KCET-2025 TEST PAPER WITH ANSWER KEY
(HELD ON THURSDAY 17TH APRIL 2025)
MATHEMATICS (CODE : A1)

1. If A = {x : x is an integer and $x^2 - 9 = 0$ }
   B = {x : x is a natural number and $2 \le x < 5$ }
   C = {x : x is a prime number ≤ 4 }
   Then $(B - C) \cup A$ is,
   (1){-3,3,4} (2) {2,3,4} (3) {3,4,5} (4) {2,3,5}

Ans. 1

Sol. A = {x : x is an integer and $x^2 - 9 = 0$ }
$x^2 = 9 \quad \Rightarrow x = \pm 3 = \{-3, 3\}$
B = {x : x is a natural number and $2 \le x < 5$ }
= {2,3,4}
C = {x : x is a prime number ≤ 4 }
= {2,3}
$(B - C) \cup A = \{4\} \cup \{-3, 3\} = \{-3, 3, 4\}$

2. A and B are two sets having 3 and 6 elements respectively.
   Consider the following statements.
   Statement (I): Minimum number of elements in AUB is 3
   Statement (II): Maximum number of elements in AB is 3
   Which of the following is correct?
   (1) Statement (I) is true, statement (II) is false
   (2) Statement (1) is false, statement (II) is true
   (3) Both statements (1) and (II) are true
   (4) Both statements (I) and (II) are false

Ans. 2

Sol. |A| = 3
|B| = 6
$|A \cup B| = |A| + |B| - |A \cap B|$
$\min|A \cup B| = |A| + |B| - \max|A \cap B|$
$= 3 + 6 - 3 = 6$
$|A \cap B| = |A| + |B| - |A \cup B|$
$\max|A \cap B| = |A| + |B| - \min|A \cup B|$
$= 3 + 6 - 6 = 3$

3. Domain of the function f, given by $f(x)=\dfrac{1}{\sqrt{(x-2)(x-5)}}$ is

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

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

Ans. 2

Sol. $f(x)=\dfrac{1}{\sqrt{(x-2)(x-5)}}$

$\Rightarrow (x-2)(x-5)>0$

$\Rightarrow x\in(-\infty,2)\cup(5,\infty)$

4. If $f(x)=\sin[\pi^2]x-\sin[-\pi^2]x$, where [x] = greatest integer $\le x$, then which of the following is not true ?

(1) f(0) = 0 (2) $f\left(\dfrac{\pi}{2}\right)=1$ (3) $f\left(\dfrac{\pi}{4}\right)=1+\dfrac{1}{\sqrt{2}}$ (4) $f(\pi)=-1$

Ans. 4

Sol. $f(x)=\sin[\pi^2]x-\sin[-\pi^2]x$

$=\sin 9x-\sin(-10)x$

$=\sin 9x+\sin 10x$

$f(\pi)=\sin 9\pi+\sin 10\pi=0$

5. Which of the following is not correct?

(1) $\cos 5\pi=\cos 4\pi$ (2) $\sin 2\pi=\sin(-2\pi)$

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

Ans. 1

Sol. $\cos 5\pi\ne\cos 4\pi$

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

(1) –1 (2)1 (3)0 (4) 2

Ans. 2

Sol. $\cos x+\cos^2 x=1$

$\Rightarrow 1-\cos^2 x=\cos x \qquad \Rightarrow \sin^2 x=\cos x$

$\Rightarrow \sin^2 x+\sin^4 x$

$\Rightarrow \cos x+(\cos x)^2=1$

7. The mean deviation about the mean for the date 4,7,8,9,10,12,13,17 is

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

Ans. 2

Sol. Mean derivation about mean $\mu=\dfrac{4+7+8+9+10+12+13+17}{8}$

$\dfrac{1}{N}\sum(xi-\mu) \quad =\dfrac{80}{8}=10$

$=\dfrac{1}{8}(6+3+2+1+2+3+7) \qquad =\dfrac{24}{8}=3$

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

(1) $\frac{2}{3}$ (2) $\frac{1}{3}$ (3) $\frac{1}{6}$ (4) $\frac{1}{12}$

Ans. 1

Sol. $p(w_1)=\frac{1}{6}$

$p(w_2)=a \qquad \Rightarrow \frac{1}{6}+a+b+x+\frac{1}{12}=1$

$p(w_3)=b \qquad \Rightarrow 12(a+b+x)=9$

$p(w_4)=c \qquad \Rightarrow a+b+x=\frac{3}{4}$

$p(w_5)=\frac{1}{12} \qquad \Rightarrow \frac{1}{12}+x=\frac{3}{4} \Rightarrow x=\frac{2}{3}$

