KCET 2017 MATHEMATICS QUESTION PAPER

1. If A and B are finite sets and $A \subset B$, then
   a) $n(A \cup B) = n(A)$ b) $n(A \cap B) = n(B)$
   c) $n(A \cup B) = n(B)$ d) $n(A \cap B) = \phi$

2. The value of $\cos^{-1} 45^\circ - \sin^2 15^\circ$ is
   a) $\frac{\sqrt{3}}{2}$ b) $\frac{\sqrt{3}}{4}$
   c) $\frac{\sqrt{3}+1}{2\sqrt{2}}$ d) $\frac{\sqrt{3}-1}{2\sqrt{2}}$

3. $3+5+7+.....$ to n term is
   a) $n(n+2)$ b) $n(n-2)$
   c) n^2 d) $(n+1)^2$

4. If $\left(\frac{1+i}{1-i}\right)^m = 1$, then the least positive integral value of m is
   a) 2 b) 3
   c) 4 d) 1

5. If $|x-2| \le 1$, then
   a) $x \in [1,3]$ b) $x \in (1,3)$
   c) $x \in [-1,3)$ d) $x \in [-1,3)$

6. If ${}^nC_{12} = {}^nC_8$, then n is equal to
   a) 26 b) 12
   c) 6 d) 20

7. The total number of terms in the expansion of $(x+a)^{47} - (x-a)^{47}$ after simplification is
   a) 24 b) 47
   c) 48 d) 96

8. Equation of line passing through the point $(1,2)$ and perpendicular to the line $y = 3x - 1$ is
   a) $x+3y-7=0$ b) $x+3y+7=0$
   c) $x+3y=0$ d) $x+3y=0$

9. The eccentricity of the ellipse $\frac{x^2}{36} + \frac{y^2}{16} = 1$ is
   a) $\frac{2\sqrt{3}}{6}$ b) $\frac{2\sqrt{5}}{4}$
   c) $\frac{2\sqrt{13}}{6}$ d) $\frac{2\sqrt{13}}{4}$

10. The perpendicular distance of the point $P(6,7,8)$ from $XY-$plane is
    a) 8 b) 7
    c) 6 d) 5

11. The value of $\lim_{\theta \to 0} \frac{1-\cos 4\theta}{1-\cos 6\theta}$ is
    a) 4/9 b) 9/4
    c) 9/3 d) 3/4

12. The contrapositive statement of the statement "If x is prime number, then x is odd" is
    a) If x is not a prime number, then x is not odd
    b) If x is a prime number, then x is not odd
    c) If x is not a prime number, then x is odd
    d) If x is not odd, then x is not a prime number

13. If coefficient of variation is 60 and standard deviation is 24, then Arithmetic mean is
    a) 40 b) 7/20
    c) 20/7 d) 1/40

14. The range of the function $f(x) = \sqrt{9-x^2}$ is
    a) $(0,3)$ b) $[0,3]$
    c) $(0,3]$ d) $[0,3)$

15. Let $f : R \to R$ be defined by $f(x) = x^4$ then,
    a) f is one – one and onto
    b) f may be one – one and onto
    c) f is one – one but not onto
    d) f is neither one – one nor onto

16. The range of $\sec^{-1} x$

a) $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$ b) $\left(\frac{-\pi}{2}, \frac{\pi}{2}\right)$

c) $[0, \pi]$ d) $[0, \pi] - \left\{\frac{\pi}{2}\right\}$

17. If $\tan^{-1} x + \tan^{-1} y = \frac{4\pi}{5}$, then $\cot^{-1} x + \cot^{-1} y$ is equal to

a) x b) $\frac{\pi}{5}$

c) $\frac{2\pi}{5}$ d) $\frac{3\pi}{5}$

18. If $f(x) = 8x^3, g(x) = x^{1/3}$, then $fog(x)$ is

a) $8x$ b) $8^3 x$

c) $(8x)^{1/3}$ d) $8x^3$

19. If

$$A = \frac{1}{\pi}\begin{bmatrix} \sin^{-1}(\pi x) & \tan^{-1}\left(\frac{x}{\pi}\right) \\ \sin^{-1}\left(\frac{x}{\pi}\right) & \cot^{-1}(\pi x) \end{bmatrix}, B = \begin{bmatrix} -\cos^{-1}(\pi x) & \tan^{-1}\left(\frac{x}{\pi}\right) \\ \sin^{-1}\left(\frac{x}{\pi}\right) & -\tan^{-1}(\pi x) \end{bmatrix}$$

