KCET 2018 MATHEMATICS QUESTION PAPER

1. If $|x+5| \geq 10$ then
   a) $x \in (-15, 5]$
   b) $x \in (-5, 5]$
   c) $x \in (-\infty, -15] \cup [5, \infty)$
   d) $x \in [-\infty, -15] \cup [5, \infty)$

2. Everybody in a room shakes hands with everybody else. The total number of handshakes is 45. The total number of persons in the room is
   a) 9 b) 10
   c) 5 d) 15

3. The constant term in the expansion of $\left(x^2 - \frac{1}{x^2}\right)^{16}$ is
   a) ${}^{16}C_8$ b) ${}^{16}C_7$
   c) ${}^{16}C_9$ d) ${}^{16}C_{10}$

4. If $P(n)$: "2^{2n-1} is divisible by k for all $n \in N$" is true, then the value of 'K' is
   a) 6 b) 3
   c) 7 d) 2

5. The equation of the line parallel to the line $3x - 4y + 2 = 0$ and passing through $(-2, 3)$ is
   a) $3x - 4y + 18 = 0$ b) $3x - 4y - 18 = 0$
   c) $3x + 4y + 18 = 0$ d) $3x - 4y - 18 = 0$

6. If $\left(\frac{1-i}{1+i}\right)^{96} = a + ib$ then (a, b) is
   a) $(1,1)$ b) $(1,0)$
   c) $(0,1)$ d) $(0,-1)$

7. The distance between the foci of a hyperbola is 16 and its eccentricity is $\sqrt{2}$. Its equation is
   a) $x^2 - y^2 = 32$ b) $\frac{x^2}{4} - \frac{y^2}{9} = 1$
   c) $2x^2 - 3y^2 = 7$ d) $y^2 - x^2 = 32$

8. The number of ways in which 5 girls and 3 boys can be seated in a row so that no two boys are together is
   a) 14040 b) 14440
   c) 14000 d) 14400

9. If a, b, c are three consecutive terms of an AP and x, y, z are three consecutive terms of a GP, then the value of $x^{b-c}, y^{c-a}, z^{a-b}$ is
   a) 0 b) xyz
   c) – 1 d) 1

10. The value of $\lim_{x \to 0} \frac{|x|}{x}$ is
    a) 1 b) – 1
    c) 0 d) does not exist

11. Let $f(x) = x - \frac{1}{x}$ then $f(-1)$ is
    a) 0 b) 2
    c) 1 d) – 2

12. The negation of the statement "72 is divisible by 2 and 3" is
    a) 72 is not divisible by 2 or 72 is not divisible by 3
    b) 72 is divisible by 2 or 72 is divisible by 3
    c) 72 is divisible by 2 and 72 is divisible by 3
    d) 72 is not divisible by 2 and 3

13. The probability of happening of an event A is 0.5 and that of B is 0.3. If A and B are mutually exclusive events; then the probability of neither A nor B is
    a) 0.4 b) 0.5
    c) 0.2 d) 0.9

14. In a simultaneous throw of a pair of dice, the probability of getting a total more than 7 is
    a) $\frac{7}{12}$ b) $\frac{5}{36}$
    c) $\frac{5}{12}$ d) $\frac{7}{36}$

15. If A and B are mutually exclusive events given that $P(A)=\frac{3}{5}, P(B)=\frac{1}{5}$, then $P(A \text{ or } B)$ is

a) 0.8 b) 0.6
c) 0.4 d) 0.2

16. Let $f,g:R\to R$ be two functions define as $f(x)=|x|+x$ and $g(x)=|x|-x \forall x\in R$. Then (fog) (x) for x < 0 is

a) 0 b) 4x
c) – 4x d) 2x

17. A is a set having 6 distinct elements. The number of distinct functions from A to A which are not bijections is

a) $6!-6$ b) 6^6-6
c) $6^6-6!$ d) $6!$

18. Let $f:R\to R$ be defined by

$$f(x)=\begin{cases}2x\ ; & x>3\\ x^2\ ; & 1<x\le 3\\ 3x\ ; & x\le 1\end{cases}$$

