MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 12

Paper 2 Mathematics

1. $\int \sin x \, d(\cos x)$ is equal to

A. $\frac{1}{2}\sin 2x + \frac{x}{2} + c$

B. $\frac{1}{2}\sin 2x - \frac{x}{2} + c$

C. $2\sin 2x + c$

D. $\sin x + \cos x$

Answer: B

Watch Video Solution

2. $\int_{-1/2}^{1/2} (\cos x)\left[\log\left(\frac{1-x}{1+x}\right)\right] dx$ is equal to

A. 0

B. 1

C. $e^{1/2}$

D. $2e^{1/2}$

Answer: A

 Watch Video Solution

3. Let p and q be two statements. Then $p \vee q$ is false if

A. p is false and q is true

B. both p and q are false

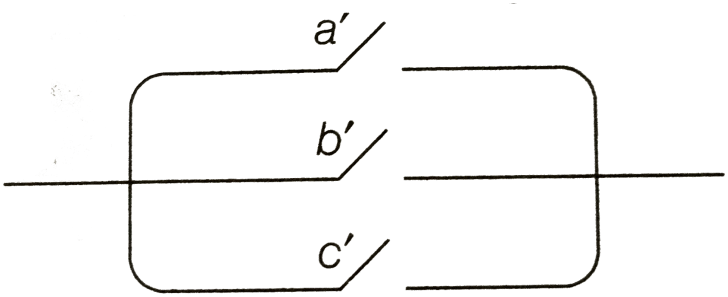
C. both p and q are true

D. None of these

Answer: B

Watch Video Solution

4. Consider the switching circuit given below.



The logical expression corresponding to the complementary to the above circuit is

A. $a'.b'.c$

B. $a+b+c'$

C. $a.b.c'$

D. $a'+b'+c$

Answer: D

Watch Video Solution

5. A bag contains 5 white and 3 black balls. Four balls are successively drawn out without

replacement. What is the probability that they are alternately of different colours?

A. $\frac{1}{196}$

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

C. $\frac{13}{56}$

D. $\frac{1}{7}$

Answer: D

Watch Video Solution

6. The length of the subtangent to the curve $x^2y^2 = a^4$ at $(-a, a)$ is

A. $3a$

B. $2a$

C. a

D. $4a$

Answer: C

Watch Video Solution

7. The sides of a parallelogram are $2\hat{i}+4\hat{j}-5\hat{k}$ and $\hat{i}+2\hat{j}+3\hat{k}$. The unit vector parallel to one of the diagonals is

A. $\frac{1}{3}\left(3\hat{i}+6\hat{j}-2\hat{k}\right)$

B. $\frac{1}{3}\left(3\hat{i}-6\hat{j}-2\hat{k}\right)$

C. $\frac{1}{7}\left(3\hat{i}+6\hat{j}-2\hat{k}\right)$

D. $\frac{1}{7}\left(3\hat{i}-6\hat{j}-2\hat{k}\right)$

Answer: D

Watch Video Solution

8. If $\frac{1}{2}, \frac{1}{3}, n$ are direction cosines of a line, then the value of n is

A. $\frac{\sqrt{23}}{6}$

B. $\frac{23}{6}$

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

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

Answer: A

 Watch Video Solution

9. The points which provides the solution to the linear programming problem max $(2x + 3y)$ subject to constraints $x \geq 0, y \geq 0, 2x + 2y \leq 9, 2x + y \leq 6, x + 2y \leq 8$ is

A. (3,2.5)

B. (2,3.5)

C. (2,2.5)

D. (1,3.5)

Answer: D

Watch Video Solution

10. If $x = \exp\left\{\tan^{-1}\left(\frac{y - x^2}{x^2}\right)\right\}$, then $\frac{dy}{dx}$ equal

A. $2x[1 + \tan(\log x)] + \sec^2(\log x)$

B. $x[1 + \tan(\log x)] + \sec^2(\log x)$

C. $2x[1 + \tan(\log x)] + x^2 \sec^2(\log x)$

D. $2x[1 + \tan(\log x)] + \sec^2(\log x)$

Answer: A

Watch Video Solution

11. $\lim_{x \to 0} \frac{\sin^{-1} x - \tan^{-1} x}{x^3}$ is equal to

A. 0

B. 1

C. -1

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

Answer: D

Watch Video Solution

12. $\frac{d}{dx}\left[\tan^{-1}\left(\frac{a-x}{1+ax}\right)\right]$ is equal to

