MATHS

BOOKS - BITSAT GUIDE

SOLVED PAPER 2019 BITSAT

Part Iv Mathematics

1. If the length of the major axis of the ellipse $\left(\frac{x^2}{a^2}\right)+\left(\frac{y^2}{b^2}\right)=1$ is three times the length of minor axis, its accentricity is

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

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

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

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

Answer: D

Watch Video Solution

2. The value of $\sum_{m=1}^{n} \tan^{-1}\left(\frac{2m}{m^4+m^2+2}\right)$ is :

A. $\tan^{-1}\left(\frac{n^2+n}{n^2+n+2}\right)$

B. $\tan^{-1}\left(\frac{n^2-n}{n^2-n+2}\right)$

C. $\tan^{-1}\left(\frac{n^2+n+2}{n^2+n}\right)$

D. none of these

Answer: A

Watch Video Solution

3. Let $\left(2x^2+3x+4\right)^{10}=\sum_{r=0}^{20} a_r x^r$ then the value of $\frac{a_8}{a_{12}}$ is

A. 2

B. 4

C. 8

D. 16

Answer: B

Watch Video Solution

4. Let ABC be an acute-angled triangle and let D be the midpoint of BC. If AB = AD, then tan(B)/tan(C) equals

A. $\sqrt{2}$

B. $\sqrt{3}$

C. 2

D. 3

Answer: D

Watch Video Solution

5. Suppose the limit L = $\lim_{n \to \infty} \sqrt{n} \int_0^1 \frac{1}{(1+x^2)^n}$ dx exists and is larger than $\frac{1}{2}$ then

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

B. $2 < L < 3$

C. $3 < L < 4$

D. $L \geq 4$

Answer: A

Watch Video Solution

6. In the real number system the equation

$\sqrt{x+3-4\sqrt{x-1}}+\sqrt{x+8-6\sqrt{x-1}}$=1 has

A. No solution

B. Exactly two distinct solution

C. Exactly four distinct solution

D. Infinitely many solution

Answer: D

Watch Video Solution

7. If system of equation ax + y + z = a, x + by + z = b and x + y + cz = c is inconsistent, then which of the following is correct?

A. abc - a - b - c + 2 = 0

B. abc -a - b - c + 3 = 0,a = 1

C. abc - a - b - c + 3 = 0

D. $abc - a - b - c + 2 = 0, a \neq 1, b \neq 1, c \neq 1$

Answer: D

Watch Video Solution

8. A die is thrown 7 times. What is the chance that an odd number turns up (i) exactly 4 times (ii) at least 4 times

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

B. $\frac{31}{64}$

C. $\frac{51}{128}$

D. $\frac{35}{128}$

Answer: A

Watch Video Solution

9. The equation of plane containing line x - y = 1, z = 1 and parallel to $\frac{x}{2} - \frac{z}{3} = 1, y = 3$is

A. 3x + 3y - 2z = 1

B. 3x - 3y - 2z = 1

C. 3x + 3y + 2z = 1

D. 3x + 3y + 2z = - 1

Answer: B

View Text Solution

10. If $\left(1+x+x^2\right)^{20}=\sum_{r=0}^{40} a_r . x^r$ then $\sum_{r=0}^{39}(-1)^r . A_r . A_{r+1}$ equal to

A. 79

B. $2^{39} .{}^{78}C_{39}$

C. $3^{39} .{}^{78}C_{39}$

D. 0

Answer: D

View Text Solution

11. The value of $\lim_{x \to \frac{3\pi}{4}} \frac{4\sin^2 x \cos x - \cos x + \sin x}{\sin x + \cos x}$ is equal to

A. -1

B. 0

C. 1

D. none of these

Answer: A

Watch Video Solution

12. If a, b, c are non-coplaner vectors such that $b \times c = a, c \times a = b, a \times b = c$, then which of the following is not TRUE?

