KCET 2016 MATHEMATICS QUESTION PAPER

1. The set A 4 elements and the set B has 5 elements then the number of injective mappings that can be defined from A to B is
   a) 144 b) 72
   c) 60 d) 120

2. Let $f:R\to R$ be defined by $f(x)=2x+6$ which is a Bijective mapping then $f^{-1}(x)$ is given by A
   a) $\frac{x}{2}-3$ b) $2x+6$
   c) $x-3$ d) $6x+2$

3. Let * be binary operation defined on R by $a*b\ b=\frac{a+b}{4}\forall a,b,\in R$ then the operation * is
   a) Commutative and Associative
   b) Commutative but not Associative
   c) Associative but not Commutative
   d) Neither Associative nor commutative

4. The value of $\sin^{-1}\left(\cos\frac{53\pi}{5}\right)$
   a) $\frac{3\pi}{5}$ b) $\frac{-3\pi}{5}$
   c) $\frac{\pi}{10}$ d) $\frac{-\pi}{10}$

5. If $3\tan^{-1}x+\cot^{-1}x=\pi$ then x equal to
   a) 0 b) 1
   c) -1 d) 1/2

6. The simplified form of $\tan^{-1}\left(\frac{x}{y}\right)-\tan^{-1}\left(\frac{x-y}{x+y}\right)$ is equal to
   a) 0 b) $\frac{\pi}{4}$
   c) $\frac{\pi}{2}$ d) π

7. If x y z are all different and not equal to zero and $\begin{vmatrix}1+x & 1 & 1\\ 1 & 1+y & 1\\ 1 & 1 & 1+z\end{vmatrix}=0$ then the value of $x^{-1}+y^{-1}+z^{-1}$ is equal to
   a) x y z b) $x^{-1}y^{-1}z^{-1}$
   c) $-x-y-z$ d) -1

8. If A is any square matrix of order 3×3 then $|3A|$ is equal to
   a) $3|A|$ b) $\frac{1}{3}|A|$
   c) $27|A|$ d) $9|A|$

9. If $y=e^{\sin^{-1}\left(t^2-1\right)}$ & $x=e^{\sec^{-1}\left(\frac{1}{t^2-1}\right)}$ then $\frac{dy}{dx}$ is equal to
   a) $\frac{x}{y}$ b) $\frac{-y}{x}$
   c) $\frac{y}{x}$ d) $\frac{-x}{y}$

10. If $A=\frac{1}{\pi}\begin{bmatrix}\sin^{-1}(\pi x) & \tan^{-1}\left(\frac{\pi}{x}\right)\\ \sin^{-1}\left(\frac{\pi}{x}\right) & \cot^{-1}(\pi x)\end{bmatrix}, B=\frac{1}{\pi}\begin{bmatrix}\cos^{-1}(\pi x)\tan^{-1}\left(\frac{x}{\pi}\right)\\ \sin^{-1}\left(\frac{\pi}{x}\right)-\tan^{-1}(\pi x)\end{bmatrix}$ then A – B is equal to
    a) 1 b) 0
    c) 21 d) $\frac{1}{2}1$

11. If x^y-e^{x-y} then $\frac{dy}{dx}$ is equal to
    a) $\frac{\log x}{\log(x-y)}$ b) $\frac{e^x}{X^{x-y}}$
    c) $\frac{\log x}{(1+\log x)^2}$ d) $\frac{1}{y}-\frac{1}{x-y}$

12. If A is a matrix of order $m\times n$ and b is a matrix such that AB' and B' A are both defined, the order of the matrix B is
a) $m\times m$ b) $n\times n$
c) $n\times m$ d) $m\times n$

13. The value of $\int \frac{e^x(1+x)dx}{\cos^2(e^x.x)}$ is equal to
a) $-\cot(e\,x^x)+c$ b) $\tan(e^x.x)+c$
c) $\tan(e^x)+c$ d) $\cot(e^x)+c$

14. If x, y z are not equal and $\neq 0, \neq 1$ the value of $\begin{vmatrix} \log x & \log y & \log z \\ \log 2x & \log 2y & \log 2x \\ \log 3x & \log 3y & \log 3z \end{vmatrix}$ is equal to
a) $\log(x\,y\,z)$ b) $\log(6\,x\,y\,z)$
c) 0 d) $\log(x+y+z)$

15. The function $f(x)=[x]$ where $[x]$ the greatest integer function, is continuous at
a) 1.5 b) 4
c) 1 d) – 2

16. The value of $\int \frac{e^x(x^2\tan^{-1}x+\tan^{-1}x+1)}{x^2+1}dx$ is equal to
a) $e^x\tan^{-1}x+c$ b) $\tan^{-1}(e^x)+c$
c) $\tan^{-1}(x^e)+c$ d) $e^{\tan^{-1}x}+c$

17. If $2\vec{a}.\vec{b}=|\vec{a}|.|\vec{b}|$ then the angle of between $\vec{a}$ & $\vec{b}$ is
a) 30° b) 0°
c) 90° d) 60°