9. A die has two face each with number '1', three faces each with number '2' and one face with number '3'. If the die is rolled once, then P(1 or 3) is

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

Ans. 2

Sol. $p(1)=\frac{2}{6} \qquad \Rightarrow p(1\cup 3)=p(1)+p(3)$

$p(2)=\frac{3}{6} \qquad =\frac{2}{6}+\frac{1}{6}$

$p(3)=\frac{1}{6} \qquad =\frac{1}{2}$

10. Let A = {a, b, c}, then the number of equivalence relations on A containing (b, c) is

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

Ans. 3

Sol. A = {a, b, c}

R = {(b, c), (a, a), (b, b), (c, c), (c, b)}

R = {(a,a) (b,b) (c,c) (a,b) (b,a) (a,c) (c,a) (b,c) (c,b)}

Total (2) equivalence relations possible

11. Let the functions "f" and "g" be $f:\left[0,\frac{\pi}{2}\right]\to R$ given by $f(x)=\sin x$ and $g:\left[0,\frac{\pi}{2}\right]\to R$ given by $g(x)=\cos x,$ where R is the set of real numbers

Consider the following statements:

Statement (I): f and g are one-one

Statement (II): f + g is one-one

Which of the following is correct?

(1) Statement (I) is true, statement (II) is false

(2) Statement (I) is false, statement (II) is true

(3) Both statements (I) and (I) are true

(4) Both statements (I) and (II) are false

Ans. 1

Sol.

$$f:\text{one}-\text{one}\left[0,\frac{\pi}{2}\right]\to R.f(x)=\sin x$$

$$g:\text{one}-\text{one}\left[0,\frac{\pi}{2}\right]\to R.f(x)=\cos x$$

Statement I is true

$$(f+g):\left[0,\frac{\pi}{2}\right]\to R$$

$$f+g(x)=\sin x+\cos x$$

$$\left.\begin{matrix}(f+g)(0)=0\\(f+g)(\pi/2)=0\end{matrix}\right\}\Rightarrow f+g\text{ is not one}-\text{one}$$

12. $\sec^2\left(\tan^{-1}2\right)+\operatorname{cosec}^2\left(\cot^{-1}3\right)=$

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

Ans. 3

Sol. $=1+\tan^2\left(\tan^{-1}2\right)+1+\cot^2\left(\cot^{-1}3\right)$

$=1+4+1+9=15$

13. $2\cos^{-1}x=\sin^{-1}\left(2x\sqrt{1-x^2}\right)$ is valid for all values of 'x' satisfying

(1) $0\le x\le\frac{1}{\sqrt{2}}$ (2) $-1\le x\le 1$ (3) $0\le x\le 1$ (4) $\frac{1}{\sqrt{2}}\le x\le 1$

Ans. 4

Sol. $2\cos^{-1}x=\sin^{-1}\left(2x\sqrt{1-x^2}\right)$

$x=\cos\theta\Rightarrow\theta=\cos^{-1}x$

$\sin^{-1}(2\cos\theta\sin\theta)=\sin^{-1}(\sin 2\theta)=2\theta\in[0,2\pi]$

$=2\cos^{-1}x$ when $\theta\in[0,\pi/4]$

$\Rightarrow 2\cos^{-1}x$ when $\cos^{-1}x\in[0,\pi/4]$

$\Rightarrow 2\cos^{-1}x$ when $x \in \left[\frac{1}{\sqrt{2}},1\right]$

14. Consider the following statements:

Statement (I): In a LPP, the objective function is always linear.

Statement (II): Ina LPP, the linear inequalities on variables are called constraints.

Which of the following is correct?

