KALAIMAGAL MATRIC HIGHER SECONDARY SCHOOL, MOHANUR.

STD : XII **MATHEMATICS** **MARKS: 50**

DATE: **ONE MARK TEST-IV (BB FULLY)** **TIME: 30 min**

Choose the correct answer: **50 x 1 = 50**

1. If $A=\begin{bmatrix}1 & -2\\ 1 & 4\end{bmatrix}=\begin{bmatrix}6 & 0\\ 0 & 6\end{bmatrix}$, Then

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

2. If $adj\,A=\begin{bmatrix}2 & 3\\ 4 & -1\end{bmatrix}$ and $adj\,B=\begin{bmatrix}1 & -2\\ -3 & 1\end{bmatrix}$ then $adj(AB)$ is

   1) $\begin{bmatrix}-7 & -1\\ 7 & -9\end{bmatrix}$ 2) $\begin{bmatrix}-6 & 5\\ -2 & -10\end{bmatrix}$ 3) $\begin{bmatrix}-7 & 7\\ -1 & -9\end{bmatrix}$ 4) $\begin{bmatrix}-6 & -2\\ 5 & -10\end{bmatrix}$

3. Which of the following is/are correct?
   i) Adjoint of a symmetric matrix is also a symmetric matrix.
   ii) Adjoint of a diagonal matrix is also a diagonal matrix.
   iii) If A is a square matrix of order n and λ is a scalar, then $adj(\lambda A)=\lambda^n adj(A)$
   (iv) $A(adjA)=(adjA)A=|A|I$
   1) Only (i) 2) (ii) and (iii) 3) (iii) and (iv) 4) (i),(ii) and (iv)

4. The augmented matrix of a system of linear equation is $\begin{bmatrix}1 & 2 & 7 & 3\\ 0 & 1 & 4 & 6\\ 0 & 0 & \lambda-7 & \mu+5\end{bmatrix}$ the system has infinitely many solution if

   1) $\lambda=7,\mu\neq-5$ 2) $\lambda=-7,\mu=5$ 3) $\lambda\neq7,\mu\neq-5$ 4) $\lambda=7,\mu=-5$

5. If $A=\begin{bmatrix}3 & -3 & 4\\ 2 & -3 & 4\\ 0 & -1 & 1\end{bmatrix}$, then $adj(adjA)$ is

   1) $\begin{bmatrix}3 & -3 & 4\\ 2 & -3 & 4\\ 0 & -1 & 1\end{bmatrix}$ 2) $\begin{bmatrix}6 & -6 & 8\\ 4 & -6 & 8\\ 0 & -2 & 2\end{bmatrix}$ 3) $\begin{bmatrix}3 & 3 & -4\\ -2 & 3 & -4\\ 0 & 1 & -1\end{bmatrix}$ 4) $\begin{bmatrix}3 & -3 & 4\\ 0 & -1 & 1\\ 2 & -3 & 4\end{bmatrix}$

6. The conjugate of a complex number is $\frac{1}{i-2}$. Then, the complex number is

   1) $\frac{1}{i+2}$ 2) $\frac{-1}{i+2}$ 3) $\frac{-1}{i-2}$ 4) $\frac{1}{i-2}$

7. The principal argument of $\frac{3}{-1+i}$ is

   1) $\frac{-5\pi}{6}$ 2) $\frac{-2}{3}$ 3) $\frac{-3\pi}{4}$ 4) $\frac{-\pi}{2}$

8. The principal argument of the complex number $\frac{\left(1+i\sqrt{3}\right)^2}{4i\left(1-i\sqrt{3}\right)}$ is

   1) $\frac{2\pi}{3}$ 2) $\frac{\pi}{6}$ 3) $\frac{5\pi}{6}$ 4) $\frac{\pi}{2}$

9. The product of all four values of $\left(\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}\right)^{\frac{3}{4}}$ is

1) -2 2) -1 3) 1 4) 2

10. The value of $\left(\frac{1+\sqrt{3}i}{1-\sqrt{3}i}\right)^{10}$ is

1) $cis\ \frac{2\pi}{3}$ 2) $cis\ \frac{4\pi}{3}$ 3) $-cis\ \frac{2\pi}{3}$ 4) $-cis\ \frac{4\pi}{3}$

11. A zero of x^3+64 is

1) 0 2) 4 3) $4i$ 4) -4

12. The polynomial x^3-kx^2+9x has three real zeros if and only if, k satisfies

1) $|k|\le 6$ 2) $k=0$ 3) $|k|>6$ 4) $|k|\ge 6$

13. $\sin^{-1}(\cos x)=\frac{\pi}{2}-x$ is valid for

1) $-\pi\le x\le 0$ 2) $0\le x\le\pi$ 3) $-\frac{\pi}{2}\le x\le\frac{\pi}{2}$ 4) $-\frac{\pi}{4}\le x\le\frac{3\pi}{4}$