A. $-\frac{1}{1+x^2}$

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

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

D. $-\frac{1}{\sqrt{1-\left(\frac{a-x}{1+ax}\right)^2}}$

Answer: A

Watch Video Solution

13. $(d^2)\dfrac{(2\cos x\cos 3x)}{dx^2}$ is equal to

A. $2^2\left(\cos 2x+2^2\cos 4x\right)$

B. $2^2\left(\cos 2x-2^2\cos 4x\right)$

C. $2^2\left(-\cos 2x+2^2\cos 4x\right)$

D. $-2^2\left(\cos 2x+2^2\cos 4x\right)$

Answer: D

 Watch Video Solution

14. If the angle between the pair of straight lines represented by the equation $x^2 - 3xy + \lambda y^2 + 3x - 5y + 2 = 0$ is $\tan^{-1}(1/3)$, where λ is non - negative real number , then λ is equal to

A. 2

B. 0

C. 3

D. 1

Answer: A

Watch Video Solution

15. The gradient of one of the lines given by $ax^2 + 2hxy + by^2 = 0$ is twice that of the other, then

A. $h^2 = ab$

B. $h = a + b$

C. $8h^2 = 9ab$

D. $9h^2 = 8ab$

Answer: C

Watch Video Solution

Watch Video Solution

16. $\int_0^3 \frac{3x+1}{x^2+9}dx$ is equal to

A. $\log\left(2\sqrt{2}\right)+\frac{\pi}{12}$

B. $\log\left(2\sqrt{2}\right)+\frac{\pi}{2}$

C. $\log\left(2\sqrt{2}\right)+\frac{\pi}{6}$

D. $\log\left(2\sqrt{2}\right)+\frac{\pi}{3}$

Answer: A

View Text Solution

17. The equation(s) of the tangent(s) to the curve $y = x^4$ from the point (2, 0) not on the curve is given by

A. $y = 0$

B. $x = 0$

C. $x + y = 0$

D. None of these

Answer: A

 Watch Video Solution

18. Three number are in A.P, such that their sum is 18 and sum of there is 158. The greatest among them is

A. 10

B. 11

C. 12

D. None of these

Answer: B

Watch Video Solution

19. If $1 + \sin x + \sin^2 x + \sin^3 x + \infty$ is equal to

`4+2sqrt(3),0

A. $\frac{\pi}{3}, \frac{5\pi}{6}$

B. $\frac{2\pi}{3}, \frac{\pi}{6}$

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

D. $\frac{\pi}{6}, \frac{\pi}{3}$

Answer: C

Watch Video Solution

20. If the length of the major axis of an ellipse is $\frac{17}{8}$ times the length of the minor axis, then the eccentricity of the ellipse is

A. $\frac{8}{17}$

B. $\frac{15}{17}$

C. $\frac{9}{17}$

D. $\frac{2\sqrt{2}}{17}$

Answer: B

Watch Video Solution

21. The set $A = \{x : x \varepsilon R, x^2 = 16 \text{ and } 2x = 16\}$ is equal to

A. ϕ

B. $\{14, 3, 4\}$

C. $\{3\}$

D. $\{4\}$

Answer: A

Watch Video Solution

22. If $A = \{1, 2, 3\}$ and $B = \{2, 3, 4\}$ then which of the following relations is a function from A to B?

A. $\{(1, 2,), (2, 3), (3, 4), (2, 2)\}$

B. $\{(1, 2), (2, 3), (1, 3)\}$

C. $\{(1, 3), (2, 3), (3, 3)\}$

D. $\{(1, 1), (2, 3), (3, 4)\}$

Answer: C

Watch Video Solution

23. If $y = y(x)$ and $\frac{2+\sin x}{y+1}\left(\frac{dy}{dx}\right) = -\cos x, y(0) = 1,$ then $y\left(\frac{\pi}{2}\right)$ equals (a) $(b)(c)(d)\frac{1}{e}3(f)(g)(h)$ (i) (b) $(j)(k)(l)\frac{2}{m}3(n)(o)(p)$ (q) (c) $(r)(s) - (t)\frac{1}{u}3(v)(w)(x)$ (y) (d) 1

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

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

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

D. 1

Answer: A

Watch Video Solution

Watch Video Solution

24. If $\tan^{-1} x, \tan^{-1} y$ and $\tan^{-1} z$ are in A.P. then find the algebraic relation between x,y and z. If x, y, z are also in A.P. then show that $x = y = z$ and $y \neq 0$

