KCET 2025 Mathematics Question Paper

Time Allowed :1 Hour 20 Minutes	**Maximum Marks :**180	**Total Questions :**60

General Instructions

Read the following instructions very carefully and strictly follow them:

1. The test is of 1 hours 20 minutes duration.
2. The question paper consists of 60 questions. The maximum marks are 180.
3. The questions are from Mathematics, of equal weightage.

Q1. Consider the following statements:
Statement-I: The set of all solutions of the linear inequalities $3x + 8 < 17$ **and** $2x + 8 \geq 12$ **are** $x < 3$ **and** $x \geq 2$ **respectively.**
Statement-II: The common set of solution of linear inequalities $3x + 8 < 17$ **and** $2x + 8 \geq 12$ **is** $(2, 3)$**. Which of the following is true?**

(1) Statement-I is false but Statement-II is true
(2) Both the statements are true
(3) Both the statements are false
(4) Statement-I is true but Statement-II is false

Q2. The number of four-digit even numbers that can be formed using the digits 0, 1, 2 and 3 without repetition is:

(1) 10
(2) 4
(3) 6
(4) 6

Q3. The number of diagonals that can be drawn in an octagon is:

(1) 20
(2) 28
(3) 30
(4) 15

Q4. If the number of terms in the binomial expansion of $(2x+3)^n$ is 22, then the value of n is:

(1) 6
(2) 7
(3) 9
(4) 8

Q5. If the 4th, 10th, and 16th terms of a G.P. are $x, y,$ and z respectively, then:

(1) $y = \sqrt{xz}$
(2) $x = \sqrt{yz}$
(3) $y = \frac{x+z}{2}$
(4) $z = \sqrt{xy}$

Q6. If A is a square matrix such that $A^2 = A$, then $(I - A)^3$ is:

(1) $I - A$
(2) $I + A$
(3) $I - A^3$
(4) $I - A$

Q7. If A and B are two matrices such that AB is an identity matrix and the order of matrix B is 3×4, then the order of matrix A is:

(1) 3×3
(2) 4×3
(3) 4×4
(4) 3×4

Q8. Which of the following statements is not correct?

(1) A diagonal matrix has all diagonal elements equal to zero.
(2) A symmetric matrix A is a square matrix satisfying $A' = A$.
(3) A skew symmetric matrix has all diagonal elements equal to zero.
(4) A row matrix has only one row.

Q9. If a matrix $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ satisfies $A^6 = kA'$, then the value of k is:

(1) 1
(2) $\frac{1}{32}$
(3) 6
(4) 32

Q10. If $A = \begin{bmatrix} k & 2 \\ 2 & k \end{bmatrix}$ and $|A^3| = 125$, then the value of k is:

(1) ± 3
(2) -5
(3) -4
(4) ± 2

Q11. If A is a square matrix satisfying the equation $A^2 - 5A + 7I = 0$, where I is the identity matrix and 0 is the null matrix of the same order, then A^{-1} is:

(1) $\frac{1}{7}(A - 5I)$
(2) $7(5I - A)$
(3) $\frac{1}{5}(7I - A)$
(4) $\frac{1}{7}(5I - A)$

Q12. If A is a square matrix of order 3×3, $\det A = 3$, then the value of $\det(3A^{-1})$ is:

(1) 3
(2) 27
(3) 9
(4) $\frac{1}{3}$

Q13. If $B = \begin{bmatrix} 1 & 3 \\ 2 & \alpha \end{bmatrix}$ is the adjoint of a matrix A and $|A| = 2$, then the value of α is:

(1) 5
(2) 2
(3) 3

(4) 4

Q14. The system of equations $4x + 6y = 5$ and $8x + 12y = 10$ has:

(1) Infinitely many solutions.
(2) A unique solution.
(3) Only two solutions.
(4) No solution.

Q15. If $\vec{a} = \hat{i}+2\hat{j}+\hat{k}$, $\vec{b} = \hat{i}-\hat{j}+4\hat{k}$, and $\vec{c} = \hat{i}+\hat{j}+\hat{k}$ are such that $\vec{a}+\lambda\vec{b}$ is perpendicular to $\vec{c}$, then the value of λ is:

(1) ± 1
(2) 3
(3) 0
(4) -1

Q16. If $|\vec{a}| = 10$, $|\vec{b}| = 2$ and $\vec{a} \cdot \vec{b} = 12$, then the value of $|\vec{a} \times \vec{b}|$ is:

(1) 10
(2) 14
(3) 16
(4) 5

Q17. Consider the following statements:
Statement (I): If either $|\vec{a}| = 0$ or $|\vec{b}| = 0$, then $\vec{a} \cdot \vec{b} = 0$.
Statement (II): If $\vec{a} \times \vec{b} = 0$, then $\vec{a}$ is perpendicular to $\vec{b}$.
Which of the following is correct?

