KCET 2019 MATHEMATICS QUESTION PAPER

1. If $\sqrt[3]{y}\sqrt{x}=\sqrt[6]{(x+y)^5}$, then $\frac{dy}{dx}=$

a) $\frac{x}{y}$ b) $x+y$

c) $x-y$ d) $\frac{y}{x}$

2. Rolle 's Theorem is not applicable in which one of the following cases?

a) $f(x)=x^2-4x+5 \text{ in } [1,3]$

b) $f(x)=x^2-x \text{ in } [0,1]$

c) $f(x)=|x| \text{ in } [-2,2]$

d) $f(x)=[x] \text{ in } [2.5,2.7]$

3. The interval in which the function $f(x)=x^3-6x^2+9x+10$ is increasing in

a) $(-\infty,1)\cup(3,\infty)$ b) $(-\infty,-1]\cup(-3,\infty)$

c) $[1,3]$ d) $(-\infty,-1)\cup[3,\infty)$

4. The side of an equilateral triangle are increasing at the rate of $4\,\text{cm/sec}$. The rate at which its area is increasing, when the sides is 14 cm

a) $10\sqrt{3}\ cm^2/\text{sec}$ b) $14\sqrt{3}\ cm^2/\text{sec}$

c) $42\ cm^2/\text{sec}$ d) $14\ cm^2/\text{sec}$

5. The value of $\sqrt{24.99}$ is

a) 4.999 b) 4.899

c) 5.001 d) 4.897

6. If $|3x-5|\le 2$ then

a) $-1\le x\le\frac{7}{5}$ b) $1\le x\le\frac{7}{3}$

c) $1\le x\le\frac{9}{3}$ d) $-1\le x\le\frac{9}{3}$

7. A random variable 'X' has the following probability distribution:

X	1	2	3	4	5	6	7
P(X)	$k-1$	3k	K	3k	$3k^2$	k^2	k^2+k

a) $\frac{1}{5}$ b) -2

c) $\frac{2}{7}$ d) $\frac{1}{10}$

8. If A and B are two events of a sample space S such that $P(A)=0.2, P(B)=0.6$ and $P(A|B)=0.5$ then $P(A'|B)=$

a) $\frac{3}{10}$ b) $\frac{2}{3}$

c) $\frac{1}{2}$ d) $\frac{1}{3}$

9. If 'X' has a binomial distribution with parameters $n=6\,p$ and $P(X=2)=12, P(X=3)=5$ then P =

a) $\frac{5}{12}$ b) $\frac{16}{21}$

c) $\frac{1}{2}$ d) $\frac{5}{16}$

10. A man speaks truth 2 out of 3 times. He picks one of the natural numbers in the set $S=\{1,2,3,4,5,6,7\}$ and reports that it is even. The probability that it is actually even is

a) $\frac{2}{5}$ b) $\frac{1}{5}$

c) $\frac{1}{10}$ d) $\frac{3}{5}$

11. If U is the universal set with 100 elements; A and B are two sets such that $n(A)=50, n(B)=60, n(A\cap B)=20$ then n $n(A'\cap B')=?$

a) 40 b) 20

c) 90 d) 10

12. The domain of the function $f:R\to R$ defined by $f(x)=\sqrt{x^2-7x+12}$

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

c) $(-\infty,3]\cap[4,\infty)$ d) $(3,4)$

13. If $\cos x = |\sin x|$ then, the general solution is

a) $x = n\pi \pm \frac{\pi}{4}, n \in Z$

b) $x = 2n\pi \pm \frac{\pi}{4}, n \in Z$

c) $x = n\pi + (-)^n \frac{\pi}{4}, n \in Z$

d) $x = (2n+1)\pi \pm \frac{\pi}{4}, n \in Z$

14. $\sqrt{3}\,\text{cosec}\,20^0 - \sec 20^0 =$

a) 2 b) 3
c) 4 d) 1

15. If $P(n): 2^n < n!$ then the smallest positive integer for which $P(n)$ is true, is

a) 2 b) 3
c) 4 d) 5

16. Foot of the perpendicular drawn from the point $(1,3,4)$ to the plane $2x - y + z + 3 = 0$ is

a) $(-1,4,3)$ b) $(0,-4,-7)$
c) $(1,2,-3)$ d) $(-3,5,2)$

17. Acute angle between the line $\frac{x-5}{2} = \frac{y+1}{-1} = \frac{z+4}{1}$ and the plane $3x - 4y - z + 5 = 0$ is

a) $\cos^{-1}\left(\frac{9}{\sqrt{364}}\right)$ b) $\sin^{-1}\left(\frac{9}{\sqrt{364}}\right)$
c) $\cos^{-1}\left(\frac{5}{2\sqrt{13}}\right)$ d) $\sin^{-1}\left(\frac{5}{2\sqrt{13}}\right)$