(1) Statement (I) is true, Statement (II) is true

(2) Statement (I) is true, Statement (II) is false

(3) Both Statements (I) and (II) are false

(4) Statement (I) is false, Statement (II) is true

Ans. 1

Sol.

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

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

Ans. 3

Sol. z = 3x + 4y

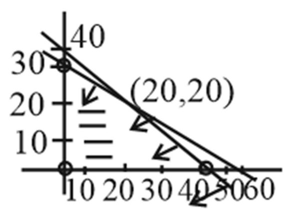
$x + y \leq 40$

$x + 2y \leq 60$

y =20

x=20

Z	(40,0)	(0,30)	(20,20)
3x+4y	120	120	140



16. Consider the following statements.

Statement (I): If E and F are two independent events, then E' and F' are also independent.

Statement (II): Two mutually exclusive events with non-zero probabilities of occurrence cannot be independent.

Which of the following is correct?

(1) Statement (I) is true and statement (II) is false

(2) Statement (I) is false and statement (II) is true

(3) Both the statements are true

(4) Both the statements are false

Ans. 3

Sol. E and F are two independent events, then E' and F' are also independent. Statement I true

$A \cap B = \phi \Rightarrow P(A \cap B) = 0$ ..(1)

$P(A) \neq 0$ ...(2)

$P(B) \neq 0$ ....(3)

From eq(1), (2) and (3)

$P(A \cap B) \neq P(A).P(B)$ Statement II is true

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

(1) $A\subset B$ but $A\neq B$ (2) A=B (3) $A\cap B=\phi$ (4) P(A) = P(B)

Ans. 4

Sol. A and B are non mutually exclusive

$P(A|B)=P(B|A)$

$\Rightarrow \dfrac{P(A\cap B)}{P(B)}=\dfrac{P(A\cap B)}{P(A)}$

$\Rightarrow P(B)=P(A)\ \left[\because P(A\cap B)\neq 0\right]$

18. If A and B are two events such that $A\subset B$ and $P(B)\neq 0$, then which of the following is correct?

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

Ans. 3

Sol. $A\subset B\Rightarrow A\cap B=A$

$P(A|B)=\dfrac{P(A\cap B)}{P(B)}$

$=\dfrac{P(A)}{P(B)}$

$\Rightarrow P(A|B)P(B)=P(A)\Rightarrow P(A)\geq P(A|B)$

$\left[\because P(B)\neq 0\right]$

19. Meera visits only one of the two temples A and B in her locality. Probability that she visits temple A is $\dfrac{2}{5}$. If she visits temple A, $\dfrac{1}{3}$ is the probability that she meets her friend, whereas it is $\dfrac{2}{7}$ if she visits temple B. Meera met her friend at one of the two temples. The probability that she met her at temple B is

(1) $\dfrac{7}{16}$ (2) $\dfrac{5}{16}$ (3) $\dfrac{3}{16}$ (4) $\dfrac{9}{16}$

Ans. 4

Sol. $P(A)=\dfrac{2}{5}$ F: The events of meera meets her friend.

$P(F/A)=\dfrac{1}{3}$

$P(F/B)=\dfrac{2}{7}$

$P(B)=1-P(A)$

$=1-\dfrac{2}{5}$

$=\dfrac{3}{5}$

The probability she meet her at temple B

$$P(B/F)=\frac{P(F\cap B)}{P(F)}$$

$$=\frac{P(B)\times P(B/F)}{P(A)P(F/A)+P(B)P(B/F)}$$

$$=\frac{3/5\times 2/7}{(2/5\times 1/3)+(3/5\times 5/7)}=\frac{9}{16}$$

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

(1) $\overline{Z_1+Z_2}=\overline{Z}_1+\overline{Z}_2$ (2) $|Z_1Z_2|=|Z_1|.|Z_2|$ (3) $\overline{Z_1Z_2}=\overline{Z}_1.\overline{Z}_2$ (4) $|Z_1+Z_2|\geq|Z_1|+|Z_2|$

Ans. 4

Sol. $|Z_1+Z_2|\leq|Z_1|+|Z_2|$

21. 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 solutions of linear inequalities 3x + 8 < 17 and $2x+8\geq 12$ is (2, 3)

Which of the following is true?