(1) Statement (I) is false but Statement (II) is true
(2) Both Statement (I) and Statement (II) are true
(3) Both Statement (I) and Statement (II) are false
(4) Statement (I) is true but Statement (II) is false

Q18. If a line makes angles $90°$, $60°$ and θ with x, y and z axes respectively, where θ is acute, then the value of θ is:

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

Q19. The equation of the line through the point (0, 1, 2) and perpendicular to the line $\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-1}{-2}$ is:

(1) $\frac{x}{-3} = \frac{y-1}{4} = \frac{z-2}{-4}$
(2) $\frac{x}{-3} = \frac{y-1}{4} = \frac{z-2}{3}$
(3) $\frac{x}{-4} = \frac{y-1}{-4} = \frac{z-2}{-3}$
(4) $\frac{x}{3} = \frac{y-1}{4} = \frac{z-2}{-4}$

Q20. A line passes through $(-1, -3)$ and is perpendicular to $x + 6y = 5$. Its x-intercept is:

(1) $-\frac{1}{2}$
(2) -2
(3) 2
(4) $\frac{1}{2}$

Q21. The length of the latus rectum of $x^2 + 3y^2 = 12$ is:

(1) $\frac{1}{3}$ units
(2) $\sqrt{\frac{4}{3}}$ units
(3) 24 units
(4) $\frac{2}{3}$ units

Q22. The value of $\lim_{x \to 1} \frac{x^4 - \sqrt{x}}{\sqrt{x} - 1}$ is:

(1) 7
(2) does not exist
(3) 1
(4) 0

Q23. If $y = \dfrac{\cos x}{1+\sin x}$, then:

(a) $\dfrac{dy}{dx} = -\dfrac{1}{1+\sin x}$
(b) $\dfrac{dy}{dx} = \dfrac{1}{1+\sin x}$
(c) $\dfrac{dy}{dx} = -\frac{1}{2}\sec^2\left(\frac{\pi}{4} - \frac{x}{2}\right)$
(d) $\dfrac{dy}{dx} = -\frac{1}{2}\sec^2\left(\frac{\pi}{4} - \frac{x}{2}\right)$

Q24. Match the following: In the following, $[x]$ denotes the greatest integer less than or equal to x. (Match a–d with i–iv.)

(1) a - iv, b - iii, c - i, d - ii
(2) a - iii, b - ii, c - iv, d - i
(3) a - iii, b - ii, c - i, d - iii
(4) a - ii, b - iv, c - i, d - iii

Q25. The function $f(x) = \begin{cases} e^x + ax, \&x < 0 \\ b(x-1)^2, \&x \geq 0 \end{cases}$ is differentiable at $x = 0$. Then,

(1) $a = 3,\ b = 1$
(2) $a = -3,\ b = 1$
(3) $a = 3,\ b = -1$
(4) $a = -3,\ b = -1$

Q26. A function $f(x) = \begin{cases} \dfrac{1}{e^{x-1}}, & x \neq 0 \\ \dfrac{1}{e^{x+1}}, & x = 0 \end{cases}$ is given. Then, which of the following is true?

(1) not continuous at $x = 0$
(2) differentiable at $x = 0$
(3) differentiable at $x = 0$, but not continuous at $x = 0$

(4) continuous at $x = 0$

Q27. If $y = a\sin^3 t,\ x = a\cos^3 t$, then $\frac{dy}{dx}$ at $t = \frac{3\pi}{4}$ is:

(1) $\sqrt{\frac{1}{3}}$
(2) $-\sqrt{3}$
(3) 1
(4) -1

Q28. The derivative of $\sin x$ with respect to $\log x$ is:

(1) $x\cos x$
(2) $\cos x \log x$
(3) $\cos x$
(4) $\cos x$

Q29. The minimum value of $1 - \sin x$ is:

(1) -1
(2) 1
(3) 2
(4) 0

Q30. The function $f(x) = \tan x - x$:

(1) always decreases
(2) never increases
(3) neither increases nor decreases
(4) always increases

Q31. The value of $\int \frac{dx}{(x+1)(x+2)}$ is:

