MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 14

Paper 2 Mathematics

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

A. 4

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

C. $\sqrt{12}$

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

Answer: A

Watch Video Solution

2. The parabola $y^2 = 4x$ and the circle $x^2 + y^2 - 6x + 1 = 0$

A. intersect at exactly one point

B. touch each other at two distinct points

C. touch each other at exactly one point

D. intersect at two distinct points

Answer: D

Watch Video Solution

3. The equation of circle which touches the line $y = x$ at origin and passes through the point (2,1) is $x^2 + y^2 + px + qy = 0$ Then p, q are

A. $-5, \ -5$

B. $-5, 5$

C. $5, \ -5$

D. None of these

Answer: B

Watch Video Solution

4. The measure of the chord intercepted by circle $x^2 + y^2 = 9$ and the line x-y+2= 0 is

A. $\sqrt{28}$

B. $2\sqrt{5}$

C. 7

D. 5

Answer: A

Watch Video Solution

5. If $\frac{5 + 9 + 13 + \text{...upto n terms}}{7 + 9 + 11 + \text{...upto 12 terms}} = \frac{5}{12}$, then n is equal to

A. 5

B. 6

C. 9

D. 12

Answer: B

Watch Video Solution

6. The number of solutions of the pair of equations $2s\in^2\theta-\cos 2\theta=0\quad 2\cos^2\theta-3\sin\theta=0$ in the interval $[0, 2\pi]$ is 0 (b) 1 (c) 2 (d) 4

A. Zero

B. one

C. two

D. four

Answer: C

Watch Video Solution

7. If $\sin 4A - \cos 2A = \cos 4A - \sin 2A$ $\left(\text{where, } 0 < A < \frac{\pi}{4}\right)$, then the value of tan 4A is

A. 1

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

C. $\sqrt{3}$

D. $\frac{\sqrt{3}-1}{\sqrt{3}+1}$

Answer: C

Watch Video Solution

8. Solve the differential equation $\frac{dy}{dx} = \frac{x(2\log x + 1)}{(\sin y + y\cos y)}$.

A. $y\sin y = x^2 \log x + c$

B. $y\sin y = x^2 + c$

C. $y\sin y = x^2 + \log x$

D. $y\sin y = x\log x + c$

Answer: A

Watch Video Solution

9. If $\sin\left(\frac{\sin^{-1}1}{5}+\cos^{-1}x\right)=1,$ then find the value of $x\cdot$

A. -1

B. $2/5$

C. $1/3$

D. $1/5$

Answer: D

Watch Video Solution

10. In a ΔABC,

$$(b+c)(bc)\cos A+(a+c)(ac)\cos B+(a+b)(ab)\cos C$$

is

A. $a^2+b^2+c^2$

B. $a^3+b^3+c^3$

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

D. $(a+b+c)(ab+bc+ca)$

Answer: B

Watch Video Solution

11. $f(x) = \frac{e^{2x} - 1}{e^{2x} + 1}$ is

A. an increasing

B. a decreasing

C. an even

D. None of these

Answer: A

Watch Video Solution

12. Find the length of normal to the curve $x = a(\theta + \sin\theta), y = a(1 - \cos\theta)$ at $\theta = \frac{\pi}{2}$.

A. 2a

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

C. $\frac{a}{\sqrt{2}}$

D. $\sqrt{2}a$

Answer: D

Watch Video Solution

13. If $y = \left(x + \sqrt{1 + x^2}\right)^n$ then $(1 + x^2)\frac{d^2y}{dx^2} + x\frac{dy}{dx}$

A. n^2y

B. $-n^2y$

C. $-y$

D. $2x^2y$

Answer: A

Watch Video Solution

14. $\frac{d}{dx}\left[\log_e e^{\sin\left(x^2\right)}\right]$ is equal to

A. $2\cos\left(x^2\right)$

B. $2\cos x$

C. $2x.\cos x$

D. $2x\cos\left(x^2\right)$

Answer: D

Watch Video Solution

15. The area enclosed between the curve $y = \log_e(x + e)$ and the coordinate axes is

A. 4 sq units

B. 3 sq units

C. 2 sq units

D. 1 sq unit

Answer: D

Watch Video Solution

16. If

$$f(x)=\begin{cases}\frac{1-\sin x}{\pi-2x} & ,x\neq\frac{\pi}{2}\\ \lambda & ,x=\frac{\pi}{2}\end{cases}$$, be continuous at $x=\frac{\pi}{2}$,

then value of λ is

A. -1

B. 1

C. 0

D. 2

Answer: C

Watch Video Solution

17. The value of $\lim_{x \to 0} \frac{(1 - \cos 2x)\sin 5x}{x^2 \sin 3x}$ is

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

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

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

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

Answer: A

Watch Video Solution

18. The differential equation of the family of parabolas with focus at the origin and the X-axis as axis, is

A. $y\left(\frac{dy}{dx}\right)^2 + 4x\frac{dy}{dx} = 4y$

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

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

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

Answer: B

Watch Video Solution

19. $\int_{-2}^{2} \sin^3 x|x|dx$ is equal to

A. 0

B. 1

C. 4

D. None of these

Answer: A

Watch Video Solution

20. Find the antiderivative of $f(x) = In(Inx) + (Inx)^{-2}$ whose graph passes through (e, e).

A. $x\left[\log(\log x) + (\log x)^{-1}\right]$

B. $x\left[-\log(\log x) + (\log x)^{-1}\right] + e$

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

D. None of the above

Answer: C

Watch Video Solution

21. A basket contains 5 apples and 7 oranges and another basket contains 4 apples and 8 oranges. One fruit is picked out from each basket. The probability that the fruits are both apples or both oranges, is

