MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 15

Paper 2 Mathematics

1. The number of elements in the set $\{(a, b): 2a^2 + 3b^2 = 35. a. b \in Z\}$,where Z is the set of all integers, is

A. 2

B. 4

C. 8

D. 12

Answer: A

2. If R is a relation from set $A = \{11, 12, 13\}$ to set $B = \{8, 10, 12\}$ defined by $y = x - 3$, then write R^{-1}.

A. $P\left\{\begin{array}{cc} 8 & 11 \\ 10 & 13 \end{array}\right)\}$

B. $\{(11, 18), (13, 10)\}$

C. $\{(10, 13), (8, 11)\}$

D. None of these

Answer: B

Watch Video Solution

3. Find the radius of the circle with the polar equation $r^2 - 8r\left(\sqrt{3}\cos\theta + \sin\theta + 15 = 0\right.$

A. 8

B. 7

C. 6

D. 5

Answer: B

Watch Video Solution

4. A circle passes through the points (0,0) and (0, 1) and also touches the circie $x^2 + y^2 = 16$ The radius of the circle is

A. 1

B. 2

C. 3

D. 4

Answer: B

Watch Video Solution

5. If $eande'$ the eccentricities of a hyperbola and its conjugate, prove that $\frac{1}{e^2}+\frac{1}{e'^2}=1$.

A. 0

B. 1

C. 2

D. 3

Answer: B

Watch Video Solution

6. Find the general solution of the differential equation

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

A. $(x + a)(x + ay) = cy$

B. $(x + a)(1 - ay) = cy$

C. $(x+a)(1-ay)=c$

D. None of these

Answer: B

Watch Video Solution

7. The switching function for given switching network is

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

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

C. $(xy') + (yz') + (zx')$

D. None of these

Answer: A

View Text Solution

8. A bag contains 5 black balls, 4 white balls and 3 red balls. If a ball is selected randomwise the probability that it is black or red ball is a. 1/3 b. 1/4 c. /12 d. 2/3

A. $1/3$

B. $1/4$

C. $5/12$

D. $2/3$

Answer: D

Watch Video Solution

9. In a lottery there were 90 tickets numbered 1 to 90. Five tickets were drawn at random. The probability that two of the tickets drawn numbers 15 and 89 is

A. $2/801$

B. $2/263$

C. $1/267$

D. $1/623$

Answer: A

Watch Video Solution

10. Area included between curves $y = x^2 - 3x + 2$ and $y = -x^2 + 3x - 2$ is

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

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

C. sq unit

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

Answer: D

Watch Video Solution

11. If $f(x) = \begin{vmatrix} \sin x & \cos x & \tan x \\ x^3 & x^2 & x \\ 2x & 1 & 1 \end{vmatrix}$, *then* $\lim_{x \to 0} \frac{f(x)}{x^2}$ is

A. 3

B. -1

C. 0

D. 1

Answer: D

Watch Video Solution

12. The value of $\int \frac{dx}{\sqrt{\sin(2x+\theta)+\sin\theta}}$ is

A. $\sqrt{(\tan x+\tan\theta)\sec\theta}+c$

B. $\sqrt{2(\tan x+\tan\theta)\sec\theta}+c$

C. $\sqrt{2(\sin x+\tan\theta)\sec\theta}+c$

D. None of above

Answer: B

Watch Video Solution

13. If the function $f(x) = 2x^3 - 9ax^2 + 12x^2x + 1, wherea > 0,$ attains its maximum and minimum at $pandq$, respectively, such that $p^2 = q,$ then a equal to 1 (b) 2 (c) $\frac{1}{2}$ (d) 3

A. 3

B. 1

C. 2

D. $1/2$

Answer: C

Watch Video Solution

14. If a cone of maximum volume is inscribed in a given sphere, then the ratio of the height of the cone to the diameter of the sphere is $3/4$ (b) $1/3$ (c) $1/4$ (d) $2/3$

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

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

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

D. $\frac{1}{4}$

Answer: A

Watch Video Solution

Watch Video Solution

15. If f(x) satifies of conditiohns of Rolle's theorem in [1,2] and f(x) is continuous in [1,2] then $\therefore \int_1^2 f'(x)dx$ is equal to

A. 3

B. 0

C. 1

D. 2

Answer: B

Watch Video Solution

16. An AND gote is the Boolean function defined by

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

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

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

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

Answer: A

Watch Video Solution

17. If matrix $A = \begin{bmatrix} 3 & 2 & 4 \\ 1 & 2 & -1 \\ 0 & 1 & 1 \end{bmatrix}$ and $A^{-1} = \frac{1}{k}$ adj

A, then k is

A. 7

B. -7

C. 1//7`

D. 11

Answer: D

Watch Video Solution

18. 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

Watch Video Solution

19. All chords of the curve $3x^2 - y^2 - 2x + 4y = 0$ which subtend a right angle at the origin, pass through the fixed point