14. If $|x|\le 1$, then $2\tan^{-1}x-\sin^{-1}\frac{2x}{1+x^2}$ is equal to

1) $\tan^{-1}x$ 2) $\sin^{-1}x$ 3) 0 4) π

15. The equation $\tan^{-1}x-\cot^{-1}x=\tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$ has

1) no solution 2) unique solution 3) two solutions 4) infinite number of solutions

16. If $\sin^{-1}\frac{x}{5}+\cos ec^{-1}\frac{5}{4}=\frac{\pi}{2}$, then the value of x is

1) 4 2) 5 3) 2 4) 3

17. The radius of the circle $3x^2+by^2+4bx-6by+b^2=0$ is

1) 1 2) 3 3) $\sqrt{10}$ 4) $\sqrt{11}$

18. If $x+y=k$ is a normal to the parabola $y^2=12x$, then the value of k is

1) 3 2) -1 3) 1 4) 9

19. If the two tangents drawn from a point P to the parabola $y^2=4x$ are at right angles then the locus of P is

1) $2x+1=0$ 2) $x=-1$ 3) $2x-1=0$ 4) $x=1$

20. The locus of a point whose distance from $(-2,0)$ is $\frac{2}{3}$ times its distance from the line $x=-\frac{9}{2}$ is

1) a parabola 2) a hyperbola 3) an ellipse 4) a circle

21. If the coordinates at one end of a diameter of the circle $x^2+y^2-8x-4y+c=0$ are $(11,2)$, the coordinates of the other end are

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

22. If $[\vec{a},\vec{c},\vec{b}]=1$, then the value of $\frac{\vec{a}.(\vec{b}\times\vec{c})}{(\vec{c}\times\vec{a}).\vec{b}}+\frac{\vec{b}(\vec{c}\times\vec{b})}{(\vec{a}\times\vec{b}).\vec{c}}+\frac{\vec{c}.(\vec{a}\times\vec{b})}{(\vec{c}\times\vec{b}).\vec{a}}$ is

1) 1 2) -1 3) 2 4) 3

23. If the line $\frac{x-2}{3}=\frac{y-1}{-5}=\frac{z+2}{2}$ lies in the plane x+3y- $\alpha z+\beta=0$, then $(\alpha+\beta)$ is

1) $(-5,5)$ 2) $(-6,7)$ 3) $(5,-5)$ 4) $(6,-7)$

24. Distance from the origin to the plane $3x-6y+2z+7=0$ is

1) 0 2) 1 3) 2 4) 3

25. If the distance of the point (1,1,1) from the origin is half of its distance from the plane $x+y+z+k=0$, then the values of k are

1) ± 3 2) ± 6 3) $-3,9$ 4) $3,-9$

26. If the length of the perpendicular from the origin to the plane $2x+3y+\lambda z=1$, $\lambda>0$ is $\frac{1}{5}$, then the value of λ is

1) $2\sqrt{3}$ 2) $3\sqrt{2}$ 3) 0 4) 1

27. The minimum value of the function $|3-x|+9$ is

1) 0 2) 3 3) 6 4) 9

28. The maximum value of the function x^2e^{-2x}, $x>0$ is

1) $\frac{1}{e}$ 2) $\frac{1}{2e}$ 3) $\frac{1}{e^2}$ 4) $\frac{4}{e^4}$

29. One of the closest points on the curve $x^2-y^2=4$ to the point $(6,0)$ is

1) $(2,0)$ 2) $\left(\sqrt{5},1\right)$ 3) $\left(3,\sqrt{5}\right)$ 4) $\left(\sqrt{13},-\sqrt{3}\right)$

30. The point of inflection of the curve $y=(x-1)^3$ is

1) $(0,0)$ 2) $(0,1)$ 3) $(1,0)$ 4) $(1,1)$

31. If $v(x,y)=\log(e^x+e^y)$, then $\frac{\partial v}{\partial x}+\frac{\partial v}{\partial y}$ is equal to

1) e^x+e^y 2) $\frac{1}{e^x+e^y}$ 3) 2 4) 1

32. If $f(x)=\frac{x}{x+1}$, then its differential is given by

1) $\frac{-1}{(x+1)^2}dx$ 2) $\frac{1}{(x+1)^2}dx$ 3) $\frac{1}{x+1}dx$ 4) $\frac{-1}{x+1}dx$

33. Linear approximation for $g(x)=\cos x$ at $x=\frac{\pi}{2}$ is

1) $x+\frac{\pi}{2}$ 2) $-x+\frac{\pi}{2}$ 3) $x-\frac{\pi}{2}$ 4) $-x-\frac{\pi}{2}$