A. $24/144$

B. $56/144$

C. $68/144$

D. $76/144$

Answer: D

Watch Video Solution

22. For the following linear programming problem minimize $Z = 4x + 6y$ subject to the constraints $2x + 3y \geq 6$, $x + y \leq 8$, $y \geq 1$, $x \geq 0$, the solution is

A. (0, 2) and (1, 1)

B. (0, 2) and $\left(\frac{3}{2}, 1\right)$

C. (0, 2) and (1, 6)

D. (0, 2) and (1, 5)

Answer: B

Watch Video Solution

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

A. F, T

B. F, F

C. T, T

D. T, F

Answer: D

Watch Video Solution

24. Which of the following pair of straight lines intersect at right angle?

A. $2x^2 = y(x + 2y)$

B. $(x + y)^2 = x(y + 3x)$

C. $2y(x + y) = xy$

D. $y = \pm 2x$

Answer: A

Watch Video Solution

25. If $\bar{u}, \bar{v}, \overline{w}$ are three non coplanar vectors then $(\bar{u}+\bar{v}-\overline{w}).\{(\bar{u}-\bar{v})\times(\bar{v}-\overline{w})\}=$

A. 0

B. $u \cdot (v \times w)$

C. $u \cdot (w \times v)$

D. $3u \cdot (v \times w)$

Answer: B

Watch Video Solution

26. A five digit number is chosen at random. The probability that all the digits are distinct and digits at odd places are odd and digits at even places are even, is

A. $\frac{1}{60}$

B. $\frac{2}{75}$

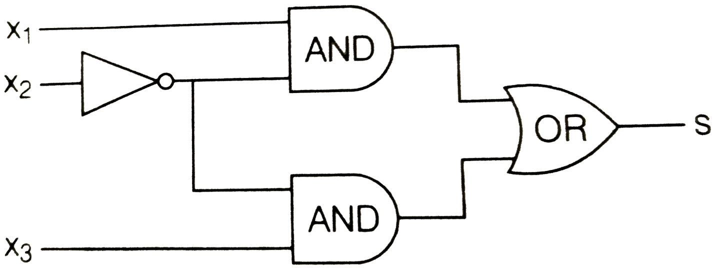
C. $\frac{1}{50}$

D. $\frac{1}{75}$

Answer: D

Watch Video Solution

27. The output s as a Boolean expression in the inputs x_1, x_2 and x_3 for the logic circuit in the following figure is



A. $x_1 \cdot x_2' + x_2' + x_3$

B. $x_1 + x_2' \cdot x_3 + x_3$

C. $(x_1 \cdot x_2)' + x_1 x_2' x_3$

D. $x_1 \cdot x_2' + x_2' \cdot x_3$

Answer: D

Watch Video Solution

28. If

$$\int \frac{\log\left(x+\sqrt{1+x^2}\right)}{\sqrt{1+x^2}}dx = \text{gof}(x) + \text{constant, then}$$

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

B. $f(x) = \log\left(x + \sqrt{x^2+1}\right)$ and $g(x) = x^2$

C. $f(x) = \log\left(x + \sqrt{x^2+1}\right)$ and $g(x) = \frac{x^2}{2}$

D. $f(x) = \frac{x^2}{2}$ and $g(x) = \log\left(x + \sqrt{x^2+1}\right)$

Answer: C

Watch Video Solution

29. If $y = f(x)$ and $y \cos x + \cos y = \pi$, then the value of f''(0) is

A. π

B. $-\pi$

C. 0

D. 2π

Answer: A

Watch Video Solution

30. The statement $(p \Rightarrow q) \Leftrightarrow (\sim p \wedge q)$ is a

A. tautology

B. contradiction

C. Neither (a) nor (b)

D. None of these

Answer: C

Watch Video Solution

31. In order that the function $f(x)=(x+1)^{\cot x}$ is continuous at x = 0, f(0) must be defined as

A. $f(0)=\frac{1}{e}$

B. $f(0)=0$

C. $f(0) = e$

D. None of these

Answer: C

Watch Video Solution

32. If $\log_x ax$, $\log_x bx$ and $\log_x cx$ are in AP, where a, b, c and x, belong to $(1, \infty)$, then a, b and c are in