Then $f(-1)+f(2)+f(4)$ is

a) 9 b) 14
c) 5 d) 10

19. If $\sin^{-1}x+\cos^{-1}y=\frac{2\pi}{5}$, then $\cos^{-1}x+\sin^{-1}y$ is

a) $\frac{2\pi}{5}$ b) $\frac{3\pi}{5}$
c) $\frac{4\pi}{5}$ d) $\frac{3\pi}{10}$

20. The value of the expression $\tan\left(\frac{1}{2}\cos^{-1}\frac{2}{\sqrt{5}}\right)$ is

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

21. If $A=\begin{bmatrix}2 & -2\\ -2 & 2\end{bmatrix}$, then $A^n=2^kA$, where k =

a) 2^{n-1} b) $n+1$
c) $n-1$ d) $2(n-1)$

22. If $\begin{bmatrix}1 & 1\\ -1 & 1\end{bmatrix}\begin{bmatrix}x\\ y\end{bmatrix}=\begin{bmatrix}2\\ 4\end{bmatrix}$, then the value of x and y respectively are

a) $-3,-1$ b) 1,3
c) 3,1 d) -1, 3

23. If $A=\begin{bmatrix}\cos\alpha & \sin\alpha\\ -\sin\alpha & \cos\alpha\end{bmatrix}$, then A'A=

a) A b) Zero matrix
c) A’ d) – 1, 3

24. If $x,y,z\in R$, then the value of determinant

$$\begin{vmatrix}(5^x+5^{-x})^2 & (5^x-5^{-x})^2 & 1\\ (6^x+6^{-x})^2 & (6^x+6^{-x})^2 & 1\\ (7^x+7^{-x})^2 & (7^x-7^{-x})^2 & 1\end{vmatrix}$$ is

a) 10 b) 12
c) 1 d) 0

25. The value of determinant

$$\begin{vmatrix}a-b & b+c & a\\ b-a & c+a & b\\ c-a & a+b & c\end{vmatrix}$$ is

a) $a^3+b^3+c^3$ b) 3abc
c) $a^3+b^3+c^3-3abc$ d) $a^3+b^3+c^3+3abc$

26. If $(x_1y_1)(x_2y_2)$ and (x_3y_3) are the vertices of a triangle whose area is ‘k’ square units, then $\begin{vmatrix}x_1 & y_1 & 4\\ x_2 & y_2 & 4\\ x_3 & y_3 & 4\end{vmatrix}$ is

a) $32\,k^2$ b) $16\,k^2$
c) $64\,k^2$ d) $48\,k^2$

27. Let A be a square matrix of order 3×3, then $|5A|=$

a) $5|A|$ b) $125|A|$
c) $25|A|$ d) $15|A|$

28. If $f(x)=\begin{cases}\frac{\sqrt{1+kx}-\sqrt{1-kx}}{x} & \text{if } -1\le x<0\\ \frac{2x+1}{x-1} & \text{if } 0\le x\le 1\end{cases}$

Is continuous at x = 0, then the value of k is

a) $k=1$ b) $k=-1$
c) $k=0$ d) $k=2$

29. If $\cos y = x\cos(a+y)$ with $\cos a \ne \pm 1$, then $\frac{dy}{dx}$ is equal to

a) $\frac{\sin a}{\cos^2(a+y)}$ b) $\frac{\cos^2(a+y)}{\sin a}$
c) $\frac{\cos a}{\sin^2(a+y)}$ d) $\frac{\cos^2(a+y)}{\cos a}$

30. If $f(x)=|\cos x-\sin x|$, then $f'\left(\frac{\pi}{6}\right)$ is equal to

a) $-\frac{1}{2}(1+\sqrt{3})$ b) $\frac{1}{2}(1+\sqrt{3})$
c) $-\frac{1}{2}(1-\sqrt{3})$ d) $\frac{1}{2}(1-\sqrt{3})$