34. The value of $\int_{-4}^{4}\left[\tan^{-1}\left(\frac{x^2}{x^4+1}\right)+\tan^{-1}\left(\frac{x^4+1}{x^2}\right)\right]dx$ is

1) π 2) 2π 3) 3π 4) 4π

35. The value of $\int_0^{\pi}\frac{dx}{1+5^{\cos x}}$ is

1) $\frac{\pi}{2}$ 2) π 3) $\frac{3\pi}{2}$ 4) 2π

36. If $\int_0^a\frac{1}{4+x^2}dx=\frac{\pi}{8}$ then a is

1) 4 2) 1 3) 3 4) 2

37. If $\int_0^x f(t)dt=x+\int_x^1 t\,f(t)\,dt$, then the value of $f(1)$ is

1) $\frac{1}{2}$ 2) 2 3) 1 4) $\frac{3}{4}$

38. The differential equation of the family of curves $y=Ae^x+Be^{-x}$, where A and B are arbitrary constants is

1) $\frac{d^2y}{dx^2}+y=0$ 2) $\frac{d^2y}{dx^2}-y=0$ 3) $\frac{dy}{dx}+y=0$ 4) $\frac{dy}{dx}-y=0$

39. The solution of the differential equation $\frac{dy}{dx}+\frac{1}{\sqrt{1-x^2}}=0$ is

1) $y+\sin^{-1}x=c$ 2) $x+\sin^{-1}y=0$ 3) $y^2+2\sin^{-1}x=c$ 4) $x^2+2\sin^{-1}y=0$

40. If $\sin x$ is the integrating factor of the linear differential equation $\frac{dy}{dx}+Py=Q$, then P is

1) $\log\sin x$ 2) $\cos x$ 3) $\tan x$ 4) $\cot x$

41. The population P in any year t is such that the rate of increase in the population is proportional to the population. Then

1) $P=Ce^{kt}$ 2) $P=Ce^{-kt}$ 3) $P=Ckt$ 4) $P=C$

42. P is the amount of certain substance left in after time t. If the rate of evaporation of the substance is proportional to the amount remaining, then

1) $P=Ce^{kt}$ 2) $P=Ce^{-kt}$ 3) $P=Ckt$ 4) $Pt=C$

43. Consider a game where the player tosses a six-sided fair die. If the face that comes up is 6, the player wins ₹36, otherwise he loses ₹k^2, where k is the face that comes up $k=\{1,2,3,4,5\}$. The expected amount to win at this game in ₹ is

1) $\frac{19}{6}$ 2) $-\frac{19}{6}$ 3) $\frac{3}{2}$ 4) $-\frac{3}{2}$

44. If X is a binomial random variable with expected value 6 and variance 2.4, Then $P(X=5)$ is

1) $\binom{10}{5}\left(\frac{3}{5}\right)^6\left(\frac{2}{5}\right)^4$ 2) $\binom{10}{5}\left(\frac{3}{5}\right)^{10}$ 3) $\binom{10}{5}\left(\frac{3}{5}\right)^4\left(\frac{2}{5}\right)^6$ 4) $\binom{10}{5}\left(\frac{3}{5}\right)^5\left(\frac{2}{5}\right)^5$

45. Which of the following is a discrete random variable?
I. The number of cars crossing a particular signal in a day.
II. The number of customers in a queue to buy train tickets at a moment.
III. The time taken to complete a telephone call.
1) I and II 2) II only 3) III only 4) II and III

46. A computer salesperson knows from his past experience that he sells computers to one in every twenty customers who enter the showroom. What is the probability that he will sell a computer to exactly two of the next three customers?

1) $\frac{57}{20^3}$ 2) $\frac{57}{20^2}$ 3) $\frac{19^3}{20^3}$ 4) $\frac{57}{20}$

47. The operation $*$ defined by $a*b=\frac{ab}{7}$ is not a binary operation on

1) $\mathbb{Q}^+$ 2) $\mathbb{Z}$ 3) $\mathbb{R}$ 4) $\mathbb{C}$

48. Which one of the following statements has truth value F ?

1) Chennai is in India or $\sqrt{2}$ is an integer
2) Chennai is in India or $\sqrt{2}$ is an irrational number
3) Chennai is in China or $\sqrt{2}$ is an integer
4) Chennai is in China or $\sqrt{2}$ is an irrational number

49. Which one of the following is incorrect? For any two propositions p and q, we have

1) $\neg(p\vee q)\equiv\neg p\wedge\neg q$ 2) $\neg(p\wedge q)\equiv\neg p\vee\neg q$
3) $\neg(p\vee q)\equiv\neg p\vee\neg q$ (4) $\neg(\neg p)\equiv p$

50. The proposition $p\wedge(\neg p\vee q)$ is

1) a tautology 2) a contradiction
3) logically equivalent to $p\wedge q$ 4) logically equivalent to $p\vee q$