Then $A - B$ is equal to –

a) I b) 0

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

20. If a matrix A is both symmetric and skew symmetric, then -

a) A is diagonal matrix
b) A is zero matrix
c) A is scalar matrix
d) A is square matrix

21. If $2\begin{bmatrix} 1 & 3 \\ 0 & x \end{bmatrix} + \begin{bmatrix} y & 0 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 5 & 6 \\ 1 & 8 \end{bmatrix}$, then the value of x and y are

a) $x = 3, y = 3$ b) $x = -3, y = 3$

c) $x = 3, y = -3$ d) $x = -3, y = -3$

22. Binary operation * on $R - \{-1\}$ defined by $a * b = \frac{a}{b+1}$ is -

a) * is associative and commutative
b) * is associative but not commutative
c) * is neither associative nor commutative
d) * is commutative but not associative

23. If $\begin{vmatrix} 3 & x \\ x & 1 \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 4 & 1 \end{vmatrix}$ then x is equal to –

a) 2 b) 4

c) 8 d) $\pm 2\sqrt{2}$

24. If A is a square matrix of order 3×3, then $|KA|$ is equal to –

a) $K|A|$ b) $K^2|A|$

c) $K^3|A|$ d) $3K|A|$

25. The area of triangle with vertices $(K, 0), (4, 0), (0, 2)$ is 4 square units, then value of K is –

a) 0 or 8 b) 0 or – 8

c) 0 d) 8

26. Let $\Delta = \begin{vmatrix} Ax & x^2 & 1 \\ By & y^2 & 1 \\ Cz & z^2 & 1 \end{vmatrix}$ and $\Delta_1 = \begin{vmatrix} A & B & C \\ x & y & z \\ zy & zx & xy \end{vmatrix}$

then

a) $\Delta_1 = -\Delta$ b) $\Delta_1 = \Delta$

c) $\Delta_1 \neq \Delta$ d) $\Delta_1 = 2\Delta$

27. If $f(x) = \begin{cases} Kx^2 & \text{if } x \leq 2 \\ 3 & \text{if } x > 2 \end{cases}$ is continuous at $x = 2$, then the value of K is

a) 3 b) 4

c) 3/4 d) 4/3

28. The value of C in Mean value theorem for the function $f(x) = x^2$ in $[2, 4]$ is

a) 3 b) 2

c) 4 d) 7/2

29. The point on the curve $y^2 = x$ where the tangent makes an angle of $\pi/4$ with X – axis is

a) $\left(\frac{1}{2}, \frac{1}{4}\right)$ b) $\left(\frac{1}{4}, \frac{1}{2}\right)$

c) $(4,2)$ d) $(1,1)$

30. The function $f(x) = x^2 + 2x + 5$ is strictly increasing in the interval.

a) $(-1, \infty)$ b) $(-\infty, -1)$

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

31. The rate of change of a sphere with respect to its surface area when the radius is 4 cm is –

a) $4\ cm^3/cm^2$ b) $2\ cm^3/cm^2$

c) $6\ cm^3/cm^2$ d) $8\ cm^3/cm^2$

32. If $y = \tan^{-1}\left(\frac{\sin x + \cos x}{\cos x - \sin x}\right)$, then $\frac{dy}{dx}$ is equal to -

a) 1/2 b) $\pi/4$

c) 0 d) 1

33. If $y = \begin{vmatrix} f'(x) & g'(x) & h'(x) \\ l & m & n \\ a & b & c \end{vmatrix}$, then $\frac{dy}{dx}$ is equal to –

a) $\begin{vmatrix} f'(x) & g'(x) & h'(x) \\ t & m & n \\ a & b & c \end{vmatrix}$

b) $\begin{vmatrix} 1 & m & n \\ f'(x) & g'(x) & h'(x) \\ a & b & c \end{vmatrix}$

c) $\begin{vmatrix} f'(x) & 1 & a \\ g'(x) & m & b \\ h'(x) & n & c \end{vmatrix}$

d) $\begin{vmatrix} 1 & m & n \\ a & b & c \\ f'(x) & g'(x) & h'(x) \end{vmatrix}$