A. $(1, 2)$

B. $(1, -2)$

C. $(-1, 2)$

D. $(-1, 2)$

Answer: B

Watch Video Solution

20. $\tan^{-1}\left(\frac{\sqrt{1+x}+\sqrt{1-x}}{\sqrt{1+x}-\sqrt{1-x}}\right)$

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

B. $\frac{1}{\sqrt{1-x^2}}$

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

D. x

Answer: C

Watch Video Solution

21. Let $f(x) = (x-7)^2(x-2)^7, x \in [2,7]$. the value of $\theta \in (2,7)$ such that $f'(\theta) = 0$ is equal to

A. $\frac{48}{4}$

B. $\frac{53}{9}$

C. $\frac{53}{7}$

D. $\frac{49}{9}$

Answer: B

Watch Video Solution

22. if $x^2 + y^2 = t - \frac{1}{t}$ and$x^4 + y^4 = t^2 + \frac{1}{t^2}$then prove that $\frac{dy}{dx} = \frac{1}{x^3 y}$

A. $\frac{1}{x^2 y^2}$

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

C. $\frac{1}{x^2 y^2}$

D. $\frac{1}{x^3 y}$

Answer: D

Watch Video Solution

23. If $f(x) = x\left(\sqrt{x} + \sqrt{(x+1)}\right.$, then

A. f (x) is continuous but not differentiable at $x = 0$

B. f (x) is differentiable at $x = 0$

C. f (x) is not differentiable at $x = 0$

D. None of the above

Answer: C

Watch Video Solution

24. The equation of an ellipse whose eccentricity is 1/2 andthe vertices are (4, 0) and (10, 0) is

A. $3x^2 + 4y^2 - 42 + 120 = 0$

B. $3x^2 + 4y^2 + 42x + 120 = 0$

C. $3x^2 + 4y^2 + 42x + 120 = 0$

D. $3x^2 + 4y^2 - 42x - 120 = 0$

Answer: A

 Watch Video Solution

25. The parametric representation of a point of the ellipse whhose foci are $(3, 0)$ and $(-1, 0)$ and accentricity 2/3 is

A. $\left(1+3\cos\theta\sqrt{3}\sin\theta\right)$

B. $(1+3\cos\theta, 5\sin\theta)$

C. $\left(1+3\cos\theta, 1+\sqrt{5}\sin\theta\right)$

D. $\left(1+3\cos\theta, \sqrt{5}\sin\theta\right)$

Answer: D

Watch Video Solution

26. In an artimetic progression, the 24th term is 100. Then, the sum of the first 47 terms of the arithmetic progression is

A. 2300

B. 2350

C. 2400

D. 4700

Answer: D

Watch Video Solution

27. The length of the perpendicular from the origin to the line $\frac{x \sin \alpha}{b} - \frac{y \cos \alpha}{a} - 1 = 0$ is

A. $\frac{|ab|}{\sqrt{a^2 \cos^2 \alpha - b^2 \sin^2 \alpha}}$

B. $\frac{|ab|}{\sqrt{a^2\cos^2\alpha + b^2\sin^2\alpha}}$

C. $\frac{|ab|}{\sqrt{a^2\sin^2\alpha - b^2\cos^2\alpha}}$

D. $\frac{|ab|^2}{\sqrt{a^2\sin^2\alpha + b^2\cos^2\alpha}}$

Answer: D

Watch Video Solution

28. A line has slope m and y- intercept 4. The distance betwee the origin and the line is equal to

A. $\frac{4}{\sqrt{1-m^2}}$

B. $\frac{4}{\sqrt{\sqrt{m^2-1}}}$

C. $\frac{4}{\sqrt{\sqrt{m^2+1}}}$

D. $\frac{4m}{\sqrt{\sqrt{m^2+1}}}$

Answer: C

Watch Video Solution

29. If the function $f(x) = \begin{cases} \frac{1-\cos x}{x^2}, & \text{for } x \neq 0 \\ k & \text{for } x = 0 \end{cases}$

continuous at x = 0, then the value of k is

A. 1

B. 0

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

D. -1

Answer: C

Watch Video Solution

30. The value of $\lim_{x \to \infty} \left(\frac{\pi}{2} - \tan^{-1} x \right)^{x/1}$ is

A. 1

B. 0

C. -1

D. e

Answer: B

Watch Video Solution

31. $\int_0^{\pi} \frac{1}{1+\sin x} dx$ is equal to

A. 1

B. 2

C. -1

D. -2

Answer: B

Watch Video Solution

32. The area bounded in the first quadrant by the normal at $(1, 2)$ on the curve $, y^2 = 4x, x -$ axis &the curve is given by (A) $\frac{10}{3}$ (B) $\frac{7}{3}$ (C) $\frac{4}{3}$ (D) $\frac{9}{2}$