A. AP

B. HP

C. GP

D. None of these

Answer: C

Watch Video Solution

33. The angle between the straight lines x -y $\sqrt{3} = 5$ and $\sqrt{3}x + y = 7$ is

A. 90°

B. 60°

C. 75°

D. 30°

Answer: A

Watch Video Solution

34. If S is a set with 10 elements and $A = \{(x, y) : x, y \in S, x \neq y\}$, then the number of elements in A is

A. 100

B. 90

C. 50

D. 45

Answer: B

Watch Video Solution

35. Let r be relation from R (set of real numbers) to R defined by $r = \{(a, b) \mid a, b \in R \text{ and } a - b + \sqrt{3}$ isan irrational number$\}$. The relation r is

A. an equivalence relation

B. only reflexive

C. only symmetric

D. only transitive

Answer: B

Watch Video Solution

36. Let $f(x) = \int e^x(x-1)(x-2)dx.$ Then f decreases in the interval $(-\infty, -2)$ (b) $-2, -1)$ $(1, 2)$ (d) $(2, +\infty)$

A. $(-\infty, -2)$

B. $(-2, -1)$

C. $(1, 2)$

D. $(2, \infty)$

Answer: C

Watch Video Solution

37. The number of critical points of

$f(x) = |x|(x-1)(x-2)(x-3)$ is

A. 1

B. 2

C. 3

D. 4

Answer: D

Watch Video Solution

38. The shaded region for the inequality $x + 5y \leq 6$ is

A. at the non-origin side of $x+5y=6$

B. to the origin side of $x+5y=6$

C. to the either side of $x+5y=6$

D. to the either side of $x-5y=6$

Answer: B

Watch Video Solution

39. For an LPP, minimise Z = 2x + y subject to constraint $5x+10y\leq 50$, $x+y\geq 1$, $y\leq 4$ and $x, y\geq 0$ then Z is equal to

A. 0

B. 1

C. 2

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

Answer: B

Watch Video Solution

40. Let [x] denotes the greatest integer less than or equal to x. If $f(x) = [x \sin \pi x]$, then f(x) is

A. continuous at x = 0

B. continuous in (-1, 0)

C. differentiable in (-1,1)

D. All of these

Answer: C

Watch Video Solution

41. If f(0) = 0 and $f(x) = \frac{1}{(1 - e^{-1/x})}$ for $x \neq 0$.

Then, only one of the following statements on f(x) is true. That is f(x) is

A. continuous at x = 0

B. not continuous at x = 0

C. both continuous and differentiable at x = 0

D. not defined at x = 0

Answer: B

Watch Video Solution

42. $\int_0^{10} |x(x-1)(x-2)|dx$ is equal to

A. 160.05

B. 1600.5

C. 16.005

D. None of these

Answer: B

Watch Video Solution

43. Statement I $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{1}{1+\tan^3 x}$ is $\frac{\pi}{12}$ Statement II $\int_a^b f(x)dx = \int_a^b f(a+b-x)dx$

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

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

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

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

Answer: A

Watch Video Solution

44. Function $f(x) = \{x - 1, x < 2 \text{ and } 2x - 3, x \geq 2$ is a continuous function

A. for x = 2 only

B. for all real values of x such that $x \neq 2$

C. for all real values of x

D. for all integral values of x only

Answer: C

Watch Video Solution

45. Area of the region bounded by the curves $y = 2^x, y = 2x - x^2, x = 0$ and $x = 2$ is given by :

A. $3/\log 2 - 4/3$ sq unit

B. $3/\log 2 + 4/3$ sq unit

C. $3\log 2 + 4/3$ sq unit

D. $3\log 2 - 4/3$ sq unit

Answer: A

Watch Video Solution

46. The equation of plane passing through a point A(2, -1, 3) and parallel to the vectors a = (3, 0, -1) and b = (-3, 2, 2) is

A. $2x - 3y + 6z - 25 = 0$

B. $2x - 3y + 6z + 25 = 0$

C. $3x - 2y + 6z - 25 = 0$

D. $3x - 2y + 6z + 25 = 0$

Answer: A

Watch Video Solution

47. Show that the disease of the point of intersection of the line $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{12}$ and the plane $(x - y + z = 5)$ from the point $(-1, -5, -10)$ is 13 units.

A. 13

B. 12

C. 11

D. 8

Answer: A

Watch Video Solution

48. If $|A| = 3, |B| = 4, |C| = 5$ and a, b, c are such that each is perpendicular to the sum of other two, then $|a + b + c|$ is

A. $5\sqrt{2}$

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

C. $10\sqrt{2}$

D. $10\sqrt{3}$

Answer: A

Watch Video Solution

49. If a, b, c are three unit vectors such that $a + b + c = 0$. Where 0 is null vector, then $a.\, b + a.\, c + c.\, a$ is

A. -3

B. -2

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

D. 0

Answer: C

Watch Video Solution

50. $a.\hat{i} = a.\left(2\hat{i} + \hat{j}\right) = a.\left(\hat{i} + \hat{j} + 3\hat{k}\right) = 1$, then a is equal to

A. $\hat{i} - \hat{k}$

B. $\left(3\hat{i} + 3\hat{j} + \hat{k}\right)/3$

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

D. $\left(3\hat{i} - 3\hat{j} + \hat{k}\right)/3$

Answer: D

Watch Video Solution