

KCET 2024 Mathematics Question Paper Code-A1

1. Two finite sets have m and n elements respectively. The total number of subsets of the first set is 56 more than the total number of subsets of the second set. The values of m and n respectively are

- (A) 7, 6 (B) 5, 1
(C) 6, 3 (D) 8, 7

Ans. C

2. If $x^2 \leq 5x \leq 60$, where x denotes the greatest integer function, then

- (A) $x \in \{3, 4\}$ (B) $x \in \{2, 4\}$
(C) $x \in \{2, 3\}$ (D) $x \in \{2, 3\}$

Ans. B

3. If in two circles, arcs of the same length subtend angles 30° and 78° at the centre, then the ratio of their radii is

- (A) $\frac{5}{13}$ (B) $\frac{13}{5}$
(C) $\frac{13}{4}$ (D) $\frac{4}{13}$

Ans. B

4. If $\triangle ABC$ is right angled at C , then the value of $\tan A + \tan B$ is

- (A) $a + b$ (B) $\frac{a^2}{bc}$
(C) $\frac{c^2}{ab + ac}$ (D) $\frac{c^2}{ab + ac}$

Ans. C

$$1 + i \sin \theta$$

5. The real value of θ for which $1 + i \sin \theta$ is purely real is

- (A) $\frac{n\pi}{2}, n \in \mathbb{N}$ (B) $\frac{2n\pi}{2}, n \in \mathbb{N}$
(C) $n\pi, n \in \mathbb{N}$ (D) $\frac{2n\pi}{2}, n \in \mathbb{N}$

Ans. C

6. The length of a rectangle is five times the breadth. If the minimum perimeter of the rectangle is 180 cm, then

- (A) Breadth < 15 cm
- (B) Breadth <= 15 cm
- (C) Length < 15 cm
- (D) Length = 15 cm

Ans. B

7. The value of ${}^{49}C_3 + {}^{48}C_3 + {}^{47}C_3 + {}^{46}C_3 + {}^{45}C_3 + {}^{45}C_4$ is

- (A) ${}_{50}C_4$
- (B) ${}_{50}C_3$
- (C) ${}_{50}C_2$
- (D) ${}_{50}C_1$

Ans. A

8. In the expansion of $(x^2 + 1)^n$

$x^2 + 1$

is equal to

$C_0 + C_1 x^2 + C_2 x^4 + \dots + C_n x^{2n}$

(A) $\frac{C_0 + C_1 + C_2 + \dots + C_n}{2}$

(B) $\frac{C_n}{2}$

(C) $\frac{C_0 + C_1 + \dots + C_n}{2}$

(D) $\frac{C_0 + C_1 + \dots + C_n}{2}$

Ans. A

9. If S_n stands for sum to n-terms of a G.P. with 'a' as the first term and 'r' as the common ratio then

$S : S_{2n}$ is

(A) r

$r^n - 1$

(B) $r^n - 1$

$r^n - 1$

(D) _____

(C) $r^n - 1$

Ans. B

10. If A.M. and G.M. of roots of a quadratic equation are 5 and 4 respectively, then the quadratic equation is

(A) $x^2 - 10x + 16 = 0$

(B) $x^2 - 10x + 16 = 0$

(C) $x^2 - 10x + 16 = 0$

(D) $x^2 - 10x + 16 = 0$

Ans. D

11. The angle between the line $x + y = 3$ and the line joining the points (1, 1) and (-3, 4) is

(A) $\tan^{-1} \frac{7}{\square}$

(B) $\tan^{-1} \frac{\square}{\square} = -17^\circ$

(C) $\tan^{-1} \frac{\square}{\square} = 17^\circ$

(D) $\tan^{-1} \frac{\square}{\square} = 72^\circ$

Ans. C

12. The equation of parabola whose focus is (6, 0) and directrix is $x = -6$ is

(A) $y^2 = 24x$

(B) $y^2 = \square$

$\sqrt{24x}$

(D) $x^2 = \square$

$\sqrt{24y}$

(C) $x^2 = 24y$

Ans. A

13. $\lim_{x \rightarrow 0} \frac{\sqrt{2} \cos x}{4x} = 1$

(A) 2

(B) $\sqrt{2}$

(C) $\frac{1}{2}$

(D) $\frac{1}{\sqrt{2}}$

Ans. C

14. The negation of the statement

“For every real number x ; $x^2 - 5$ is positive” is

(A) For every real number x ; $x^2 - 5$ is not positive

(B) For every real number x ; $x^2 - 5$ is negative

(C) There exists at least one real number x such that $x^2 - 5$ is not positive

(D) There exists at least one real number x such that $x^2 - 5$ is positive

Ans. C

15. Let a, b, c, d and e be the observations with mean m and standard deviation S . The standard deviation of the observations $a + k, b + k, c + k, d + k$ and $e + k$ is

