KCET 2015 MATHEMATICS QUESTION PAPER

1. $f(x)=\frac{1}{2}-\tan\left(\frac{\pi x}{2}\right)-1<x<1$

and $g(x)=\sqrt{(3+4x-4x^2)}$

a) $\left[\frac{-1}{2},1\right)$ b) $\left(\frac{-1}{2},1\right]$

c) $\left[-\frac{1}{2},\frac{3}{2}\right]$ d) $(-1,1)$

2. Write the set builder form $A=(-1,1)$

a) $A=\{x:x \text{ is a real number}\}$

b) $A=\{x:x \text{ is an integer}\}$

c) $A=\{x:x \text{ is a root of the equation } x^2=1\}$

d) $A=\{x:x \text{ is a root of the equation } x^2+1=0\}$

3. If the operation $\oplus$ is defined by $a\oplus b=a^2+b^2$ for all real number 'a' and 'b', then $(2\oplus 3)\oplus 4=$_____

a) 181 b) 182

c) 184 d) 185

4. If $z=\frac{(\sqrt{3}+i)^3(3i+4)^2}{(8+6)^2}$, then $|z|$ is equal to

a) 0 b) 1

c) 2 d) 3

5. If α and β are the roots of $x^2-ax+b^2=0$, then $a^2+b^2=0$ then a^2+b^2 is equal to _____

a) a^2-2b^2 b) $2a^2-b^2$

c) a^2-b^2 d) a^2+b^2

6. If the 2nd and 5th term of G.P. are 24 and 3 respectively, then the sum of 1sts six terms is _____

a) $\frac{189}{2}$ b) $\frac{189}{5}$

c) $\frac{179}{2}$ d) $\frac{2}{189}$

7. The middle term of expansion of $\left(\frac{10}{x}+\frac{x}{10}\right)^{10}$

a) ${}^7C_5$ b) ${}^8C_5$

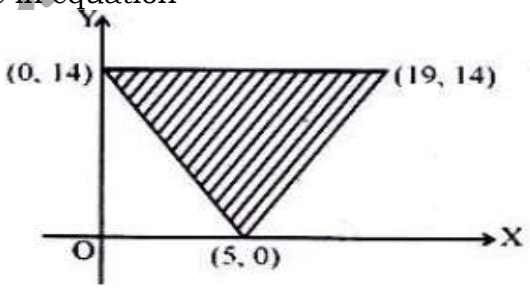
c) ${}^9C_5$ d) ${}^{10}C_5$

8. If $\begin{vmatrix}2a & x_1 & y_1\\ 2b & x_1 & y_2\\ 2c & x_1 & y_2\end{vmatrix}=\frac{abc}{2}\neq 0$, then the area of the triangle whose vertices are $\left(\frac{x_1}{a},\frac{y_1}{a}\right),\left(\frac{x_1}{b},\frac{y_2}{b}\right),\left(\frac{x_3}{c},\frac{y_3}{c}\right)$, is

a) $\frac{1}{4}abc$ b) $\frac{1}{8}abc$

c) $\frac{1}{4}$ d) $\frac{1}{8}$

9. The shaded region in the figure is given by the in equation



a) $14x+5y\geq 70$ $y\leq 14$ and $x-y\leq 5$

b) $14x+5y\geq 70$ $y\leq 14$ and $x-y\geq 5$

c) $14x+5y\leq 70$ $y\leq 14$ and $x-y\geq 5$

d) $14x+5y\geq 70$ $y\geq 14$ and $x-y\geq 5$

10. $-[(-p)\wedge q]$ is logically equivalent to

a) $P\vee(\sim q)$ b) $P\wedge(\sim q)$

c) $-[p\wedge(-q)]$ d) $-(p\wedge q)$

11. The value of $\sin^{-1}\left(\frac{2\sqrt{2}}{3}\right)+\sin^{-1}\left(\frac{1}{3}\right)$ is equal to

a) $\frac{\pi}{6}$ b) $\frac{\pi}{2}$

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

12. If the eccentricity of the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ is $\frac{5}{4}$ and $2x+3y-6=0$ Is a focal chord of the hyperbola, then the length of transverse axis is equal to