(1)Statement (I) is true but statement (II) is false

(2)Statement (I) is false but statement (II) is true

(3)Both the statements are true

(4) Both the statements are false

Ans. 1

Sol. $3x+8<17\Rightarrow 3x<9\Rightarrow x<3$

$2x+8\geq 12\Rightarrow 2x\geq 4\Rightarrow x\geq 2$

Statement I is correct.

The common set of solution $\Rightarrow\{2\}$

$\rightarrow$ Statement II is false

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

(1)6 (2)10 (3)4 (4)12

Ans. 2

Sol.
$$\left.\begin{array}{lll} ---- & 0 & \rightarrow 3! \\ 1--- & 2 & \rightarrow 2! \\ 3--- & 2 & \rightarrow 2! \end{array}\right\}6+2+2=10$$

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

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

Ans. 2

Sol. A octagon has 8 sides.

$\rightarrow$ The number of diagonals in a polygon is $\frac{n(n-3)}{2}$,

Where n is the number of sides.

$\rightarrow \frac{8(8-3)}{2}=4.5=20$

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

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

Ans. 3

Sol. $(2x+3)^{3n} \to 3n+1=22 \to n=7$

25. If 4th, 10th and 16th terms of a G.P. are x, y and z respectively, then

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

Ans. 2

Sol. $x=ar^3$

$y=ar^9$ $\quad xz=a^2x^{18}=(ar^9)^2$

$z=ar^{15}$ $\quad \Rightarrow y^2=xz \Rightarrow y=\sqrt{xz}$

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

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

Ans. 1

Sol. $A^2=A.$

$$(I-A)^3=(I-A)(I-2A+A^2)$$
$$=(I-A)(I-2A+A)$$
$$=(I-A)(I+A)$$
$$=I-A^2=I-A$$

27. 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) 3×4 (2) 3×3 (3) 4×3 (4) 4×4

Ans. 3

Sol. AB = I

$A_{4\times3}B_{3\times4} \to I_{4\times4}$

$\to$ The order of matrix A is 4×3

28. Which of the following statements is not correct?

(1)A row matrix has only one row

(2)A diagonal matrix has all diagonal elements equal to zero

(3)A symmetric matrix A is a square matrix satisfying $A'=A$.

(4) A skew symmetric matrix has all diagonal elements equal to zero

Ans. 2

Sol. A diagonal matrix need not be contains only zero as it diagonal element.

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

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

Ans. 1

Sol. $A=\begin{bmatrix}1&1\\1&1\end{bmatrix}$

$$A^2 = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix} = \begin{bmatrix} 2 & 2 \\ 2 & 2 \end{bmatrix}$$

$$A^3 = \begin{bmatrix} 2 & 2 \\ 2 & 2 \end{bmatrix}\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix} = \begin{bmatrix} 4 & 4 \\ 4 & 4 \end{bmatrix} = \begin{bmatrix} 2^2 & 2^2 \\ 2^2 & 2^2 \end{bmatrix}$$

$$A^4 = \begin{bmatrix} 8 & 8 \\ 8 & 8 \end{bmatrix} = \begin{bmatrix} 2^3 & 2^3 \\ 2^3 & 2^3 \end{bmatrix}$$

$$A^6 = \begin{bmatrix} 2^5 & 2^5 \\ 2^5 & 2^5 \end{bmatrix} = 2^5\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix} \Rightarrow 2^5 = 32$$

$\therefore k = 32$

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

(1) ± 2 (2) ± 3 (3) -5 (4) -4

Ans. 2

Sol. $A = \begin{bmatrix} k & 2 \\ 2 & k \end{bmatrix}$

$|A| = k^2 - 4$

$|A|^3 = |A|.|A|.|A| = 125$, given

$\Rightarrow (k^2 - 4)^3 = 125$

$\Rightarrow k^2 - 4 = 5 \Rightarrow k^2 = 9$

$\Rightarrow k = \pm 3$

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

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

Ans. 1

Sol. Given

$A^2 - 5A + 7I = 0$ $(\because \text{Multiply by } A^{-1} \text{ both sides } |A| \neq 0)$