A. $x = y = z$

B. $x = y = -z$

C. $x = 1, y = 2, z = 3$

D. $x = 2, y = 4, z = 6$

Answer: A

Watch Video Solution

25. If angles $A, B,$ and C are in $A.P.,$ then $\frac{a+c}{b}$ is equal to

A. $2\sin\frac{A-C}{2}$

B. $2\cos\frac{A-C}{2}$

C. $\cos\frac{A-C}{2}$

D. $\sin\frac{A-C}{2}$

Answer: B

Watch Video Solution

26. In order to eliminate the first degree terms from the equation $2x^2 - 4xy + 5y^2 - 4x - 2y + 7 = 0$ then point to which origin is to be shifted is

A. (1,-3)

B. (2,3)

C. (-2,3)

D. (1,3)

Answer: C

Watch Video Solution

27. If $x = -a(\theta - \sin\theta), y = a(1 - \cos\theta)$, then $\frac{dy}{dx}$ is

A. $\cot\frac{\theta}{2}$

B. $\tan\frac{\theta}{2}$

C. $\frac{1}{2}\cos ec^2\frac{\theta}{2}$

D. $-\frac{1}{2}\cos ec^2\frac{\theta}{2}$

Answer: A

Watch Video Solution

28. Let $f(x) = \begin{cases} 1 & \forall \quad x < 0 \\ 1 + \sin x & \forall \quad 0 \leq x \leq \pi/2 \end{cases}$

then what is the value of $f'(x)$ at $x = 0$?

A. 1

B. -1

C. ∞

D. does not exist

Answer: D

Watch Video Solution

29. If $f(x) = (x+1)^{\cot x}$ is continuous at x=0, then what is f(0) equal to?

A. 0

B. $-e$

C. e

D. None of these

Answer: C

Watch Video Solution

30. Three letters, to each of which corresponds an envelope, are placed in the envelopes at random. The probability that all the letters are not placed in the right envelopes, is

A. $1/6$

B. $5/6$

C. $1/3$

D. $2/3$

Answer: B

Watch Video Solution

31. The area under the curve $y + \sqrt{3}\sin x = \sin 2x$ between the ordinates $x = 0$ and $x = \frac{\pi}{6}$ is

A. $\frac{1}{4}(\sqrt{7} - 4)$

B. $\frac{1}{4}(7 - 4\sqrt{3})$

C. $\frac{1}{4}(7 - \sqrt{3})$

D. None of these

Answer: B

Watch Video Solution

32. $\int(1-\cos x)\cos ec^2 x dx$ is equal to

A. $\tan\frac{x}{2}+c$

B. $-\cot\frac{x}{2}+c$

C. $2\tan\frac{x}{2}+c$

D. $-2\cot\frac{x}{2}+c$

Answer: A

Watch Video Solution

33. The system of equations

$x + y + z = 5, x + 2y + \lambda z = \mu, x + 2y + 3z = 9$

has

(i) unique solution of $\lambda \neq 3$

(ii) infinitely many solutions if $\lambda = 3, \mu = 9$

(iii) no solution if $\lambda = 3, \mu \neq 9$

From the above statements, number of correct statements is

A. 1

B. 2

C. 3

D. 0

Answer: D

View Text Solution

34. Find the general solution of the differential equations $\sec^2 x \tan y dx + \sec^2 y \tan x dy = 0$

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

B. $\frac{\tan y}{\tan x} = c$

C. $\frac{\tan^2 x}{\tan y} = c$

D. None of these

Answer: A

Watch Video Solution

35. $\sin\left[3\sin^{-1}\left(\frac{1}{5}\right)\right]$ is equal to

A. $\frac{71}{125}$

B. $\frac{74}{125}$

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

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

Answer: A

Watch Video Solution

36. If $f: R \to R$ is defined by $f(x) = |x|$, then

A. $f^{-1}(x) = -x$

B. $f^{-1}(x) = \frac{1}{|x|}$

C. $f^{-1}(x)$ does not exist

D. $f^{-1}(x) = \frac{1}{x}$

Answer: C

Watch Video Solution

37. The equations of the circle which pass through the origin and make intercepts of lengths 4 and 8 on the X and Y-axes respectively are