34. If $\sin x = \frac{2t}{1+t^2}$, $\tan y = \frac{2t}{1-t^2}$, then $\frac{dy}{dx}$ is equal to

a) 1 b) 0

c) -1 d) 2

35. The derivative of $\cos^{-1}\left(2x^2 - 1\right)$ w.r.t $\cos^{-1} x$ is

a) 2 b) $\frac{-1}{2\sqrt{1-x^2}}$

c) $\frac{2}{x}$ d) $1 - x^2$

36. If $y = \log(\log x)$ then $\frac{d^2y}{dx^2}$ is equal to

a) $\frac{-(1+\log x)}{(x \log x)^2}$ b) $\frac{-(1+\log x)}{x^2 \log x}$

c) $\frac{(1+\log x)}{(x \log x)^2}$ d) $\frac{(1+\log x)}{x^2 \log x}$

37. $\int \frac{(x+3)e^x}{(x+4)^2} dx$ is equal to

a) $\frac{1}{(x+4)^2} + C$ b) $\frac{e^x}{(x+4)^2} + C$

c) $\frac{e^x}{(x+4)} + C$ d) $\frac{e^x}{(x+3)} + C$

38. $\int \frac{\cos 2x - \cos 20}{\cos x - \cos \theta} dx$ is equal to –

a) $2(\sin x + x\cos\theta) + C$

b) $2(\sin x - x\cos\theta) + C$

c) $2(\sin x + 2x\cos\theta) + C$

d) $2(\sin x - x\cos\theta) + C$

39. $\int \sqrt{x^2+2x+5}$ is equal to

a) $\frac{1}{2}(x+1)\sqrt{x^2+2x+5}+2\log\left|x+1+\sqrt{x^2+2x+5}\right|+C$

b) $(x+1)\sqrt{x^2+2x+5}+2\log\left|x+1+\sqrt{x^2+2x+5}\right|+C$

c) $(x+1)\sqrt{x^2+2x+5}-2\log\left|x+1+\sqrt{x^2+2x+5}\right|+C$

d) $(x+1)\sqrt{x^2+2x+5}+\frac{1}{2}\log\left|x+1+\sqrt{x^2+2x+5}\right|+C$

40. $\int_0^{\pi/2}\frac{\tan^7 x}{\cot^7 x+\tan^7 x}dx$ is equal to

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

c) $\frac{\pi}{6}$ d) $\frac{\pi}{3}$

41. $\int_{-5}^{5}|x+2|dx$ is equal to

a) 29 b) 28

c) 27 d) 30

42. $\int_{-\pi/2}^{\pi/2}\frac{dx}{e^{\sin x}+1}$ is equal to

a) 0 b) 1

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

43. $\int_0^{\pi/2}\frac{1}{a^2\cdot\sin^2 x+b^2\cdot\cos^2 x}$dx is equal to

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

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

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

a) $\frac{32}{3}$ sq. units b) $\frac{256}{3}$ sq. units

c) $\frac{64}{3}$ sq. units d) $\frac{128}{3}$ sq. units

45. Area of the region bounded by the curve $y=\cos x, x=0$ and $x=\pi$ is –

a) 2 sq units b) 4 sq. units

c) 3 sq. units d) 1 sq. units

46. The degree of the differential equation $\left[1+\left(\frac{dy}{dx}\right)^2\right]^2=\frac{d^2y}{dx^2}$

a) 1 b) 2

c) 3 d) 4

47. General solution of differential equation $\frac{dy}{dx}+y=1(y\neq 1)$ is

a) $\log\left|\frac{1}{1-y}\right|=x+C$ b) $\log|1-y|=x+C$

c) $\log|1+y|=x+C$ d) $\log\left|\frac{1}{1-y}\right|=-x+C$

48. The integrating factor of the differential equation $x.\frac{dy}{dx}+2y=x^2$ is $(x\neq 0)$

a) x^2 b) $\log|x|$

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