31. If $y=\sqrt{x+\sqrt{x+\sqrt{x+....\infty}}}$, then $\frac{dy}{dx}=$

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

32. If $f(x)=\begin{cases}\frac{\log_e x}{x-1} & ;\ x\ne 1\\ k & ;\ x=1\end{cases}$ is

continuous at $x=1$, then the value of k is

a) e b) 1
c) – 1 d) 0

33. Approximate change in the volume V of a cube of side x metres caused by increasing the side by 3% is

a) 0.09 x^3m^3 b) 0.03 x^3m^3
c) 0.06 x^3m^3 d) 0.04 x^3m^3

34. The maximum value of $\left(\frac{1}{x}\right)^x$ is

a) e b) e^x
c) $e^{1/e}$ d) $\left(\frac{1}{e}\right)^{1/e}$

35. $f(x)=x^x$ has stationary point at

a) $x=e$ b) $x=\frac{1}{e}$
c) $x=1$ d) $x=\sqrt{e}$

36. The maximum area of a rectangle inscribed in the circle $(x+1)^2(y-3)^2=64$ is

a) 64 sq. units b) 72 sq. units
c) 128 sq. units d) 8 sq. units

37. $\int\frac{1}{1+e^x}dx$ is equal to

a) $\log_e\left(\frac{e^x+1}{e^x}\right)+c$ b) $\log_e\left(\frac{e^x-1}{e^x}\right)+c$
c) $\log_e\left(\frac{e^x}{e^x+1}\right)+c$ d) $\log_e\left(\frac{e^x}{e^x-1}\right)+c$

38. $\int\frac{1}{\sqrt{3-6x+9x^2}}dx$ is equal to

a) $\sin^{-1}\left(\frac{3x+1}{2}\right)+c$ b) $\sin^{-1}\left(\frac{3x+1}{6}\right)+c$
c) $\frac{1}{3}\sin^{-1}\left(\frac{3x+1}{2}\right)+c$ d) $\sin^{-1}\left(\frac{2x+1}{3}\right)+c$

39. $\int e^{\sin x}\cdot\left(\frac{\sin x+1}{\sec x}\right)dx$ is equal to

a) $\sin x.e^{\sin x}+c$ b) $\cos x.e^{\sin x}+c$
c) $e^{\sin x}+c$ d) $e^{\sin x}(\sin x+1)+c$

40. $\int_{-2}^{2}|x\cos\pi x|dx$ is equal to

a) $\frac{8}{\pi}$ b) $\frac{4}{\pi}$
c) $\frac{2}{\pi}$ d) $\frac{1}{\pi}$

41. $\int_0^1 \frac{dx}{e^x + e^{-x}}$ is equal to

a) $\frac{\pi}{4} - \tan^{-1}(e)$ b) $\tan^{-1}(e) - \frac{\pi}{4}$

c) $\tan^{-1}(e) + \frac{\pi}{4}$ d) $\tan^{-1}(e)$

42. $\int_0^{1/2} \frac{dx}{(1+x^2)\sqrt{1-x^2}}$ is equal to

a) $\frac{1}{\sqrt{2}} \tan^{-1}\sqrt{\frac{2}{3}}$ b) $\frac{2}{\sqrt{2}} \tan^{-1}\left(\frac{3}{\sqrt{2}}\right)$

c) $\frac{\sqrt{2}}{2} \tan^{-1}\left(\frac{3}{2}\right)$ d) $\frac{\sqrt{2}}{2} \tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$

43. The area of the region bounded by the curve $y = \cos x$ between $x = 0$ and $x = \pi$ is

a) 1 sq. units b) 4 sq. units
c) 2 sq. units d) 3 sq. units

44. The area bounded by the line $y = x, x-$axis and ordinates $x = -1$ and $x = 2$ is

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

45. The degree and the order of the differential equation $\frac{d^2y}{dx^2} = \sqrt[3]{1 + \left(\frac{dy}{dx}\right)^2}$ respectively are

a) 2 and 3 b) 3 and 2
c) 2 and 2 d) 3 and 3

46. The solution of the differential equation $x\frac{dy}{dx} - y = 3$ represents a family of

a) Straight line b) circles
c) parabolas d) ellipses

47. The integrating factor of $\frac{dy}{dx} + y = \frac{1+y}{x}$ is

a) xe^x b) $xe^{1/x}$

c) $\frac{e^x}{x}$ d) $\frac{x}{e^x}$

48. If $\left|\vec{a} \times \vec{b}\right| + \left|\vec{a}.\vec{b}\right| = 144$ and $\left|\vec{a}\right| = 4$, then the value of $\left|\vec{b}\right|$ is