A. |a|-|b|=0

B. |a| =|b| =|c| =2

C. [a b c] =1

D. |a||b||c|=1

Answer: B

Watch Video Solution

13. The value of λ for which the loci $\arg z = \frac{\pi}{6}$ and $\left|z - 2\sqrt{3}i\right| = \lambda$ on the argand plane touch each other is

A. 3

B. 4

C. 5

D. 6

Answer: A

Watch Video Solution

14. The angle between the lines whose direction cosines satisfy the equations $l + m + n = 0$ and $l^2 = m^2 + n^2$ is (1) $\frac{\pi}{3}$ (2) $\frac{\pi}{4}$

(3) $\frac{\pi}{6}$ (4) $\frac{\pi}{2}$

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

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

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

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

Answer: A

Watch Video Solution

15. The locus of the foot of prependicular drawn from the center of the ellipse $x^2 + 3y^2 = 6$ on any tangent to it is

A. $\left(x^2 - y^2\right)^2 = 6x^2 + 2y^2$

B. $\left(x^2 - y^2\right)^2 = 6x^2 - 2y^2$

C. $\left(x^2 + y^2\right)^{2 = 6x^2 + 2y^2}$

D. $\left(x^2+y^2\right)^2=6x^2-2y^2$

Answer: C

Watch Video Solution

16. If f and g are differentiable function in [0, 1] satisfying f (0) = 2 = g(1), g(0) = 0 and f (1) = 6, then for some $c \in (0, 1)$

A. 2f (c) = g(c)

B. 2f '(c) = 3g'(c)

C. f '(c) = g'(c)

D. f '(c) = 2g'(c)

Answer: D

Watch Video Solution

17. The integral $\int\left(1+x-\frac{1}{x}\right)e^{x+\frac{1}{x}}dx$ is equal to

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

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

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

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

Answer: B

Watch Video Solution

18. If the coefficients of x^3 and x^4 in the expansion of $\left(1+ax+bx^2\right)(1-2x)^{18}$ in powers of x are both zero, then (a, b) is equal to (1) $\left(16, \frac{251}{3}\right)$ (3) $\left(14, \frac{251}{3}\right)$ (2) $\left(14, \frac{272}{3}\right)$ (4) $\left(16, \frac{272}{3}\right)$

A. $\left(16, \frac{251}{3}\right)$

B. $\left(14, \frac{251}{3}\right)$

C. $\left(14, \frac{272}{3}\right)$

D. $\left(16, \frac{272}{3}\right)$

Answer: D

Watch Video Solution

19. An equation of a plane parallel to the plane $x - 2y + 2z - 5 = 0$ and at a unit distance from the origin is

A. x - 2y + 2z = 3

B. x - 2y + 2z + 1= 0

C. x - 2y + 2z - 1= 0

D. x - 2y + 2z + 5 = 0

Answer: A

Watch Video Solution

20. Three numbers are chosen at random without replacement from {1, 2, 3, ... 8}. The probability that their minimum is 3, given that their maximum is 6, is (1) $\frac{3}{8}$ (2) $\frac{1}{5}$ (3) $\frac{1}{4}$ (4) $\frac{2}{5}$

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

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

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

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

Answer: B

Watch Video Solution

21. The number of real number λ for which the equality

$$\frac{\sin(\lambda\alpha)}{\sin\alpha} - \frac{\cos(\lambda\alpha)}{\cos\alpha} = \lambda - 1,$$

holds for all real α which are not integral multiples of $\pi/2$ is-

A. 1

B. 2

C. 3

D. infinite

Answer: B

Watch Video Solution

22. Suppose a parabola $y = ax^2 + bx + c$ has two x intercepts, one negative, and its vertex is (2,-2). Then which of the following is true ?