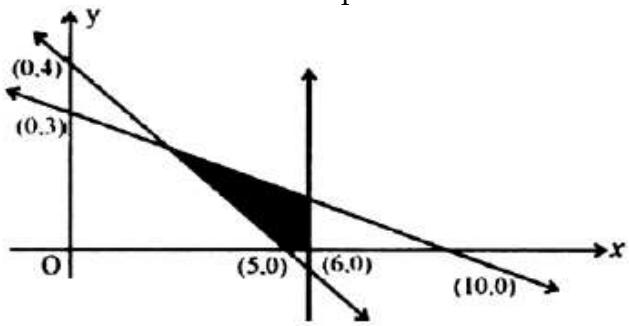
18. The distance of the point $(1,2,1)$ form the line $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-3}{2}$ is

a) $\frac{2\sqrt{3}}{5}$ b) $\frac{2\sqrt{5}}{3}$
c) $\frac{\sqrt{5}}{3}$ d) $\frac{20}{3}$

19. XY – plane divides the line joining the points $A(2,3,-5)$ and $B(-1,-2,-3)$ in the ratio

a) 2:1 internally b) 3:2 externally
c) 5:3 internally d) 5:3 externally

20. The shaded region in the figure is the solution set of the in equations



a) $4x + 5y \geq 20,\ 3x + 10y \leq 30,\ x \leq 6,\ x, y \geq 0$
b) $4x + 5y \geq 20,\ 3x + 10y \leq 30,\ x \geq 6,\ x, y \geq 0$
c) $4x + 5y \leq 20,\ 3x + 10y \leq 30,\ x \leq 6,\ x, y \geq 0$
d) $4x + 5y \leq 20,\ 3x + 10y \leq 30,\ x \geq 6,\ x, y \geq 0$

21. The order of the differential equation $y = C_1 e^{C_2 + x} + C_3 e^{C_4 + x}$ is

a) 1 b) 2
c) 3 d) 4

22. If $|\vec{a}| = 16, |\vec{b}| = 4$ then $\sqrt{|\vec{a} \times \vec{b}|^2 + |\vec{a}.\vec{b}|^2} =$

a) 4 b) 8
c) 16 d) 64

23. If the angle between $\vec{a}$ and $\vec{b}$ is $\frac{2\pi}{3}$ and the projection of $\vec{a}$ in the direction of $\vec{b}$ is – 2, then $|\vec{a}| =$

a) 4 b) 3
c) 2 d) 1

24. A unit vector perpendicular to the plane containing the vectors $\hat{i} + 2j + k$ and $-2\hat{i} + j + 3k$ is

a) $\frac{\hat{i} + j + k}{\sqrt{3}}$ b) $\frac{\hat{i} - j - k}{\sqrt{3}}$
c) $\frac{-\hat{i} + j - k}{\sqrt{3}}$ d) $\frac{-\hat{i} - j - k}{\sqrt{3}}$

25. $\left[\vec{a}+2\vec{b}-\vec{c}, \vec{a}-\vec{b}, \vec{a}-\vec{b}-\vec{c}\right] =$

a) 0 b) $\left[\vec{a},\vec{b},\vec{c}\right]$

c) $2\left[\vec{a},\vec{b},\vec{c}\right]$ d) $3\left[\vec{a},\vec{b},\vec{c}\right]$

26. $\int_{-3}^{3} \cot^{-1} x\, dx =$

a) 3π b) 0

c) 6π d) 3

27. $\int \frac{1}{\sqrt{x}+x\sqrt{x}}dx =$

a) $2\log\left(\sqrt{x}+1\right)+C$ b) $\frac{1}{2}\tan^{-1}\sqrt{x}+C$

c) $\tan^{-1}\sqrt{x}+C$ d) $2\tan^{-1}\sqrt{x}+C$

28. $\int \frac{2x-1}{(x-1)(x+2)(x-3)}dx = A\log|x-1|+B\log|x+2|+C\log|x-3|+K$, then A, B, C are respectively

a) $\frac{-1}{6},\frac{1}{3},\frac{-1}{2}$ b) $\frac{1}{6},\frac{1}{3},\frac{-1}{5}$

c) $\frac{1}{6},\frac{-1}{3},\frac{1}{3}$ d) $\frac{-1}{6},\frac{-1}{3},\frac{1}{2}$