(A) kS

(B) $S + k$

(C) $\frac{S}{k}$

(D) Sk

Ans. D

16. Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be given $f(x) = \tan x$. Then $f^{-1} \left(\frac{1}{\sqrt{3}} \right)$ is

(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{6}$

(C) $\frac{1}{3}$ (D) $\frac{1}{3}$

Ans. A

17. Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x) = x^2 - 1$. Then the pre images of 17 and -3 respectively are

- (A) $\{4, -4\}$ (B) $\{3, -3\}$
 (C) $\{4, -4\}$ (D) $\{4, -4, 2, -2\}$

Ans. C

18. Let $f(x) = \sin x$ and $g(x) = \sqrt{\sin x}$. Then

- (A) $f \circ g(x) = \sin^2 x, g \circ f(x) = x$ (B) $f \circ g(x) = \sqrt{\sin x}, g \circ f(x) = x$
 (C) $f \circ g(x) = \sin x, g \circ f(x) = x^2$ (D) $f \circ g(x) = \sin x, g \circ f(x) = x^2$

Ans. C

19. Let $A = \{2, 3, 4, 5, \dots, 16, 17, 18\}$. Let R be the relation on the set A of ordered pairs of positive integers defined by $(a, b) R (c, d)$ if and only if $ad = bc$ for all $(a, b), (c, d) \in A \times A$. Then the number of ordered pairs of the equivalence class of $(3, 2)$ is

- (A) 4 (B) 5
 (C) 6 (D) 7

Ans. C

20. If $\cos^2 x + \cos^2 y + \cos^2 z = 3$, then $\frac{y}{z} = \frac{x}{z}$ equals to

- (A) 0 (B) 1
 (C) 6 (D) 12

Ans. C

21. If $2\sin^2 x + 3\cos^2 x = 4$, then $2\sin^2 x - 3\cos^2 x$ is equal to

- (A) $\frac{4}{5}$ (B) $\frac{6}{5}$
 (C) $\frac{3}{2}$ (D) 0

Ans. B

22. If A is a square matrix such that $A^2 = A$, then $(I - A)^3$ is equal to

- (A) $7A - I$ (B) $7A$

(C) $7A + I$

(D) $I - 7A$

Ans. C

23. If A^{10} is equal to $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$, then A

- (A) $2^8 A$
- (C) $2^{10} A$

- (B) $2^9 A$
- (D) $2^{11} A$

Ans. B

24. If $f(x) = \frac{32x^2 - 18x + 81}{2x^2 + 5}$, then $f(1) + f(3) + f(5) + f(1)$ is

- (A) -1
- (B) 0
- (C) 1
- (D) 2

Ans. Bonus

$\begin{bmatrix} 1 & 3 \end{bmatrix}$

25. If $P^{-1}AP$ is the adjoint of a 3×3 matrix A and $|A| = 4$, then $|P|$ is equal to

- (A) 4
- (B) 5
- (C) 11
- (D) 0

Ans. C

26. If $A = \begin{bmatrix} x & 1 & 1 \\ 1 & 1 & x \end{bmatrix}$ and $B = \begin{bmatrix} x & 1 & 1 \\ 1 & 1 & x \end{bmatrix}$, then $A^{-1}B$ is

- (A) $3A$
- (C) $3B + 1$
- (B) $-3B$
- (D) $1 - 3A$

Ans. A

27. Let $f(x) = \frac{\cos x - x}{\sin x - x}$. Then $\lim_{x \rightarrow 0} f(x)$ is

- (A) -1
- (B) 0

(C) 3

(D) 2

Ans. B

28. Which one of the following observations is correct for the features of logarithm function to any base $b > 1$?

- (A) The domain of the logarithm function is \mathbb{R} , the set of real numbers.
- (B) The range of the logarithm function is \mathbb{R}^+ , the set of all positive real numbers.
- (C) The point $(1, 0)$ is always on the graph of the logarithm function.
- (D) The graph of the logarithm function is decreasing as we move from left to right.

Ans. C

29. The function $f(x) = \cos x$ is

- (A) Everywhere continuous and differentiable
- (B) Everywhere continuous but not differentiable at odd multiples of $\frac{\pi}{2}$
- (C) Neither continuous nor differentiable at $2n\pi - 1, n \in \mathbb{Z}$
- (D) Not differentiable everywhere

30. If $y = 2x^{3x}$, then $\frac{dy}{dx}$ at $x = 1$ is

- (A) 2
- (B) 6
- (C) 3
- (D) 1

Ans. B

31. Let the function satisfy the equation $f(x) = y + f(x) + f(y)$ for all $x, y \in \mathbb{R}$, where $f(0) \neq 0$. If $f(5) = 3$ and $f'(0) = 2$, then $f'(5)$ is