18. If $x^m y^n=(x+y)^{(m+n)}$ then $\frac{dy}{dx}$ is equal to
a) $\frac{x+y}{xy}$ b) xy
c) 0 d) $\frac{y}{x}$

19. The general solution of $\cot\theta+\tan\theta=2$ is
a) $\theta=\frac{n\pi}{2}+(-1)^n\frac{\pi}{8}$ b) $\frac{n\pi}{2}+(-1)^n\frac{\pi}{4}$
c) $\theta=\frac{n\pi}{2}+(-1)^n\frac{\pi}{6}$ d) $\theta=n\pi+(-1)^n\,\pi/8$

20. The value of $\int_{-\pi/4}^{\pi/4}\sin^{103}x.\cos^{101}x\,dx$ is
a) $\left(\frac{\pi}{4}\right)^{103}$ b) $\left(\frac{\pi}{4}\right)^{101}$
c) 2 d) 0

21. The length of latus rectum of the parabola $4y^2+3x+3y+1=0$ is
a) $\frac{4}{3}$ b) 7
c) 12 d) $\frac{3}{4}$

22. The value of $\int \frac{e^{6\log x}-e^{5\log x}}{e^{4\log x}-e^{3\log x}}dx$ is equal to
a) 0 b) $\frac{x^3}{3}+c$
c) $\frac{3}{x^3}+c$ d) $\frac{1}{x}+c$

23. The differential coefficient of $\log_{10}x$ with respect to $\log_x 10$ is
a) 1 b) $-(\log_{10}x)^2$
c) $(\log_x 10)^2$ d) $\frac{x^2}{100}$

24. The slope of the tangent to the curve $x=t^2+3t-8, y=2t^2-2t-5$ at the point $(2,-1)$ is
a) $\frac{22}{7}$ b) $\frac{6}{7}$
c) $\frac{7}{6}$ d) $\frac{-6}{7}$

25. The real part of $(1-\cos\theta+i\sin\theta)^{-1}$ is
a) $\frac{1}{2}$ b) $\frac{1}{1+\cos\theta}$
c) $\tan\frac{\theta}{2}$ d) $\cot\frac{\theta}{2}$

26. $\int_0^{\pi/2} \frac{\sin^{1000} x dx}{\sin^{1000} x + \cos^{1000} x}$ is equal to

a) 1000 b) 1

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

27. If $1+\sin\theta+\sin^2\theta+.....\text{upto}\ \infty = 2\sqrt{3}+4$, then $\theta =$

a) $\frac{\pi}{6}$ b) $\frac{\pi}{4}$

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

28. $\lim_{x\to 0} \frac{xe^x - \sin x}{x}$ is equal to

a) 3 b) 1

c) 0 d) 2

29. If $\tan^{-1}\left(x^2+y^2\right) = \alpha$ then $\frac{dy}{dx}$ is equal to

a) $\frac{-x}{y}$ b) xy

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

30. The simplified form of $i^n + i^{n+1} + i^{n+2} + i^{n+3}$ is

a) 0 b) 1

c) – 1 d) 1

31. The two curves $x^3 - 3xy^2 + 2 = 0$ and $3x^2y - y^2 = 2$

a) Touch each other

b) Cut each other at right angle

c) Cut at angle π/3

d) Cut at angle π/4

32. The equation of the normal to the curve $y\left(1+x^2\right)2-x$ where the tangent crosses x – axis is

a) $5x - y - 10 = 0$ b) $x - 5y - 10 = 0$

c) $5x + y + 10 = 0$ d) $x + 5y + 10 = 0$

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

a) e b) e^e

c) $e^{\frac{1}{e}}$ d) $\left(\frac{1}{e}\right)^e$

34. The solution for the differential equation $\frac{dy}{y} + \frac{dx}{y} = 0$ is

a) $\frac{1}{y} + \frac{1}{x} = c$ b) $\log x . \log y = c$

c) $x\,y = c$ d) $x + y = c$

35. The order and degree of the differential equation $\left[1+\left(\frac{dy}{dx}\right)^2 + \sin\left(\frac{dy}{dx}\right)^{\frac{3}{4}} = \frac{d^2y}{dx^2}\right]$

a) Order = 2, Degree = 3

b) Order = 2, Degree = 4

c) Order = 2, Degree = ¾

d) Order = 2, Degree = not found

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

a) 30° b) 45°

c) 60° d) 90°

37. The sum of 1st n terms of the series $\frac{1^2}{1} + \frac{1^2+2^2}{1+2} + \frac{1^2+2^2+3^2}{1+2+3} + ...$

a) $\frac{n+2}{3}$ b) $\frac{n(n+2)}{3}$

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

38. The 11th term in the expansion of $\left(x + \frac{1}{\sqrt{x}}\right)^{14}$ is

a) $\frac{999}{x}$ b) $\frac{1001}{x}$

c) i d) $\frac{x}{1001}$

39. Suppose $\vec{a}+\vec{b}+\vec{c} = 0, |\vec{a}| = 3, |\vec{b}| = 5, |\vec{c}| = 7$, then the angle between $\vec{a}$ & $\vec{b}$ is

a) π b) $\frac{\pi}{2}$

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

40. If $a=3, b=4, c=5$ each one of $\vec{a}, \vec{b}$ & $\vec{c}$ is perpendicular to the sum of the remaining then $\left|\vec{a}+\vec{b}+\vec{c}\right|$ is equal to