29. $\int_{0}^{2}\left[x^2\right]dx =$

a) $5-\sqrt{2}-\sqrt{3}$ b) $5+\sqrt{2}-\sqrt{3}$

c) $5-\sqrt{2}+\sqrt{3}$ d) $-5-\sqrt{2}-\sqrt{3}$

30. $\int_{0}^{1}\sqrt{\frac{1+x}{1-x}}dx =$

a) $\frac{\pi}{2}-1$ b) $\frac{\pi}{2}+1$

c) $\frac{\pi}{2}$ d) $\frac{1}{2}$

31. If α and β are roots of the equations $x^2+x+1=0$ then $\alpha^2+\beta^2$ is

a) 1 b) $\frac{-1+i\sqrt{3}}{2}$

c) $\frac{-1-i\sqrt{3}}{2}$ d) -1

32. The number of 4 – digit numbers without repetition that can be formed using the digits 1,2,3,4,5,6,7 in which each number has two odd digits and two even digits is

a) 432 b) 436

c) 450 d) 454

33. The number of terms in the expansion of $\left(x^2+y^2\right)^{25}-\left(x^2-y^2\right)^{25}$ after simplification is

a) 0 b) 13

c) 26 d) 50

34. The third term of a G.P is 9. The product of its first five terms is

a) 3^5 b) 3^9

c) 3^{10} d) 3^{12}

35. A line cuts off equals intercepts on the co – ordinate axes. The angle made by this line with the positive direction of X – axis is

a) 45° b) 90°

c) 120° d) 135°

36. $\int x^3 \sin 3x\, dx =$

a) $\frac{x^3\cos 3x}{3}-\frac{x^2\sin 3x}{3}+\frac{2x\cos 3x}{9}-\frac{2\sin 3x}{27}+C$

b) $\frac{x^3\cos 3x}{3}+\frac{x^2\sin 3x}{3}-\frac{2x\cos 3x}{9}-\frac{2\sin 3x}{27}+C$

c) $-\frac{x^3\cos 3x}{3}+\frac{x^2\sin 3x}{3}+\frac{2x\cos 3x}{9}-\frac{2\sin 3x}{27}+C$

d) $\frac{x^3\cos 3x}{3}+\frac{x^2\sin 3x}{3}-\frac{2x\cos 3x}{9}-\frac{2\sin 3x}{27}+C$

37. The area of the region above X – axis included between the parabola $y^2=x$ and the circle $x^2+y^2=2x$ in square units is

a) $\frac{\pi}{4}-\frac{3}{2}$ b) $\frac{3}{2}-\frac{\pi}{4}$

c) $\frac{2}{3}-\frac{\pi}{4}$ d) $\frac{\pi}{4}-\frac{2}{3}$

38. The area of the region bounded by Y – axis, $y=\cos x$ and $y=\sin x; 0\le x\le\frac{\pi}{2}$ is

a) $\sqrt{2}-1$ Sq units b) $\sqrt{2}$ Sq. units
c) $\sqrt{2}+1$ Sq. units d) $2-\sqrt{2}$ sq. units

39. The integrating factor of the differential equation $\left(2x+3y^2\right)dy=y\,dx\,(y>0)$ is

a) $e^{\frac{1}{y}}$ b) $-\frac{1}{y^2}$
c) $\frac{1}{x}$ d) $\frac{1}{y^2}$

40. The equation of the curve passing through the point $(1,1)$ such that the slope of the tangent at any point (x,y) is equal to the product of its coordinates is

a) $2\log x=y^2-1$ b) $2\log y=x^2+1$
c) $2\log y=x^2-1$ d) $2\log x=y^2+1$

41. The eccentricity of the ellipse $9x^2+25y^2=225$ is

a) $\frac{4}{5}$ b) $\frac{3}{5}$
c) $\frac{3}{4}$ d) $\frac{9}{16}$

42. $\sum_{r=1}^{n}(2r-1)=x$ then $\lim_{n\to\infty}\left[\frac{1}{x^2}+\frac{2^3}{x^2}+\frac{3^3}{x^2}+.....+\frac{n^3}{x^2}\right]=$

a) $\frac{1}{2}$ b) $\frac{1}{4}$
c) 1 d) 4

43. The negation of the statement "All continuous function are differentiable"

a) All continuous functions are not differentiable
b) Some continuous functions are differentiable
c) Some continuous functions are not differentiable
d) All differentiable functions are continuous