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

49. If $\vec{a}$ and $\vec{b}$ are mutually perpendicular unit vectors, then $(3\vec{a} + 2\vec{b}).(5\vec{a} - 6\vec{b})$.

a) 5 b) 3
c) 6 d) 12

50. If the vectors $a\hat{i} + \hat{j} + \hat{k}, \hat{i} + b\hat{j} + \hat{k}$ and $\hat{i} + \hat{j} + c\hat{k}$ are coplanar $(a \neq b \neq c \neq 1)$, then the value of $abc - (a+b+c) =$

a) 2 b) – 2
c) 0 d) – 1

51. If $\vec{a} = \hat{i} + \lambda\hat{j} + 2\hat{k}, \vec{b} = \mu\hat{i} + \hat{j} - \hat{k}$ are orthogonal and $\left|\vec{a}\right| = \left|\vec{b}\right|$ then $(\lambda, \mu) =$

a) $\left(\frac{1}{4}, \frac{7}{4}\right)$ b) $\left(\frac{7}{4}, \frac{1}{4}\right)$

c) $\left(\frac{1}{4}, \frac{9}{4}\right)$ d) $\left(\frac{-1}{4}, \frac{9}{4}\right)$

52. The image of the point $(1,6,3)$ in the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$ is

a) $(1,0,7)$ b) $(7,0,1)$

c) $(2,7,0)$ d) $(-1,-6,-3)$

53. The angle between the lines $2x = 3y = -z$ and $6x = -y = -4z$ is

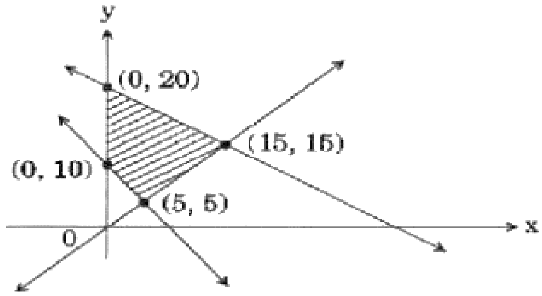
a) 0° b) 45°
c) 90° d) 30°

54. The value of k such that the line $\frac{x-4}{1} = \frac{y-2}{1} = \frac{z-k}{2}$ lies on the plane $2x - 4y + z = 7$ is

a) -7 b) 4
c) -4 d) 7

55. The locus represented by $xy + yz = 0$ is
   a) A pair of perpendicular lines
   b) A pair of parallel lines
   c) A pair of parallel planes
   d) A pair of perpendicular planes

56. The feasible region of an LPP is shown in the figure. If $z = 3x + 9y$, then the minimum value of z occurs at



   a) $(5, 5)$ b) $(0, 10)$
   c) $(0, 20)$ d) $(15, 15)$

57. For the LPP; maximize $z = x + 4y$ subject to the constraints $x + 2y \le 2, x + 2y \ge 8, x, y \ge 0$
   a) $z_{max} = 4$
   b) $z_{max} = 18$
   c) $z_{max} = 16$
   d) has no feasible solution

58. For the probability distribution given by

$X = x_1$	0	1	2
P_1	$\frac{25}{36}$	$\frac{5}{18}$	$\frac{1}{36}$

The standard deviation (σ) is
   a) $\sqrt{\frac{1}{3}}$ b) $\frac{1}{3}\sqrt{\frac{5}{2}}$
   c) $\sqrt{\frac{5}{36}}$ d) None of the above

59. A bag contains 17 tickets numbered from 1 to 17. A ticket is drawn at random, then another ticket without replacing thefirst one. The probability that both the tickets may show even numbers is
   a) $\frac{7}{34}$ b) $\frac{8}{17}$
   c) $\frac{7}{16}$ d) $\frac{7}{17}$

60. A flashlight has 10 batteries out of which 4 are dead. If 3 batteries are selected without replacement and tested, then the probability that all 3 are dead is
   a) $\frac{1}{30}$ b) $\frac{2}{8}$
   c) $\frac{1}{15}$ d) $\frac{1}{10}$

ANSWER KEYS

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