A. $ab > 0$

B. $bc > 0$

C. $ac > 0$

D. $a + b + c > 0$

Answer: B

Watch Video Solution

23. The larger of two angles made with the X-axis of a straight line drawn through (1, 2) so that it intersects the line x + y = 4 at a paint distant $\sqrt{6}$ / 3 from the point (1, 2) is

A. 60°

B. 75°

C. 105°

D. none of these

Answer: B

Watch Video Solution

24. The point ([P + 1], [P]) (where, [x] is the greatest integer function) lying inside the region bounded by the circle $x^2 + y^2 - 2x - 15$=0 and $x^2 + y^2 - 2x - 7 = 0$, then

A. $P \in [-1, 2) - \{0, 1\}$

B. $P \in [-1, 0) \cup (0, 1) \cup (1, 2]$

C. $P \in (-1, 2)$

D. none of these

Answer: D

Watch Video Solution

25. Solution of the equation $\frac{dy}{dx} = e^{x-y}(e^x - e^y)$ is equal to

A. $e^y = e^x - 1ce^{-e^x}$

B. $e^{y-x} = 1 + ce^{-e^x}$

C. $e^x + e^y = ce^{-e^x}$

D. none of these

Answer: A

Watch Video Solution

26. The area bounded by two branches of the curve $(y-x)^2 = x^3$ and $x = 1$ equals (A) $\frac{3}{5}$ (B) $\frac{5}{4}$ (C) $\frac{6}{5}$ (D) $\frac{4}{5}$

A. $\frac{5}{4}$ sq unit

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

C. $\frac{1}{4}$ sq unit

D. $\frac{4}{5}$ sq unit

Answer: D

Watch Video Solution

27. The least value of the function f(x) = $\int_0^x (3\sin x + 4\cos x)dx$ on the interval $\left[\frac{5\pi}{4}, \frac{4\pi}{3}\right]$ is

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

B. $\frac{5 - 4\sqrt{3}}{2}$

C. $\frac{7 - 4\sqrt{3}}{2}$

D. $\frac{9 - 4\sqrt{3}}{2}$

Answer: D

Watch Video Solution

28. If z_1 and $\bar{z}_1$ represent adjacent vertices of a regular polygon of n sides whose centre is origin and if $\frac{Im(z_1)}{Re(z_1)} = \sqrt{2} - 1$ then n is equal to:

A. 8

B. 16

C. 18

D. 24

Answer: A

Watch Video Solution

29. In the expansion of $\left(1+x+x^3+x^4\right)$, the coefficient of x^4 is ˆ $40C_4$ b. ˆ $10C_4$ c. 210 d. 310

A. 235

B. 310

C. 285

D. 325

Answer: B

Watch Video Solution

30. A person writes letters to six friends and addresses the corresponding envelopes. Let x be the number of ways so that atleast two of the letters are in wrong envelopes and y be the

number of ways so that all the letters are in wrong envelopes. Then, x-y is equal to

A. 719

B. 265

C. 454

D. 720

Answer: C

Watch Video Solution

31. If $x = \log_5 3 + \log_7 5 + \log_9 7$,then x is $\geq$?

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

B. $x > \frac{1}{\sqrt[2]{2}}$

C. $x > \frac{3}{\sqrt[3]{2}}$

D. $x > \sqrt[3]{2}$

Answer: C

Watch Video Solution

32. Let $pandq$ be the roots of the equation $x^2 - 2x + A = 0$ and let $rands$ be the roots of the equation $x^2 - 18x + B = 0$. If `p

A. $-3, \ -77$

B. $3, \ -77$

C. $-3, 77$

D. $3, 77$

Answer: C

Watch Video Solution

33. Let $a, b, c \in R$ and the system of equations $(1-a)x + y + z = 0, x + (1-b)y + z = 0, x + y + (1-c)z = 0$ has infinitely many solutions then the minimum value of 'abc' is