(1) $\log\left|\frac{x-1}{x-2}\right| + C$
(2) $\log\left|\frac{x+2}{x+1}\right| + C$

(3) $\log\left|\dfrac{x+1}{x+2}\right| + C$
(4) $\log\left|\dfrac{x-1}{x+2}\right| + C$

Q32. The value of $\int_{-1}^{1} \sin^5 x \cos^4 x \, dx$ is:

(1) π
(2) $\dfrac{\pi}{2}$
(3) 0
(4) $-\pi$

Q33. The value of $\int_0^{2\pi} \dfrac{dx}{1+\sin\dfrac{x}{2}}$ is:

(1) 4
(2) 2
(3) 0
(4) 8

Q34. The integral $\int \dfrac{dx}{x^2(x^4+1)^{3/4}}$ equals:

(1) $(x^4+1)^{1/4} + C$
(2) $-(x^4+1)^{1/4} + C$
(3) $-\dfrac{(x^4+1)^{1/4}}{x^4} + C$
(4) $\left(\dfrac{x^4+1}{x^4}\right)^{1/4} + C$

Q35. The value of the integral $\int_0^1 \log(1-x)\, dx$ is:

(1) 0
(2) $\log(2)$
(3) $\log\dfrac{1}{2}$
(4) 1

Q36. The area bounded by the curve $y = \sin\left(\frac{x}{3}\right)$, x-axis, and the lines $x = 0$ and $x = 3\pi$ is:

(1) 1 sq. unit
(2) 6 sq. units
(3) 3 sq. units
(4) 9 sq. units

Q37. The area of the region bounded by the curve $y = x^2$ and the line $y = 16$ is:

(1) $\frac{256}{3}$ sq. units
(2) 64 sq. units
(3) $\frac{128}{3}$ sq. units
(4) $\frac{32}{3}$ sq. units

Q38. General solution of the differential equation $\frac{dy}{dx} + y\tan x = \sec x$ is:

(1) $y\tan x = \sec x + C$
(2) $\cos x = y\tan x + C$
(3) $y\sec x = \tan x + C$
(4) $y\sec x = \sec x \int \sec x\, dx + C$

Q39. If 'a' and 'b' are the order and degree respectively of the differential equation $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^3 + x^4 = 0$, then $a - b =$

(1) 2
(2) -1
(3) 0
(4) 1

Q40. The distance of the point $P(-3, 4, 5)$ from the yz-plane is:

(1) 5 units
(2) 3 units
(3) 4 units

(4) 3 units

Q41. If $A = \{x : x$ is an integer and $x^2 - 9 \geq 0\}$, $B = \{x : x$ is a natural number and $2 \leq x \leq 5\}$, $C = \{x : x$ is a prime number $\leq 4\}$. Then $(B - C) \cup A$ is:

(1) $\{2, 3, 4\}$
(2) $\{3, 4, 5\}$
(3) $\{2, 3, 5\}$
(4) $\{-3, 3, 4\}$

Q42. A and B are two sets having 3 and 6 elements respectively. Consider the statements:
Statement (I): Minimum number of elements in $A \cup B$ is 3.
Statement (II): Maximum number of elements in $A \cap B$ is 3.
Which of the following is correct?

(1) Statement (I) is false, Statement (II) is true.
(2) Both statements (I) and (II) are true.
(3) Both statements (I) and (II) are false.
(4) Statement (I) is true, Statement (II) is false.

Q43. Domain of the function $f(x) = \dfrac{1}{(x-2)(x-5)}$ is:

(1) $(-\infty, 2) \cup (5, \infty)$
(2) $(-\infty, 3] \cup (5, \infty)$
(3) $(-\infty, 3) \cup (5, \infty)$
(4) $(-\infty, 2] \cup [5, \infty)$

Q44. If $f(x) = \sin\big(\lfloor x/2 \rfloor\big) - \sin\big(\lfloor -x/2 \rfloor\big)$, where $\lfloor x \rfloor$ denotes the greatest integer $\leq x$, then which of the following is not true?

(1) $f\big(\frac{\pi}{2}\big) = 1$

(2) $f\big(\frac{\pi}{4}\big) = 1 + \sqrt{\frac{1}{2}}$

(3) $f(\pi) = -1$

(4) $f(0) = 0$

Q45. Which of the following is not correct?