$A - 5I + 7A^{-1} = 0$

$A^{-1} = \frac{(5I - A)}{7}$

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

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

Ans. 4

Sol. $|3A^{-1}| = 3^3\frac{1}{3} = 9$

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

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

Ans. 2

Sol. $\alpha-3=2, \alpha=5$

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

(1) No solution (2) Infinitely many solutions

(3) A unique solution (4) Only two solutions

Ans. 2

Sol. $\frac{1}{2}=\frac{1}{2}=\frac{1}{2}$

35. 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) ± 1 (3) –1 (4) 0

Ans. 3

Sol. $(\vec{a}+\lambda\vec{b})\perp c$

$(\vec{a}+\lambda\vec{b})\cdot\vec{c}=0$

$\lambda+1+2+\lambda+4\lambda+1=0, \lambda+1 \Rightarrow \lambda=-1$

36. 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) 5 (2) 10 (3) 14 (4) 16

Ans. 4

Sol. $\frac{|\vec{a}\times\vec{b}|}{|\vec{a}||\vec{b}|}=\frac{4}{5}$

$|\vec{a}\times\vec{b}|=\frac{4}{5}\times 20=16$

37. 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 $\vec{a}\times\vec{b}=\vec{0}$, then a is perpendicular to b.

Which of the following is correct ?

(1) Statement (I) is false but Statement (II) is false

(2) Statement (I) is false but Statement (II) is true

(3) Both Statement (I) and Statement (II) is true

(4) Both Statement (I) and Statement (II) is false

Ans. 1

Sol. Statement (I) is true

Statement (II) is false

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

Ans. 1

Sol. $\ell^2 + m^2 + n^2 = 1$

$n^2 = 1 - \frac{1}{4} \Rightarrow n = \frac{\sqrt{3}}{2}$

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

Ans. 2

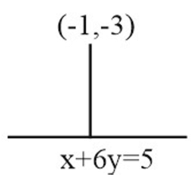
Sol. $a_1a_2 + b_1b_2 + c_1c_2 = 0$

40. A line passes through (–1, –3) and perpendicular to x + 6y = 5. Its x intercept is

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

Ans. 2

Sol.



y +3 = 6 (x+1)

x intercept y = 0

$x = \frac{-1}{2}$

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

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

Ans. 3

Sol. $\frac{x^2}{12} + \frac{y^2}{4} = 1$

$L.R = \frac{2b^2}{a} = \frac{\cancel{2} \times 4}{\cancel{2}\sqrt{3}} = \frac{4}{\sqrt{3}}$

42. $\lim_{x \to 1} \frac{x^4 - \sqrt{x}}{\sqrt{x} - 1}$ is

(1) 0 (2) 7 (3) Does not exist (4) $\frac{1}{2}$

Ans. 2

Sol. $\lim\limits_{x\to1}\dfrac{x^4-\sqrt{x}}{\sqrt{x}-1}=\lim\limits_{x\to1}\dfrac{4x^3-\dfrac{1}{2\sqrt{x}}}{\dfrac{1}{2\sqrt{x}}}=\lim\limits_{x\to1}\dfrac{\dfrac{8x^3\sqrt{x}-1}{\cancel{2\sqrt{4}}}}{\dfrac{1}{\cancel{2\sqrt{x}}}}$

= 7

43. 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) $\dfrac{dy}{dx}=-\dfrac{1}{2}\sec^2\left(\dfrac{\pi}{4}-\dfrac{x}{2}\right)$

(d) $\dfrac{dy}{dx}=\dfrac{1}{2}\sec^2\left(\dfrac{\pi}{4}-\dfrac{x}{2}\right)$

(1) Only b is correct

(2) Only a is correct

(3) Both a and c are correct

(4) Both b and d are correct

Ans. 3

Sol. $y=\dfrac{\cos x}{1+\sin x}$

$$y'=\frac{-\sin x(1+\sin x)-\cos x(\cos x)}{(1+\sin x)^2}=\frac{-(1+\sin x)}{(1+\sin x)^2}$$

$$y'=\frac{-1}{\left(\cos\frac{x}{2}+\sin\frac{x}{2}\right)^2}=\frac{-1}{1+\sin x}$$

$$=\frac{-1}{2.\left(\frac{1}{\sqrt{2}}.\cos\frac{x}{2}+\frac{1}{\sqrt{2}}\sin\frac{x}{2}\right)^2}=\frac{-1}{2.\cos^2\left(\frac{\pi}{4}-\frac{x}{2}\right)}$$

$$=\frac{-1}{2}.\sec^2\left(\frac{\pi}{4}-\frac{x}{2}\right)$$

44. Match the following:

In the following, [x] denotes the greatest integer less than or equal to x.