- (A) 6
- (B) 0
- (C) 3
- (D) -6

Ans. Bonus (If we ignore inconsistency we will get A)

32. The value of C in $(0, 2)$ satisfying the mean value theorem for the function $f(x) = x^2$ is

$\frac{1}{3}$, $x \in (0, 2)$ is equal to

- (A) $\frac{3}{4}$
- (B) $\frac{4}{3}$
- (C) $\frac{1}{3}$
- (D) $\frac{2}{3}$

Ans. B

33. $\int \frac{dx}{\cos^2 x \cot^2 x}$ is

(A) $\frac{3}{4}$

(B) $\frac{1}{2}$

(C) $\frac{1}{2}$

(D) $\frac{1}{4}$

Ans. D

34. For the function $f(x) = x^3 - 6x^2 + 12x - 3$; $x = 2$ is

(A) A point of minimum

(B) A point of inflexion

(C) Not a critical point

(D) A point of maximum

Ans. B

35. The function x^x ; $x > 0$ is strictly increasing at

(A) $x \in \mathbb{R}$

(B) $x < \frac{1}{e}$

(C) $x > \frac{1}{e}$

(D) $x < 0$

Ans. C

36. The maximum volume of the right circular cone with slant height 6 units is

(A) $4\sqrt{3}$ cubic units

(B) $16\sqrt{3}$ cubic units

(C) $3\sqrt{3}$ cubic units

(D) $6\sqrt{3}$ cubic units

Ans. B

37. If $f(x) = x e^{x^2}$ then $f(x)$ is

(A) Increasing in \mathbb{R}

(B) Decreasing in \mathbb{R}

(C) Decreasing in $[-2, 1]$

(D) Increasing in $[-2, 1]$

Ans. D

38. $\int \frac{\sin x}{3 + 4\cos^2 x} dx$

(A) $\frac{1}{2} \tan^{-1} \frac{1}{\sqrt{2} \cos x} + C$

(B) $\frac{1}{2} \tan^{-1} \frac{1}{\cos x} + C$

$$2\sqrt{3} \quad \square \quad 3 \square$$

$$\sqrt{3}$$

(C) $\sqrt{\tan \square \square \square \cos x} \square \square \square \blacksquare C$

(D) $\tan \frac{1}{\sqrt{3}} \square \square \square \text{---} 2 \cos x \square \square \square \blacksquare C$

2 3

Ans. A

<

39. $\int \square \square \square 1 \square \square x^2 \square \square \sin x \cdot \cos^2 x \, dx \heartsuit$

(A) $< \frac{\square^2}{3}$

(B) $2 < \square < 3$

(C) $< \frac{\square^3}{2}$

(D) 0

Ans. D

$$\int \frac{1}{\square} dx \heartsuit$$

40. $x \log x \square \square \square \square \square \square 2 \square \square 7 \log x \square \square 2 \square \square$

(A) $2 \log 3 \log x \square \square 2 \square \square C$

(B) $\log 3 \log x \square \square 2 \square \square C$

(C) $\log 2 \log x \square \square 1 \square \square C$

(D) $2 \log 2 \log x \square \square 1 \square \square C$

Ans. B

$$\sin \frac{5x}{\square}$$

41. $\int \frac{2^x}{x} dx \heartsuit$

$$\sin \frac{\square}{2}$$

(A) $2x \square \sin x \square 2 \sin 2x \square C$

(B) $x \square 2 \sin x \square 2 \sin 2x \square C$

(C) $x \square 2 \sin x \square \sin 2x \square C$

(D) $2x \square \sin x \square \sin 2x \square C$

Ans. C

42. $\int \square^5 \square \square x \square \square \square \square 3 \square \square 1 \square \square x \, dx \heartsuit$

- (A) 12 (B) $\frac{5}{6}$
 (C) 21 (D) 10

Ans. A

$$\lim_{n \rightarrow \infty} \left(\frac{1}{2n^2} + \frac{1}{2n^2} + \frac{1}{2n^2} + \dots + \frac{1}{2n^2} \right)$$

43. $\lim_{n \rightarrow \infty} \left(\frac{1}{n} + \frac{2}{n} + \frac{3}{n} + \dots + \frac{5n}{n} \right)$

- (A) $\frac{1}{4}$ (B) $\tan^{-1} 3$
 (C) $\tan^{-1} 2$ (D) $\frac{1}{2}$

Ans. C

44. The area of the region bounded by the line $y = 3x$ and the curve $y = x^2$ in sq. units is

- (A) 10 (B) $\frac{9}{2}$
 (C) 9 (D) 5

Ans. B

45. The area of the region bounded by the line $y = x$ and the curve $y = x^3$ is

- (A) 0.2 sq. units (B) 0.3 sq. units
 (C) 0.4 sq. units (D) 0.5 sq. units

Ans. D

46. The solution of $e^{-dx} = x$, $y = 0$ is

- (A) $y = 2x \log x$ (B) $y = x^3 - x \log x$
 (C) $y = x^3 - x - 1 \log x$ (D) $y = x^3 - x - 1 \log x$