49. If $\vec{a}=2\hat{i}+\lambda j+k$ and $\vec{b}=\hat{i}+2j+3k$ are orthogonal, then value of λ is -

a) 0 b) 1

c) $\frac{3}{2}$ d) $-\frac{5}{2}$

50. If $\vec{a},\vec{b},\vec{c}$ are unit vectors such that $\vec{a}+\vec{b}+\vec{c}=\vec{o}$, then the value of $\vec{a}\cdot\vec{b}+\vec{b}\cdot\vec{c}\cdot\vec{c}+\vec{c}\cdot\vec{a}$ is equal to –

a) 1 b) 3

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

51. If $\vec{a}$ and $\vec{b}$ are unit vectors, the angle between $\vec{a}$ and $\vec{b}$ for $\sqrt{3}\,\vec{a}-\vec{b}$ to be unit vector is -

a) 30° b) 45°

c) 60° d) 90°

52. Reflexion of the point (α,β,γ) in XY plane is -

a) $(\alpha,\beta,0)$ b) $(0,0,\gamma)$

c) $(-\alpha,-\beta,\gamma)$ d) $(\alpha,\beta-\gamma)$

53. The plane $2x-3y+6z-11=0$ makes an angle $\sin^{-1}(\alpha)$ with X – axis. The value of α is equal to -

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

c) $\frac{2}{7}$ d) $\frac{3}{7}$

54. The distance of the point $(-2,4,-5)$ from the line $\frac{x+3}{3}=\frac{y-4}{5}=\frac{z+8}{6}$ is -

a) $\frac{\sqrt{37}}{10}$ b) $\sqrt{\frac{37}{10}}$

c) $\frac{37}{\sqrt{10}}$ d) $\frac{37}{10}$

55. A box has 100 pens of which 10 are defective. The probability that out a sample of 5 pens drawn one by one with replacement and at most one is defective is

a) $\frac{9}{10}$ b) $\frac{1}{2}\left(\frac{9}{10}\right)^4$

c) $\left(\frac{9}{10}\right)^5+\frac{1}{2}\left(\frac{9}{10}\right)^4$ d) $\frac{1}{2}\left(\frac{9}{10}\right)^5$

56. Two events A and B will be independent if –

a) A and B are mutually exclusive

b) $P(A'\cap B')=(1-P(A))(1-P(B))$

c) $P(A)=P(B)$

d) $P(A)+P(B)=1$

57. The probability distribution of X is

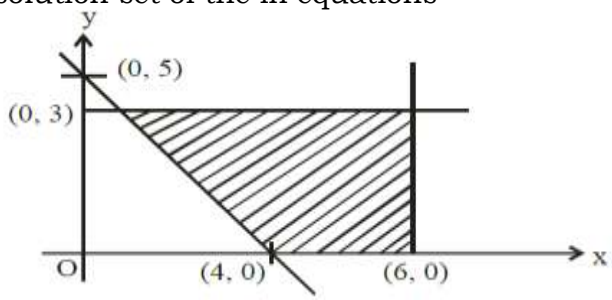
X	0	1	2	3
P(X)	0.3	K	2k	2k

The value of K is –

a) 0.14 b) 0.3

c) 0.7 d) 1

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



a) $5x+4y\geq 20, x\leq 6, y\geq 3, x\geq 0, y\geq 0$

b) $5x+4y\leq 20, x\leq 6, y\leq 3, x\geq 0, y\geq 0$

c) $5x+4y\geq 20, x\leq 6, y\leq 3, x\geq 0, y\geq 0$

d) $5x+4y\geq 20, x\geq 6, y\leq 3, x\geq 0, y\geq 0$

59. If an LPP admits optimal solution at two consecutive vertices of a feasible region, then

a) The required optimal solution is at the midpoint of the line joining two points

b) The optimal solution occurs at every point on the line joining these two points

c) The LPP under consideration is not solvable

d) The LPP under consideration must be reconstructed

60. $\int_{0.2}^{3.5}[x]dx$ equal to -

a) 4 b) 4.5

c) 3.5 d) 3

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

ANSWER KEYS