a) $\frac{12}{5}$ b) $\frac{24}{5}$

c) $\frac{6}{5}$ d) $\frac{5}{24}$

13. If $\vec{a}=i+2j+2k, |\vec{b}|=5$ and the angle between $\vec{a}$ and $\vec{b}$ is $\frac{\pi}{6}$, then the area of the triangle formed by these two vectors as two sides is

a) $\frac{15}{2}$ b) 15

c) $\frac{15}{4}$ d) $\frac{15\sqrt{3}}{2}$

14. Let $\vec{a}=i-2j+3k$ if $\vec{b}$ is a vector such that $\vec{a}.\vec{b}=|\vec{b}|$ and $|\vec{a}-\vec{b}|=\sqrt{7}$, then $|\vec{b}|$ =_____

a) 7 b) 14

c) $\sqrt{7}$ d) 21

15. If direction cosines of a vector of magnitude 3 are $\frac{2}{3},\frac{9}{3},\frac{2}{3}$ and $a>0$, then vector is

a) $2i+j+2k$ b) $2i-j+2k$

c) $i-2j+2k$ d) $i+2j+2k$

16. Equation of line passing through the point $(2,3,1)$ and parallel to the line of intersection of the plane $x-2y-z+5=0$ and $x+y+3z=6$ is

a) $\frac{x-2}{5}=\frac{y-3}{-4}=\frac{z-1}{3}$

b) $\frac{x-2}{-5}=\frac{y-3}{-4}=\frac{z-1}{3}$

c) $\frac{x-2}{3}=\frac{y-3}{4}=\frac{z-1}{3}$

d) $\frac{x-2}{4}=\frac{y-3}{3}=\frac{z-1}{2}$

17. Foot of perpendicular drawn from the origin to the plane $2x-3y+4z=29$ is _____

a) $(5,-1,4)$ b) $(2,-3,4)$

c) $(7,-1,3)$ d) $(5,-2,3)$

18. If two dice are thrown simultaneously, then the probability that the sum of the number which come up on the dice to be more than 5 is _____

a) $\frac{5}{36}$ b) $\frac{1}{6}$

c) $\frac{5}{18}$ d) $\frac{13}{18}$

19. If $y=f(x^2+2)$ and $f(3)=5$, then $\frac{dy}{dx}$ at $x=1$ is

a) 5 b) 25

c) 15 d) 10

20. If $x=a\cos^3\theta, y=a\sin^3\theta$, then $1+\left(\frac{dy}{dx}\right)^2$ is _____

a) $\tan\theta$ b) $\tan^2\theta$

c) $\sec^2\theta$ d) 1

21. Slope of Normal to the curve $y=x^2-\frac{1}{x^2}$ at $(-1,0)$ is

a) $\frac{1}{4}$ b) $-\frac{1}{4}$

c) 4 d) -4

22. $\int\frac{1}{x^2(x^4+1)^{3/4}}dx$ is equal to

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

c) $\frac{-(1+x^4)^{1/4}}{2x}+C$ d) $\frac{-(1+x^4)^{3/4}}{x}+C$

23. If $f:R\to R$ is defined by $f(x)=\frac{x}{x^2+1}$, find $f(f(2))$

a) $\frac{1}{29}$ b) $\frac{10}{29}$

c) $\frac{29}{10}$ d) 29

24. Evaluate $\begin{vmatrix} \cos 15 & \sin 15 \\ \sin 75 & \cos 75 \end{vmatrix}$

a) 1 b) 0
c) 2 d) 3

25. A man takes a sleep forward with probability 0.4 and one step backward with probability 0.6 then the probability that at the end of eleven steps he is one step away from the starting point is

a) ${}^{11}C_5 \times (0.48)^5$ b) ${}^{11}C_6 \times (0.24)^5$
c) ${}^{11}C_5 \times (0.12)^5$ d) ${}^{11}C_5 \times (0.72)^5$