(1) $\sin 2\pi = \sin(-2\pi)$
(2) $\sin 4\pi = \sin 6\pi$
(3) $\tan 45^\circ = \tan(-315^\circ)$
(4) $\cos 5\pi = \cos 4\pi$

Q46. If $\cos x + \cos^2 x = 1$, then the value of $\sin^2 x + \sin^4 x$ is:

(1) 1
(2) 0
(3) 2
(4) -1

Q47. The mean deviation about the mean for the data $4, 7, 8, 9, 10, 12, 13, 17$ is:

(1) 3
(2) 8.5
(3) 4.03
(4) 10

Q48. A random experiment has five outcomes w_1, w_2, w_3, w_4, w_5. The probabilities of w_1, w_2, w_4, w_5 are respectively $\frac{1}{6}, a, b, \frac{1}{12}$ such that $12a + 12b - 1 = 0$. Then the probability of w_3 is:

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

(2) $\frac{1}{6}$

(3) $\frac{1}{12}$

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

Q49. A die has two faces each labeled '1', three faces labeled '2' and one face labeled '3'. If the die is rolled once, then $P(1 \text{ or } 3)$ is:

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

(2) $\frac{1}{3}$

(3) $\frac{1}{6}$

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

Q50. Let $A = \{a, b, c\}$. Then the number of equivalence relations on A containing the pair (b, c) is:

(1) 3
(2) 2
(3) 4
(4) 1

Q51. Let the functions $f : [0, \pi/2] \to \mathbb{R}$ be $f(x) = \sin x$ and $g(x) = \cos x$. Consider the statements:
Statement (I): f and g are one-to-one.
Statement (II): $f + g$ is one-to-one. Which of the following is correct?

(1) Statement (I) is false, Statement (II) is true.
(2) Both statements (I) and (II) are true.
(3) Both statements (I) and (II) are false.
(4) Statement (I) is true, Statement (II) is false.

Q52. Find $\sec^2(\tan^{-1} 2) + \csc^2(\cot^{-1} 3)$.

(1) 5
(2) 15
(3) 10
(4) 1

Q53. The equation $2\cos^{-1} x = \sin^{-1}(2\sqrt{1 - x^2})$ is valid for all values of x satisfying:

(1) $-1 \leq x \leq 1$
(2) $0 \leq x \leq 1$
(3) $\sqrt{1/2} \leq x \leq 1$
(4) $0 \leq x \leq \sqrt{1/2}$

Q54. Consider the statements:
Statement (I): In a LPP, the objective function is always linear.
Statement (II): In a LPP, the linear inequalities on variables are called constraints.
Which of the following is correct?

(1) Statement (I) is true, Statement (II) is false.
(2) Both Statements (I) and (II) are false.
(3) Statement (I) is false, Statement (II) is true.
(4) Both statements (I) and (II) are true.

Q55. The maximum value of $z = 3x + 4y$, subject to $x + y \leq 40$, $x + 2y \geq 60$ and $x, y \geq 0$ is:

(1) 120
(2) 140
(3) 40
(4) 130

Q56. Statement (I): If E and F are independent, then E' and F' are independent.
Statement (II): Two mutually exclusive events with non-zero probabilities cannot be independent.
Which of the following is correct?

(1) Statement (I) is false and Statement (II) is true.
(2) Both statements are true.
(3) Both statements are false.
(4) Statement (I) is true and Statement (II) is false.

Q57. If A and B are two non-mutually exclusive events such that $P(A|B) = P(B|A)$, then:

(1) $A = B$
(2) $A \cap B = \emptyset$

(3) $P(A) = P(B)$
(4) $A \subset B$ but $A \neq B$

Q58. If $A \subset B$ and $P(B) \neq 0$, then which is correct?

(1) $P(A) < P(B)$
(2) $P(A|B) \geq P(A)$
(3) $P(A) = P(B)$
(4) $P(A|B) = \frac{P(A)}{P(B)}$

Q59. Meera visits only one of the two temples A and B with $P(A) = 2/5$. If she visits A, P(meets friend) $= 1/3$; if she visits B, P(meets friend) $= 2/7$. She met her friend. The probability it was at temple B is:

(1) 5/16
(2) 3/16
(3) 9/16
(4) 7/16

Q60. If Z_1 and Z_2 are two non-zero complex numbers, which of the following is not true?

(1) $|Z_1 Z_2| = |Z_1||Z_2|$
(2) $Z_1 Z_2 = Z_1 \cdot Z_2$
(3) $|Z_1 + Z_2| \geq |Z_1| + |Z_2|$
(4) $Z_1 + Z_2 = Z_1 + Z_2$