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

c) $5\sqrt{2}$ d) $\sqrt{5}$

41. If the straight lines $2x+3y-3=0$ and $x+ky+7=0$ are perpendicular, then the value of k is

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

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

42. The rate of change of area of a circle with respect to its radius at $r=2$ cms is

a) 4 b) 2π

c) 2 d) 4π

43. The value of $\tan\frac{\pi}{8}$ is equal to

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

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

44. Area lying between the curves $y^2=2x$ and $y=x$ is

a) $\frac{2}{3}$ sq. units b) $\frac{1}{3}$ sq. units

c) $\frac{1}{4}$ sq. units d) $\frac{3}{4}$ sq. units

45. If $P(A\cap B)=\frac{7}{10}$ and $P(B)=\frac{17}{20}$, where P stands for probability then $P(A|B)$ is equal to

a) $\frac{7}{8}$ b) $\frac{17}{20}$

c) $\frac{14}{17}$ d) $\frac{1}{8}$

46. The coefficient of variation of two distributions are 60 and 70. The standard deviation are 21 and 16 respectively, then their mean is

a) 35 b) 23

c) 28.25 d) 22.85

47. Two cards are drawn at random from a pack of 52 cards. The probability of these two being "Aces" is

a) $\frac{1}{26}$ b) $\frac{1}{221}$

c) $\frac{1}{2}$ d) $\frac{1}{13}$

48. If $\sin^{-1}x+\sin^{-1}y=\frac{\pi}{2}$, then x^2 is equal to

a) $1-y^2$ b) y^2

c) 0 d) $\sqrt{1-y}$

49. The value of $\int_2^8 \frac{\sqrt{10-x}}{\sqrt{x}+\sqrt{10-x}}dx$ is

a) 10 b) 0

c) 8 d) 3

50. The contra positive of the converse of the statement "If x is a prime number then x is odd" is

a) If x is not a prime number then x is odd
b) If x is not a odd number then xi is not a prime number.
c) If x is a prime number then it is not odd
d) If x is a prime number then x is not an odd.

51. Two dice are thrown simultaneously, the probability of obtaining a total score of 5 is

a) $\frac{1}{18}$ b) $\frac{1}{12}$

c) $\frac{1}{9}$ d) $\frac{1}{6}$

52. If $A=\begin{bmatrix}\cos 2\theta & -\sin 2\theta\\ \sin 2\theta & \cos 2\theta\end{bmatrix}$ and $A+A^T=I$,

Where I is the unit matrix of 2×2 A^T is the transpose of A, then the value of θ is equal to

a) $\frac{\pi}{6}$ b) $\frac{\pi}{3}$

c) π d) $\frac{3\pi}{2}$

53. If $A\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ then $A^2 - 5A$ is equal to

a) 1 b) – 1
c) 71 d) – 71

54. The value of x if $x\left(\hat{i}+\hat{j}+k\right)$ is a unit vector is

a) $\pm\frac{1}{\sqrt{3}}$ b) $\pm\sqrt{3}$
c) ± 3 d) $\pm\frac{1}{3}$

55. If $x = 2+3\cos\theta$ and $y = 1-3\sin\theta$ represent a circle then the Centre and radius is

a) $(2,1,),9$ b) $(2,1,),3$
c) $(1,2),\frac{1}{3}$ d) $(-2,-1,),3$

56. The vector equation of the plane which is at a distance of $\frac{3}{\sqrt{14}}$ from the origin and the normal from the origin is $2\vec{i}-3\vec{j}+\vec{k}$ is

a) $r.\left(2\vec{i}-3\vec{j}+\vec{k}\right)=3$ b) $r.\left(\vec{i}-\vec{j}+\vec{k}\right)=9$
c) $r.\left(\vec{i}+2\vec{j}\right)=3$ d) $r.\left(2\vec{i}+\vec{k}\right)=3$

57. Find the co – ordinates of the foot of the perpendicular drawn from the origin to the plane $5y+8=0$;

a) $\left(0,-\frac{18}{5},2\right)$ b) $\left(0,\frac{8}{5},0\right)$
c) $\left(\frac{8}{25},0,0\right)$ d) $\left(0,-\frac{8}{5},0\right)$

58. If $\cos\alpha,\cos\beta,\cos\gamma$ are the direction cosines of a vector $\vec{a}$ then $\cos 2\alpha+\cos 2\beta+\cos 2\gamma$ is equal to

a) 2 b) 3
c) – 1 d) 0

59. The value of the $\sin 1^\circ+\sin 2^\circ+....+\sin 359^\circ$ is equal to

a) 0 b) 1
c) – 1 d) 180

60. Integrating factor of $x\frac{dy}{dx}-y=x^4-3x$ is

a) x b) $\log x$
c) $\frac{1}{x}$ d) $-x$

ANSWER KEYS

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