Column – I		**Column – II**	
(a)	$x\|x\|$	(i)	continuous in (–1, 1)
(b)	$\sqrt{\|x\|}$	(ii)	differentiable in (–1, 1)
(c)	x + [x]	(iii)	strictly increasing in (–1, 1)
(d)	|x – 1| + |x + 1|	(iv)	not differentiable at, at least one point in (–1, 1)

(1) a – i, b – ii, c – iv, d – iii

(2) a – iv, b – iii, c – i, d – ii

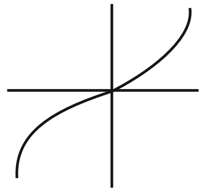
(3) a – ii, b – iv, c – iii, d – i

(4) a – iii, b – ii, c – iv, d – i

Ans. 3

Sol. (a) x|x|

$$f(x)=\begin{cases}x^2, & x\ge0\\ -x^2 & x<0\end{cases}\ \text{differentiable in } (-1,1)$$



(b) $\sqrt{|x|}=\begin{cases}\sqrt{x}, & x\ge 0\\ \sqrt{-x}, & x<0\end{cases}$ Not differentiable at x = 0

(c) $x+[x]$ strictly increasing in (–1, 1)

(d) $|x-1|+|x+1|=\begin{cases}-x+1-x-1 & x<-1\\ -x+1+x+1 & -1<x<1\\ x-1+x-1 & x>1\end{cases}$

Continuous (–1, 1) $=\begin{cases}-2x, & x<-1\\ 2, & -1<x<1\\ 2x, & x>1\end{cases}$

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

(1) a = 1, b = 1 (2) a = 3, b = 1 (3) a = –3, b = 1 (4) a = 3, b = –1

Ans. 3

Sol. $f(x)=\begin{cases}e^x+ax, & x<0\\ b(x-1)^2, & x\ge 0\end{cases}$

Continuity LHL = 1

RHL = b ⇒ b = 1

Differentiability LHD = 1 + a

RHD = –2b

1 + a = –2b

a = –3

46. A function $f(x)=\begin{cases}\dfrac{e^{\frac{1}{x}}-1}{e^{\frac{1}{x}}+1}, & \text{if } x\ne 0\\ 0, & \text{if } x=0\end{cases}$ is

(1) continuous at x = 0 (2) not continuous at x = 0

(3) differentiable at x = 0 (4) differentiable at x = 0, but not continuous at x = 0

Ans. 2

Sol. $f(x)=\begin{cases}\dfrac{e^{\frac{1}{x}}-1}{e^{\frac{1}{x}}+1}, & x\ne 0\\ 0, & x=0\end{cases}$

LHL = –1, RHL = 1, Not continuous.

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

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

Ans. 4

Sol. $y = a\sin^3 t,\ x = a\cos^3 t$

$$\frac{dy}{dx}=\frac{\frac{dy}{dt}}{\frac{dx}{dt}}=\frac{\cancel{3}a\sin^{\cancel{2}} t\cancel{\cos t}}{\cancel{3}a\cos^{\cancel{2}} t\left(\cancel{-\sin t}\right)}=-\tan t$$

$$t=\frac{3\pi}{4}\ =1$$

48. The derivative of sin x with respect to log x is

(1) cos x (2) x cos x (3) $\frac{\cos x}{\log x}$ (4) $\frac{\cos x}{x}$

Ans. 2

Sol. $f(x)=\sin x$ $\frac{d(\sin x)}{d(\log x)}=\frac{\cos x}{\frac{1}{x}}$
$g(x)=\log x$

