimum

C. $x = -1$is a maximum

D. $x = -1$is a minimum

Answer: D

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31. $\int x \log x dx$ is equal to

A. $\frac{x^2}{4}(2\log x - 1) + C$

B. $\frac{x^2}{2}(2\log x - 1) + C$

C. $\frac{x^2}{4}(2\log x + 1) + C$

D. $\frac{x^2}{2}(2\log x + 1) + C$

Answer: A

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32. A die is thrown 100 times. Getting an even number is considered a successes. Find the mean and variance of successes.

A. 10

B. 25

C. 18

D. 10

Answer: B

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33. The angle between the line $\frac{x-3}{2}=\frac{y-1}{1}=\frac{z+4}{-2}$ and the plane, $x+y+z+5=0$ is

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

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

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

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

Answer: D

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34. If in a triangle ABC, $3\sin A = 6\sin B = 2\sqrt{3}\sin C$, then the angle A is

A. 0°

B. 30°

C. 60°

D. 90°

Answer: D

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35. The differential equation of all circles which passes through the origin and whose centers lie on Y-axis is

A. $\left(x^2 - y^2\right)\frac{dy}{dx} - 2xy = 0$

B. $\left(x^2 - y^2\right)\frac{dy}{dx} + 2xy = 0$

C. $\left(x^2 - y^2\right)\frac{dy}{dx} - xy = 0$

D. $\left(x^2 - y^2\right)\frac{dy}{dx} + xy = 0$

Answer: A

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36. The value of the integral $\int_0^{\pi/2} \left(\sin^{100} x - \cos^{100} x\right) dx$ is

A. $\frac{1}{100}$

B. $\frac{100!}{(100)^{100}}$

C. $\frac{\pi}{100}$

D. 0

Answer: D

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37. If $8f(x) + 6f\left(\frac{1}{x}\right) = x + 5$ and $y = x^2(f(x),$ then $\frac{dy}{dx}$ at $x = -1$ is equal to 0 (b) $\frac{1}{14}$ (c) $-\frac{1}{4}$ (d) None of these

A. 0

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

C. $-\frac{1}{14}$

D. 1

Answer: C

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38. If $2a + 3b + 6c = 0$, then prove that at least one root of the equation $ax^2 + bx + c = 0$ lies in the interval (0,1).

A. $(0, 1)$

B. $(1, 2)$

C. $(2, 3)$

D. $(1, 3)$

Answer: A

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39. $\int \frac{\sin^{-1} x}{\sqrt{1-x^2}} dx$ is equal to

Where, C is an arbitrary constant.

A. $\log\left(\sqrt{1-x^2}\right) + C$

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

C. $\log\left(\sqrt{1-x^2}\right) + C$

D. $\sin\left(\cos^{-1x}\right) + C$

Answer: B

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40. If X and Y are independent binomial vatiates $B\left(5, \frac{1}{2}\right)$ and $B\left(7, \frac{1}{2}\right)$ and the value of $P(X+Y=3)$ is

A. $\frac{35}{47}$

B. $\frac{55}{1024}$

C. $\frac{220}{512}$

D. $\frac{11}{204}$

Answer: B

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41. $\sin\left(\frac{1}{2}\cos^{-1}.\frac{4}{5}\right)$ is equal to

A. $-\frac{1}{\sqrt{10}}$

B. $\frac{1}{\sqrt{10}}$

C. $-\frac{1}{10}$

D. $\frac{1}{10}$

Answer: B

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42. In a ΔABC, if A,B,C are in AP, then $\frac{a}{c}\sin 2C + \frac{c}{a}(\sin 2A)$ is equal to

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

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

C. 1

D. $\sqrt{3}$

Answer: D

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43. The general solution of the differential equation $\frac{dy}{dx} + \frac{1+\cos 2y}{1-\cos 2x} = 0$ is given by

A. $\tan y + \cot x = c$

B. $\tan y - \cot x = c$

C. $\tan x - \cot y = c$

D. $\tan x + \cot y = c$

Answer: B

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44. The number of values of x in the interval $[0, 5\pi]$ satisfying the equation $3\sin^2 x - 7\sin x + 2 = 0$ is

A. 0

B. 5

C. 6

D. 10

Answer: C

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45. Let $A(1, -1, 2)$ and $B(2, 3 - 1)$ be two points. If a point P divides AB internally in the ratio $2:3$, then the position vector of P is

A. $\frac{1}{\sqrt{5}}\left(\hat{i}+\hat{j}+\hat{k}\right)$

B. $\frac{1}{\sqrt{3}}\left(\hat{i}+6\hat{j}+\hat{k}\right)$

C. $\frac{1}{\sqrt{3}}\left(\hat{i}+\hat{j}+\hat{k}\right)$

D. $\frac{1}{5}\left(7\hat{i}+3\hat{j}+4\hat{k}\right)$

Answer: D

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46. If the line $y\cos\alpha = x\sin\alpha + a\cos\alpha$ be a tangent to the circle $x^2 + y^2 = a^2$, then

A. $\sin^2\alpha = 1$

B. $\cos^2\alpha = 1$

C. $\sin^2\alpha = a^2$

D. $\cos^2\alpha = a^2$

Answer: D

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47. The value of λ for which the curve $(7x+5)^2+(7y+3)^2=\lambda^2(4x+3y-24)^2$ represents a parabola is

A. $\pm\frac{6}{5}$

B. $\pm\frac{7}{5}$

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

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

Answer: B

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48. if $y = 4x + 3$ is parallel to a tangent to the parabola $y^2 = 12x$, then its distance from the normal parallel to the given line is

A. $\frac{213}{\sqrt{17}}$

B. $\frac{219}{\sqrt{17}}$

C. $\frac{211}{\sqrt{17}}$

D. $\frac{210}{\sqrt{17}}$

Answer: B

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49. Let the equation of an ellipse be $\frac{x^2}{144}+\frac{y^2}{25}=1$,Then , the radius of the circle with centre $\left(0,\sqrt{2}\right)$ and passing through the foci of the ellipse is

A. 9

B. 7

C. 11

D. 5

Answer: C

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50. The value of $\sin 50^\circ - \sin 70^\circ + \sin 10^\circ$ is

A. 0

B. 1

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

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

Answer: A

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