44. Mean and standard deviation of 100 items are 50 and 4 respectively. The sum of all squares of the item is

a) 251600 b) 256100
c) 266000 d) 261600

45. Two letters are chosen from the letters of the word 'EQUATIONS'. The probability that one is vowel and the other is consonant is

a) $\frac{8}{9}$ b) $\frac{4}{9}$
c) $\frac{3}{9}$ d) $\frac{5}{9}$

46. The constant term in the expansion of $\begin{vmatrix}3x+1 & 2x-1 & x+2\\ 5x-1 & 3x+2 & x+1\\ 7x-2 & 3x+1 & 4x-1\end{vmatrix}$ is

a) 0 b) 2
c) – 10 d) 6

47. If $[x]$ represents the greatest integer function and $f(x)=x-[x]-\cos x$ then $f'\left(\frac{\pi}{2}\right)=$

a) 0 b) 1
c) 2 d) does not exist

48. If $f(x)=\begin{cases}\frac{\sin 3x}{e^{2x}-1} & x=0\\ k-2; & x=0\end{cases}$ is continuous at $x=0$, then $k=$

a) $2\log 2$ b) $\log 2$
c) $\frac{2\log 2}{5}$ d) $\frac{4\log 2}{5}$

49. If $f(x)=\sin^{-1}\left[\frac{2^{x+1}}{1+4^x}\right]$, then $f(0)=$

a) $2\log 2$ b) $\log 2$
c) $\frac{2\log 2}{5}$ d) $\frac{4\log 2}{5}$

50. If $x=a\sec^2\theta, y=a\tan^2\theta$ then $\frac{d^2y}{dx^2}=$

a) 2a b) 1
c) 0 d) 4

51. The inverse of the matrix $\begin{bmatrix} 2 & 5 & 0 \\ 0 & 1 & 1 \\ -1 & 0 & 3 \end{bmatrix}$ is

a) $\begin{bmatrix} 3 & -1 & 1 \\ -15 & 6 & -5 \\ 5 & -2 & 2 \end{bmatrix}$ b) $\begin{bmatrix} 3 & -5 & 5 \\ -1 & -6 & -2 \\ 1 & -5 & 2 \end{bmatrix}$

c) $\begin{bmatrix} 3 & -15 & 5 \\ -1 & 6 & -2 \\ 1 & -5 & 2 \end{bmatrix}$ d) $\begin{bmatrix} 3 & -15 & 5 \\ -1 & 6 & -2 \\ 1 & -5 & -2 \end{bmatrix}$

52. If P and Q are symmetric matrices of the same order then PQ – QR is
a) Identity matrix
b) Symmetric matrix
c) Zero matrix
d) Skew symmetric matrix

53. If $3A+4B'=\begin{bmatrix} 7 & -10 & 17 \\ 0 & 6 & 31 \end{bmatrix}$ and $2B-3A=\begin{bmatrix} -1 & 18 \\ 4 & 0 \\ 5 & 7 \end{bmatrix}$ then B =

a) $\begin{bmatrix} 1 & 3 \\ -1 & 1 \\ 2 & 4 \end{bmatrix}$ b) $\begin{bmatrix} 1 & -3 \\ -1 & 1 \\ 2 & 4 \end{bmatrix}$

c) $\begin{bmatrix} -1 & -18 \\ 4 & -16 \\ -5 & -7 \end{bmatrix}$ d) $\begin{bmatrix} 1 & 3 \\ -1 & 1 \\ 2 & -4 \end{bmatrix}$

54. If $A=\begin{bmatrix} 1 & 3 \\ 4 & 2 \end{bmatrix}, B=\begin{bmatrix} 2 & -1 \\ 1 & 2 \end{bmatrix}$, then $|ABB'|=$
a) 50 b) – 250
c) 100 d) 250

55. If the value of a third order determinant is 16, then the value of the determinant formed by replacing each of its element by its cofactor is
a) 96 b) 48
c) 256 d) 16

56. $f:R\to R$ and $g:[0,\infty)\to R$ is defined by $f(x)=x^2$ and $g(x)=\sqrt{x}$. Which one of the following is not true?
a) $gof(4)=4$ b) $fog(-4)=4$
c) $Fog(2)=2$ d) $gof(-2)=2$

57. $A=\{x|x\in N, x\le 5\}, B=\{x|x\in Z, x^2-5x+6=0\}$ then the number of onto functions from A to B is
a) 2 b) 23
c) 30 d) 32

58. On the set of positive rationals, a binary operation * is defined by $a*b=\frac{2ab}{5}$. If $2*x=3^{-1}$ then $x=$
a) $\frac{1}{6}$ b) $\frac{5}{12}$
c) $\frac{2}{5}$ d) $\frac{125}{48}$

59. $\cos\left[2\sin^{-1}\frac{3}{4}+\cos^{-1}\frac{3}{4}\right]=$
a) $\frac{-3}{4}$ b) $\frac{3}{4}$
c) $\frac{3}{5}$ d) does not exist

60. If $a+\frac{\pi}{2}<2\tan^{-1}x+3\cot^{-1}x<b$ then 'a' and 'b' are respectively
a) 0 and π b) $\frac{\pi}{2}$ and 2π
c) 0 and 2π d) $\frac{-\pi}{2}$ and $\frac{\pi}{2}$

ANSWER KEYS

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