$= x \cos x$

49. The minimum value of 1 – sin x is

(1) 0 (2) –1 (3) 1 (4) 2

Ans. 1

Sol. f(x) = 1 – sin x

$-1\le \sin x\le 1$

$f_{min}=0$

50. The function f(x) = tan x – x

(1) always increases (2) always decreases

(3) never increases (4) neither increases nor decreases

Ans. 1

Sol. $f(x)=\tan x-x$

$f'(x)=\sec^2 x-1=\tan^2 x\ge 0$

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

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

Ans. 4

Sol. $\int\frac{dx}{(x+1)(x+2)}=\int\frac{(x+2)-(x+1)}{(x+1)(x+2)}dx$

$$=\int\frac{1}{x+1}dx-\int\frac{1}{x+2}dx$$

$$= \log\left|\frac{x+1}{x+2}\right| + c$$

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

(1) $-\pi/2$ (2) π (3) $\pi/2$ (4) 0

Ans. 4

Sol. $\int_{-1}^{1} \sin^5 x \cos^4 x \, dx = 0$

Since it is odd function.

53. The value of $\int_0^{2\pi} \sqrt{1+\sin\left(\frac{x}{2}\right)} \, dx$ is

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

Ans. 1

Sol. $\int_0^{2\pi} \sqrt{1+\sin\frac{x}{2}}$

$$\int_0^{2\pi} \left|\cos\frac{x}{4} + \sin\frac{x}{4}\right| = \left[4\sin\frac{x}{4} - 4\cos\frac{x}{4}\right]_0^{2\pi}$$

$$= \left(4(1) - 0(0-4)\right)$$

$$= 8$$

54. $\int \frac{dx}{x^2\left(x^4+1\right)^{3/4}}$ equals

(1) $\left(\frac{x^4+1}{x^4}\right)^{\frac{1}{4}} + c$ (2) $\left(x^4+1\right)^{\frac{1}{4}} + c$ (3) $-\left(x^4+1\right)^{\frac{1}{4}} + c$ (4) $-\left(\frac{x^4+1}{x^4}\right)^{\frac{1}{4}} + c$

Ans. 4

Sol. $\int \frac{dx}{x^2\left(x^4+1\right)^{3/4}}$

$$= \int \frac{dx}{x^5\left(1+\frac{1}{X^4}\right)^{3/4}} \qquad 1+\frac{1}{x^4} = T$$

$$-4x^{-5}dx = dt$$

$$= -\frac{1}{4}\int t^{-3/4} dt = -\frac{1}{\cancel{4}}\frac{t^{1/4}}{\frac{1}{\cancel{4}}} + c = -\left(1+\frac{1}{x^4}\right)^{1/4}$$

55. $\int_0^1 \log\left(\frac{1}{x}-1\right) dx$ is

(1) 1 (2) 0 (3) $\log_e 2$ (4) $\log_e\left(\frac{1}{2}\right)$

Ans. 2

Sol. $\int_0^1 \log\left(\frac{1}{x}-1\right) dx = \int_0^1 \log\left(\frac{1-x}{x}\right) dx$

$I = \int_0^1 \log\left(\frac{1}{1+0-x}-1\right) = \int_0^1 \log\left(\frac{1}{1-x}-1\right) dx$

$I = \int_0^1 \log\left(\frac{1-1+x}{1-x}\right) dx = \int_0^1 \log\left(\frac{x}{1-x}\right) dx$

$2I = \int_0^1 \left(\log\left(\frac{1-x}{x}\right) + \log\left(\frac{x}{1-x}\right)\right) dx$

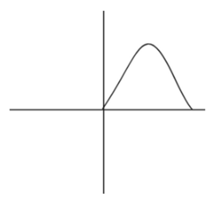
$2I = 0 \qquad \Rightarrow I = 0.$

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

(1) 9 sq. units (2) $\frac{1}{3}$ sq. units (3) 6 sq. units (4) 3 sq. units

Ans. 3

Sol. $\int_0^{3\pi} \sin\left(\frac{x}{3}\right) dx$



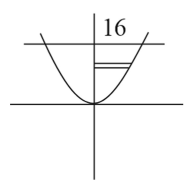
$\left(-3.\cos\frac{x}{3}\right)_0^{3\pi} = \left(-3(-1)\right) - \left(-3(1)\right) = 6$