A. $x^2 + y^2 \pm 4x \pm 8y = 0$

B. $x^2 + y^2 \pm 2x \pm 4y = 0$

C. $x^2 + y^2 \pm 8x \pm 16y = 0$

D. $x^2 + y^2 \pm x \pm y = 0$

Answer: A

Watch Video Solution

38. A circle with centre at (2, 4) is such that the line $x + y + 2 = 0$ cuts a chord of length 6. The radius of the circle is

A. $\sqrt{41}$ cm

B. $\sqrt{11}$ cm

C. $\sqrt{21}$cm

D. $\sqrt{31}$cm

Answer: A

Watch Video Solution

39. The equation of the parabola whose focus is (3,-4) and direction $6x - 7y + 5 = 0$ is

A. $(7x + 6y)^2 - 570x + 750y + 2100 = 0$

B. $(7x + 6y)^2 + 570x - 750y + 2100 = 0$

C. $(7x - 6y)^2 - 570x + 750y + 2100 = 0$

D. $(7x - 6y)^2 + 570x - 750y + 2100 = 0$

Answer: A

Watch Video Solution

40. The equation $\frac{x^2}{2-\lambda} - \frac{y^2}{\lambda-5} - 1 = 0$, represent and ellipse, if

A. $\lambda > 5$

B. $\lambda < 2$

C. $2 < \lambda < 5$

D. $2 > \lambda > 5$

Answer: B

Watch Video Solution

41. If $x^m y^n = (x+y)^{m+n}$, then $\left(\frac{dy}{dx}\right)_{x=1, y=2}$ is equal to

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

B. 2

C. $\frac{2m}{n}$

D. $\frac{m}{2n}$

Answer: B

Watch Video Solution

42. If $f'(x) = \sin(\log x)$ and $y = f\left(\frac{2x+3}{3-2x}\right)$, then $\frac{dy}{dx}$ equals

A. $6 \sin \log(5)$

B. $5 \sin \log(6)$

C. $12 \sin \log(5)$

D. $5 \sin \log(12)$

Answer: C

Watch Video Solution

43. If the mean and the variance of a binomial variable X are 2 and 1 respectively, then the probability that X takes a value greater than one is equal to:

A. $\frac{5}{16}$

B. $\frac{8}{16}$

C. $\frac{11}{16}$

D. $\frac{1}{16}$

Answer: C

Watch Video Solution

44. Twelve tickets are numbered from 1 to 12. One ticket is drawn at random, then the probability of the number to be divisible by 2 or 3 is

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

B. $\frac{7}{12}$

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

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

Answer: A

Watch Video Solution

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

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

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

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

D. None of these

Answer: C

Watch Video Solution

46. Write the angle between the line $\frac{x-1}{2}=\frac{y-2}{1}=\frac{z+3}{-2}$ and the plane $x+y+4=0$.

A. 0°

B. 30°

C. 45°

D. 90°

Answer: C

Watch Video Solution

47. The number of distinct values of λ, for which the vectors $-\lambda^2\hat{i}+\hat{j}+\hat{k}, \hat{i}-\lambda^2\hat{j}+\hat{k}$ and $\hat{i}+\hat{j}-\lambda^2\hat{k}$ are coplanar, is

A. zero

B. one

C. two

D. three

Answer: C

Watch Video Solution

48. The solution of the differential equation $\frac{dy}{dx} = \frac{x - y + 3}{2x(x - y) + 5}$ is

A. $2(x - y) + \log(x - y) = x + c$

B. $2(x - y) - \log(x - y + 2) = x + c$

C. $2(x - y) + \log(x - y + 2) = x + c$

D. None of these

Answer: C

Watch Video Solution

49. The general solution of equation $3\tan(\theta - 15^o) = \tan(\theta + 15^o)$ is:

A. $\theta = n\pi - \frac{\pi}{3}$

B. $\theta = n\pi + \frac{\pi}{3}$

C. $\theta = n\pi - \frac{\pi}{4}$

D. $\theta - n\pi + \frac{\pi}{4}$

Answer: D

Watch Video Solution

50. The mean and standard deviation of a binomial variate X are 4 and 3 respectively. Then, $P(X \geq 1)$ is equal to

A. $1 - \left(\frac{1}{4}\right)^{16}$

B. $1 - \left(\frac{3}{4}\right)^{16}$

C. $1 - \left(\frac{2}{3}\right)^{16}$

D. $1 - \left(\frac{1}{3}\right)^{16}$

Answer: B

Watch Video Solution