26. $\int_0^{\pi/4} \log\left(\frac{\sin x + \cos x}{\cos x}\right) dx$

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

27. Area bounded by $y = x^3, y = 8$ and $x = 0$ is _____

a) 2 sq. unit b) 4 sq. unit
c) 12 sq. unit d) 6 sq. unit

28. Let $\vec{a} = -i + 2j + k, \vec{b} = i - j + k$ and $\vec{c} = i + j - k$, a vector in the plane $\vec{a}$ and $\vec{b}$ whose projection on $\vec{c}$ is $\frac{1}{\sqrt{3}}$ is _____

a) $3i + j - 3k$ b) $4i + j - 4k$
c) $I + j - 2k$ d) $4i - j + 4k$

29. The mean deviation from the data 3, 10, 10, 4, 7, 10, 5

a) 3 b) 2
c) 3, 75 d) 2, 75

30. The probability distribution of x is

X	0	1	2	3
P(X)	0.2	K	K	2K

Find the value of K

a) 0.2 b) 0.3
c) 0.4 d) 0.1

31. If the function $g(x)$ is defined by $g(x) = \frac{x^{200}}{200} + \frac{x^{100}}{199} + \frac{x^{198}}{198} + \ldots\ldots + \frac{x^2}{2} + x + 5$

a) 1 b) 200
c) 100 d) 5

32. A box contains 6red marbles numbers from 1 through 6 and 4 white marbles 12 through 15. Find the probability that a marble drawn 'at random' is white and odd numbered

a) 5 b) $\frac{1}{5}$
c) 6 d) $\frac{1}{6}$

33. $\lim_{x \to 0} \frac{1 - \cos x}{x^2}$ is

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

34. $f(x) = \begin{cases} 3x - 8 \text{ if } x \le 5 \\ 2k \quad \text{if } x > 5 \end{cases}$ is Continous, find k

a) $\frac{2}{7}$ b) $\frac{3}{7}$
c) $\frac{4}{7}$ d) $\frac{7}{2}$

35. If $f(x) = 2x^2$, find $\frac{f(3.8) - f(4)}{3.8 - 4}$ Choose the correct option.

a) 1.56 b) 156
c) 15.6 d) 0.156

36. If $x = ct$ and $y = \frac{c}{t}$, find $\frac{dy}{dx}$ at $t = 2$

a) $\frac{1}{4}$ b) 4
c) $\frac{-1}{4}$ d) 0

37. A ballon which always remain spherical is being inflated by pumping in 10 cubic centimeters of gas per second. Find the rate at which the radius of the ballon is increasing when the radius is 15 cms

a) $\frac{1}{90\pi}$ cm/sec b) $\frac{1}{9\pi}$ cm/sec
c) $\frac{1}{30\pi}$ cm/sec d) $\frac{1}{\pi}$ cm/sec

38. $\int \frac{\sin^2 x}{1+\cos x} dx$

a) $x+\sin x+C$ b) $x-\sin x+C$
c) $\sin x+C$ d) $\text{Cos } x+C$

39. $\int e^x \left(\frac{1+\sin x}{1+\cos x}\right) dx$

a) $e^x \tan\left(\frac{x}{2}\right)+C$ b) $\tan\left(\frac{x}{2}\right)+C$
c) e^x+C d) $e^x \sin x+C$

40. If 1, w, w^2 are three cube roots of unit, then $\left(1-w+w^2\right)\left(1+w-w^2\right)$ is _____

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

41. Solve for x

$\tan^{-1}\left(\frac{1-x}{1+x}\right)=\frac{1}{2}\tan^{-1} x, x>0$ _____

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

42. The system of linear equation $x+y+z=6, x+2y+3z=10$ and $x+2y+az=b$ has no solutions when_____

a) $a=2b\neq 3$ b) $a=3b\neq 10$
c) $b=2a=3$ d) $b=3a\neq 3$

43. The value of $\tan\left(1^\circ\right)+\tan\left(89^\circ\right)$ is _____

a) $\frac{1}{\sin\left(1^\circ\right)}$ b) $\frac{2}{\sin\left(2^\circ\right)}$
c) $\frac{2}{\sin\left(1^\circ\right)}$ d) $\frac{2}{\sin\left(2^\circ\right)}$