Ans. D

47. The family of curves whose x and y intercepts of a tangent at any point are respectively double the x and y coordinates of that point is

- (A) $xy = C$ (B) $x^2 = y^2 C$

(C) $x^2 + y^2 = C$

(D) $\frac{y}{x} = C$

Ans. A

48. The vectors $\vec{AB} = 3\mathbf{i} + 4\mathbf{k}$ and $\vec{AC} = 5\mathbf{i} + 2\mathbf{j} + 4\mathbf{k}$ are the sides of a $\triangle ABC$. The length of the median through A is

(A) $\sqrt{18}$

(B) $\sqrt{72}$

(C) $\sqrt{33}$

(D) $\sqrt{288}$

Ans. C

49. The volume of the parallelepiped whose co-terminous edges are $\mathbf{j} + \mathbf{k}$, $\mathbf{i} + \mathbf{k}$ and $\mathbf{i} + \mathbf{j}$ is

(A) 6 cu. units

(B) 2 cu. units

(C) 4 cu. units

(D) 3 cu. units

Ans. B

50. Let a and b be two unit vectors and θ is the angle between them. Then $a + b$ is a unit vector if

(A) $\theta = \frac{\pi}{4}$ (B) $\theta = \frac{\pi}{3}$

(C) $\theta = \frac{2\pi}{3}$ (D) $\theta = \frac{\pi}{2}$

Ans. C

51. If a, b, c are three non-coplanar vectors and p, q, r are vectors defined by

$p = \frac{1}{2}(a + b + c)$, $q = \frac{1}{2}(a + b - c)$, $r = \frac{1}{2}(a - b + c)$ then

$a \cdot b \cdot p + b \cdot c \cdot q + c \cdot a \cdot r$ is

(A) 0 (B) 1
(C) 2 (D) 3

Ans. D

52. If lines $x + 2y + 3z = 1$ and $x + y + 5z = 6$ are mutually perpendicular then k is equal to

- (A) $\frac{10}{7}$ (B) $\frac{7}{10}$
 (C) 10 (D) 7

Ans. A

53. The distance between the two planes $2x + 3y + 4z = 4$ and $4x + 6y + 8z = 12$ is

- (A) 2 units (B) 8 units
 (C) $\frac{2}{\sqrt{29}}$ (D) 4 units

Ans. C

54. The sine of the angle between the straight line $x + 2y + 3z = 4$ and the plane $2x + 2y + 5z = 5$ is

- (A) $\frac{1}{5\sqrt{2}}$ (B) $\frac{2}{5\sqrt{2}}$
 (C) $\frac{3}{50}$ (D) $\frac{3}{\sqrt{50}}$

Ans. A

55. The equation $xy = 0$ in three-dimensional space represents

- (A) A pair of straight lines (B) A plane
 (C) A pair of planes at right angles (D) A pair of parallel planes

56. The plane containing the point (3, 2, 0) and the line $x + y + z = 1$ is

- (A) $x + y + z = 1$ (B) $x + y + z = 5$
 (C) $x + 2y + z = 5$ (D) $2x + y + z = 5$

Ans. A

57. Corner points of the feasible region for an LPP are (0, 2), (3, 0), (6, 8) and (0, 5). Let $z = 4x + 6y$ be the objective function. The minimum value of z occurs at

- (A) Only (0, 2) (B) Only (3, 0)
 (C) The mid-point of the line segment joining the points (0, 2) and (3, 0)
 (D) Any point on the line segment joining the points (0, 2) and (3, 0)

Ans. D

58. A die is thrown 10 times. The probability that an odd number will come up at least once is

(A) $\frac{11}{1024}$

(B) $\frac{1013}{1024}$

(C) $\frac{1023}{1024}$

(D) $\frac{1}{1024}$

Ans. C

59. A random variable X has the following probability distribution:

X	0	1	2
P	$\frac{25}{36}$		$\frac{25}{36}$
X		k	$\frac{1}{36}$
<input type="checkbox"/>			

If the mean of the random variable X is $\frac{1}{3}$, then the variance is

(A) $\frac{1}{18}$

(B) $\frac{5}{18}$

(C) $\frac{7}{18}$

(D) $\frac{11}{18}$

Ans. B

60. If a random variable X follows the binomial distribution with parameters $n = 5$, p and $P X = 2 \cdot 9P X = 3$, then p is equal to

(A) 10

(B) $\frac{1}{10}$

(C) 5

(D) $\frac{1}{5}$

Ans.