A. 10/3

B. $7/3$

C. $4/3$

D. None of these

Answer: A

Watch Video Solution

33. Probability of throwing 16 in one throw with there dice is

A. $\frac{1}{36}$

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

C. $\frac{1}{72}$

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

Answer: A

Watch Video Solution

34. The probability of choosing a number divisible by 6 or 8 from among 1 to 90 is

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

B. $\frac{1}{90}$

C. $\frac{1}{30}$

D. $\frac{23}{90}$

Answer: D

Watch Video Solution

35. The records of a hospital show that 10% of the cases of a certain disease are fatal. If 6 patients are suffering from the disease, then the probability that only three will die is

A. 8748×10^{-5}

B. 1458×10^{-5}

C. 1458×10^{-6}

D. 41×10^{-6}

Answer: B

Watch Video Solution

36. In $\Delta ABC, a = 2, b = 3$ and $\sin A = \frac{2}{3}$, then B is equal to

A. 30°

B. 60°

C. 90°

D. 120°

Answer: C

Watch Video Solution

37. If $\sin^{-1} x = \frac{\pi}{5}, f \text{ or } somex \in (-1, 1)$, then find the value of $\cos^{-1} x$.

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

B. $\frac{5\pi}{10}$

C. $\frac{7\pi}{10}$

D. $\frac{9\pi}{10}$

Answer: A

Watch Video Solution

38. Equation $\cos 2x + 7 = a(2 - \sin x)$ can have a real solution for

A. all values of a

B. $a \in [2, 6]$

C. $a \in (-\infty, 2)$

D. $a \in (0, \infty)$

Answer: B

Watch Video Solution

39. An integrating factor of the differential equation $y \log y \frac{dx}{dy} + x - \log y = 0$, is

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

B. $\log(\log y)$

C. $1 + \log y$

D. $\log y$

Answer: D

Watch Video Solution

40. The general solution of the differential equaiton $(1+y^2)dx+(1+x^2)dy=0$, is

A. $x-y=c(1-xy)$

B. $x-y=c(1+xy)$

C. $x+y=c(1-xy)$

D. $x+y=c(1+xy)$

Answer: C

Watch Video Solution

41. $\int(e^x+e^{-x})^2\cdot(e^x-e^{-x})dx$ is equal to

A. $e^x + c$

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

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

D. $\frac{1}{3}\left(d^x + e^{-x}\right)^3 + c$

Answer: D

Watch Video Solution

42. The ratio in which YZ-plane divided the line segment joining $(-3, 4, -2)$ and $(2, 1, 3)$, is

A. $-4:1$

B. $3:2$

C. $-2:3$

D. $1:4$

Answer: B

Watch Video Solution

43. The cosine of the angle of the triangle with vertices $A(1, -1, 2)$, $B(6, 11, 2)$ and $C(1, 2, 6)$ is

A. $\frac{63}{65}$

B. $\frac{36}{65}$

C. $\frac{16}{65}$

D. $\frac{13}{64}$

Answer: B

Watch Video Solution

44. The angle between the line $\frac{3x-1}{3} = \frac{y+3}{-1} = \frac{5-2z}{4}$ and the plane $3x - 3y - 6z = 10$ is equal to

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

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

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

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

Answer: D

Watch Video Solution

45. Find the co-ordinates of the foot of perpendicular drawn from point $A(1, 6, 3)$ to the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$.

A. 3

B. $\sqrt{11}$

C. $\sqrt{13}$

D. 5

Answer: C

Watch Video Solution

46. If A and B are two enents such that $P(A \cup B) = \frac{3}{4}, P(A \cap B) = \frac{1}{4}, P(\overline{A}) = \frac{2}{3},$ then $P(\overline{A} \cap B)$ is equal to

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

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

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

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

Answer: A

Watch Video Solution

47. एक व्यक्ति के बारे में ज्ञात है कि वह 4 में से 3 बार सत्य बोलता है। वह एक पासे को उछालता है और बतलाता है कि उस पर आने वाली संख्या 6 है। इस की प्रायिकता ज्ञात कीजिए कि पासे आने वाली संख्या वास्तव में 6 है।

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

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

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

D. None of these

Answer: A

Watch Video Solution

48. The system of equations $2x - y + z = 0, x - 2y + z = 0$ and $\lambda x - y + 2z = 0$ has infinite number of non-trivial solution for

A. $\lambda = 5$

B. $lamd = -5$

C. $\lambda \neq \pm 5$

D. None of these

Answer: A

Watch Video Solution

49. A plane makes intercepts $-6, 3, 4$ upon the coordinate axes. Then, the length of the perpendicular from the origin on it is

A. $\frac{2}{\sqrt{29}}$

B. $\frac{3}{\sqrt{29}}$

C. $\frac{4}{\sqrt{29}}$

D. $\frac{12}{\sqrt{29}}$

Answer: D

Watch Video Solution

50. The graph of $x \leq 2$ and $y \geq 2$ will be situated in the

A. first and second quadrant

B. second and third quadrant

C. first and third quadrant

D. third and fourth quadrant

Answer: A

Watch Video Solution