44. If $\frac{(x+1)^2}{x^3+x}=\frac{A}{x}+\frac{Bx+C}{x^2+1}$ then

$\text{cosec}^{-1}\left(\frac{1}{A}\right)+\cot^{-1}\left(\frac{1}{B}\right)+\sec^{-1} C$ is

a) $\frac{5\pi}{6}$ b) 0
c) $\frac{5\pi}{6}$ d) $\frac{\pi}{2}$

45. The remainder obtained when $1!+2!+3!+.....+11!$ is divided by 12 is _____

a) 9 b) 8
c) 7 d) 6

46. If $\alpha \leq 2\sin^{-1} x+\cos^{-1} x\leq \beta$ then

a) $\alpha=\frac{-\pi}{2}\beta=\frac{\pi}{2}$ b) $\alpha=\frac{-\pi}{2}\beta=\frac{3\pi}{2}$
c) $\alpha=0,\beta=\pi$ d) $\alpha=0\beta=2\pi$

47. If $A=\begin{bmatrix}0 & 1\\ 1 & 0\end{bmatrix}$, then A^2 equal to_____

a) $\begin{bmatrix}0 & 1\\ 1 & 0\end{bmatrix}$ b) $\begin{bmatrix}1 & 0\\ 1 & 0\end{bmatrix}$
c) $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$ d) $\begin{bmatrix}0 & 1\\ 0 & 1\end{bmatrix}$

48. The function $f(x)=[x]$, where $[x]$ denotes greatest integer function is continuous at_____

a) 4 b) – 2
c) 1 d) 1.5

49. If $y=\log\left(\frac{1-x^2}{1+x^2}\right)$, then $\frac{dy}{dx}$ is equal to _____

a) $\frac{-4x}{1-x^4}$ b) Stem height
c) $\frac{1}{4-x^2}$ d) $\frac{-4x^2}{1-x^4}$

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

a) Touch each other
b) Cut at right angle
c) cut at angle $\frac{\pi}{3}$
d) Cut at angle $\frac{\pi}{4}$

51. If x is real, then the minimum value of $x^2-8x+17$ is _____
a) 1 b) 2
c) 3 d) 4

52. $\int_{-\pi/4}^{\pi/4} \frac{dx}{1+\cos 2x}$ is equal to
a) 2 b) 1
c) 1 d) 0

53. The order of differential equation of all circles of given radius 'a' is _____
a) 4 b) 2
c) 1 d) 3

54. The solution of differential equation $x\frac{dy}{dx}+2y=x^2$ is _____
a) $y=\frac{x^2+C}{4x^2}$ b) $y=\frac{x^2}{4}$
c) $y=\frac{x^4+C}{x^2}$ d) $y=\frac{x^4+C}{4x^2}$

55. If $\sin x+\sin y=\frac{1}{2}$ and $\cos x+\cos y=1$, then $\tan(x+y)=$_____
a) $\frac{8}{3}$ b) $\frac{3}{4}$
c) $\frac{-8}{3}$ d) $\frac{4}{3}$

56. If $A=\begin{bmatrix}\alpha & 2\\ 2 & \alpha\end{bmatrix}$ and $[A^3]=27$, then $\alpha=$_____
a) ±1 b) ±2
c) $\pm\sqrt{7}$ d) $\pm\sqrt{5}$

57. If $A=\begin{vmatrix}x & 1\\ 1 & x\end{vmatrix}$ and $\begin{vmatrix}x & 1 & 1\\ 1 & x & 1\\ 1 & 1 & x\end{vmatrix}$ then $\frac{dQ}{dX}=$_____
a) $3p+1$ b) $1-3p$
c) $-3p$ d) $3p$

58. A line passes through $(2,2)$ and is perpendicular in the line $3x+y=3$ its y – intercept is
a) $\frac{1}{3}$ b) $\frac{2}{3}$
c) $\frac{4}{3}$ d) 1

59. Let $f:R\to R$ be defined $f(x)=\frac{1}{x}\forall x\in R$, then f is
a) One – one b) onto
c) Bijective d) f is not defined

60. The solution set of the in equation $\frac{x^2+6x-7}{|x+4|}<0$ is
a) $(-7,1)$ b) $(-7,-4)$
c) $(-7,-4)\cup(-4,1)$ d) $(-7,-4)\cup(4,1)$

ANSWER KEYS

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