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

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

Ans. 2

Sol. $y = x^2, \ y = 16$



$2\int_0^{16} \sqrt{y} dy = 2\frac{y^{3/2}}{3/2}$

$= \frac{4}{3}\left(4^3\right) = \frac{256}{3}$

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

(1) y sec x = tan x + c (2) y tan x = sec x + c

(3) co sec x = y tan x + c (4) x sec x = tan y + c

Ans. 1

Sol. $\frac{dy}{dx} + (\tan x) y = \sec x$

$I.F = e^{(-)\int -\frac{\sin x}{\cos x} dx} = e^{-\log_e \cos x} = \sec x.$

$\therefore \quad y.\sec x = \int \sec^2 x dx$

$y \sec x = \tan x + c$

59. If ‘a’ and ‘b’ are the order and degree respectively of the differentiable equation.

$\left(\frac{d^2y}{dx^2}\right)^2 + \left(\frac{dy}{dx}\right)^3 + x^4 = 0$, then a – b = _____

(1) 1 (2) 2 (3) –1 (4) 0

Ans. 4

Sol. a = order = 2

b = degree = 2

a – b = 0

60. The distance of the point P(–3, 4, 5) from yz plane is

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

Ans. 4

Sol. 3 units

KCET-2025 17TH APRIL 2025

ANSWER KEY (CODE : A1)

MATHEMATICS

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	1	2	2	4	1	2	2	1	2	3	1	3	4	1	3
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	3	4	3	4	4	1	2	2	3	2	1	3	2	1	2
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	1	4	2	2	3	4	1	1	2	2	3	2	3	3	3
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	2	4	2	1	1	4	4	1	4	2	3	2	1	4	4

Assure Your Selection In

JEE MAIN & KCET

ALLEN

Join

ALLEN BENGALURU

NURTURE COURSE

Class X To XI Moving Student

Batch Starting From Phase -2

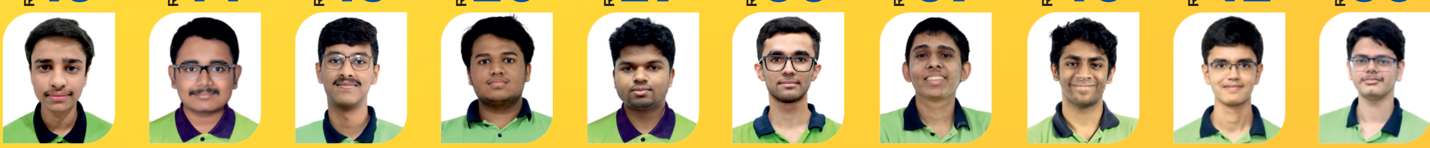
8th MAY 2025

Karnataka State Topper

JEE MAIN 2024	KCET 2024
AIR 41	RANK 3
SAINAVANEET M	ABHINAV P J
CLASSROOM	CLASSROOM

Result: KCET 2024

RANK 3	RANK 5	RANK 7	RANK 8	RANK 9	RANK 10
ABHINAV P J	ANIMESH S R	VIDEEP REDDY J	SHAWN T K	KARTHIKEYA S V	SAGAR V
4 Years Classroom	4 Years Classroom	3 Years Classroom	2 Years Classroom	3 Years Classroom	3 Years Classroom



RANK 13	RANK 14	RANK 15	RANK 20	RANK 29	RANK 30	RANK 39	RANK 40	RANK 42	RANK 50
ABHISHEK UPADHYA	HEMANTH M	AVANEESH P KURADE	ANSHUL GOYAL	AKASH SOMASUNDARAM	MADHAV ARUN KRISHNA	KRISHNAN R	PRAKET GOEL	ABHINAV PRASAD	DEVANSH TRIPATHI
Classroom	Classroom	Classroom	Classroom	Classroom	Classroom	Classroom	Classroom	Classroom	Classroom

06 In Top 10 Ranks

16 In Top 50 Ranks

34 In Top 100 Ranks

101 In Top 500 Ranks

080-46704000

Bengaluru Campuses : Jayanagar | Marathahalli | Banaswadi | Hebbal | HSR Layout | Bannerghatta | Basaveshwara Nagar | Sarjapura | Jalahalli | Indiranagar | Whitefield | Electronic City | RR Nagar | Yelahanka