A. $3\sqrt{3}$

B. 9

C. 27

D. 3

Answer: C

Watch Video Solution

34. If A is a 3×3 non-singular matrix such that $AA' = A'A$ and $B = A^{-1}A'$, then BB' equals:

A. $\left(B^{-1}\right)$

B. I+B

C. I

D. B^{-1}

Answer: C

Watch Video Solution

35. If $\sin^{-1} x + \tan^{-1} x = \frac{\pi}{2}$, then prove that $2x^2 + 1 = \sqrt{5}$

A. $\sqrt{5}$

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

C. 2

D. $\frac{\sqrt{5}+1}{2}$

Answer: A

Watch Video Solution

36. Find the number of solution of the equations

$|\cos x| = [x]$, (where [.] denotes the greatest integer function).

A. 0

B. 2

C. 1

D. infinitely many

Answer: A

Watch Video Solution

37. Let $\cos(\alpha+\beta)=\frac{4}{5}$ and let $\sin(\alpha-\beta)=\frac{5}{13}$, where $0\leq\alpha$, $\beta=\frac{\pi}{4}$. Then $\tan 2\alpha=$

A. $\frac{20}{7}$

B. $\frac{25}{16}$

C. $\frac{56}{33}$

D. $\frac{19}{2}$

Answer: C

Watch Video Solution

38. Cards are drawn one-by-one at random from a well-shuffled pack of 52 playing cards until 2 aces are obtained from the first time. The probability that 18 draws are obtained for this is $3/34$ b. $17/455$ c. $561/15925$ d. none of these

A. $3/34$

B. $17/455$

C. $\frac{561}{15925}$

D. none of these

Answer: C

Watch Video Solution

39. If $a = \hat{i} + 2\hat{j} + 3\hat{k}, b = -\hat{i} + 2\hat{j} + \hat{k}$ and $c = 3\hat{i} + \hat{j}$. If $(a + b) \perp c$, then t is equal to

A. 0

B. 1

C. 5

D. 3

Answer: C

Watch Video Solution

40. Let f(x) = $x[x]$, $x \not\in Z$ [.] denotes greatest integer function), then f (x) is equal to

A. 2x

B. [x]

C. 2 [x]

D. none of these

Answer: B

Watch Video Solution

41. The difference of maximum and minimum values of $f(x) = x^2 e^{-x}$ is

A. e

B. $1/e$

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

D. $1 + \frac{1}{e}$

Answer: B

Watch Video Solution

42. If $f'(x) = f(x) + \int_0^1 f(x)\ dx$ and given $f(0) = 1$, then $\int f(x)dx$ is equal to :

A. $\frac{2e^x}{3-e} + \frac{1-e}{3-e}$

B. $\frac{e^x}{3-e}+\frac{1+e}{1-e}$

C. $\frac{3e^x}{2-e}+\frac{1+e}{1-e}$

D. $\frac{3e^x}{2-e}+\frac{1-e}{3+e}$

Answer: A

Watch Video Solution

43. The distance between the origin and the normal to the curve $y=e^{2x}+x^2$ at $x=0$ is

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

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

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

D. $\frac{1}{\sqrt{5}}$

Answer: B

Watch Video Solution

44. Reflection of the line $\frac{x-1}{-1}=\frac{y-2}{3}=\frac{z-3}{1}$ in the plane $x+y+z=7$ is

A. $\frac{x-1}{3}=\frac{y-2}{1}=\frac{z-4}{1}$

B. $\frac{x-1}{-3}=\frac{y-2}{-1}=\frac{z-4}{1}$

C. $\frac{x-1}{-3}=\frac{y-2}{1}=\frac{z-4}{-1}$

D. $\frac{x-1}{3}=\frac{y-2}{1}=\frac{z-4}{1}$

Answer: C

Watch Video Solution

45. If x,y,z $\in$ R , x +y+z =5

$x^2 + y^2 + z^2 = 9$ then length of interval in which x lies is

A. $8/3$

B. $4/3$

C. $2/3$

D. $1/3$

Answer: B

Watch Video Solution