KALAIMAGAL MATRIC HIGHER SECONDARY SCHOOL, MOHANUR.

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

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

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

1. If $|\text{adj}(\text{adj A})| = |\text{A}|^9$, then the order of the square matrix A is
   1) 3 2) 4 3) 2 4) 5
2. If $P=\begin{bmatrix}1 & x & 0\\ 1 & 3 & 0\\ 2 & 4 & -2\end{bmatrix}$ is the joint of 3×3 matrix A and $|A|=4$, then x is
   1) 15 2) 12 3) 14 4) 11
3. If A= $A=\begin{bmatrix}\frac{3}{5} & \frac{4}{5}\\ x & \frac{3}{5}\end{bmatrix}$ and $\text{A}^{\text{T}} = \text{A}^{-1}$, then value of x is
   1) $\frac{-4}{5}$ 2) $\frac{-3}{5}$ 3) $\frac{3}{5}$ 4) $\frac{4}{5}$
4. If $A=\begin{bmatrix}2 & 3\\ 5 & -2\end{bmatrix}$ be such that $\lambda A^{-1} = A$, then λ is
   1) 17 2) 14 3) 19 4) 21
5. The rank of matrix $\begin{bmatrix}1 & 2 & 3 & 4\\ 2 & 4 & 6 & 8\\ -1 & -2 & -3 & -4\end{bmatrix}$ is
   1) 1 2) 2 3) 4 4) 3
6. $i^{\text{n}} + i^{\text{n}+1} + i^{\text{n}+2} + i^{\text{n}+3}$ is
   1) 0 2) 1 3) -1 4) i
7. if $|z-2+i|\le 2$, then the greatest value of $|z|$ is
   1) $\sqrt{3}-2$ 2) $\sqrt{3}+2$ 3) $\sqrt{5}-2$ 4) $\sqrt{5}+2$
8. z_1, z_2 and z_3 are complex numbers such that $z_1+z_2+z_3=0$ and $|z_1|=|z_2|=|z_3|=1$ then $z_1^{\,2}+z_2^{\,2}+z_3^{\,2}$ is
   1) 3 2) 2 3) 1 4) 0
9. The principal argument of $(\sin 40^\circ + i\cos 40^\circ)^5$ is
   1) -110° 2) -70° 3) 70° 4) 110°
10. If $\omega \ne 1$ is a cubic root of unity and $(1+\omega)^7 = A+B\omega$, then (A, B) equals
    1) $(1,0)$ 2) $(-1,1)$ 3) $(0,1)$ 4) $(1,1)$
11. A polynomial equation in x of degree n always has
    1) n distinct roots 2) n real roots 3) n complex roots 4) at most one root.
12. The number of real numbers in $[0, 2\pi]$ satisfying $\sin^4 x - 2\sin^2 x + 1$ is
    1) 2 2) 4 3) 1 4) ∞
13. The value of $\sin^{-1}(\cos x)$, $0 \le x \le \pi$ is
    1) $\pi - x$ 2) $x - \frac{\pi}{2}$ 3) $\frac{\pi}{2} - x$ 4) $x - \pi$

14. The domain of the defined by $f(x)=\sin^{-1}\sqrt{x-1}$ is

1) $[1,2]$ 2) $[-1,1]$ 3) $[0,1]$ 4) $[-1,0]$

15. $\sin^{-1}\left(\tan\frac{\pi}{4}\right)-\sin^{-1}\left(\sqrt{\frac{3}{x}}\right)=\frac{\pi}{6}$. Then x is a root of the equation

1) $x^2-x-6=0$ 2) $x^2-x-12=0$ 3) $x^2+x-12=0$ 4) $x^2+x-6=0$

16. If $\cot^{-1}\left(\sqrt{\sin\alpha}\right)+\tan^{-1}\left(\sqrt{\sin\alpha}\right)=u$, then $\cos 2u$ is equal to

1) $\tan^2\alpha$ 2) 0 3) -1 4) $\tan 2\alpha$

17. The equation of the circle passing through $(1,5)$ and $(4,1)$ and touching y - axis is $x^2+y^2-5x-6y+9+\lambda(4x+3y-19)=0$ Where λ is equal to

1) $0,-\frac{40}{9}$ 2) 0 3) $\frac{40}{9}$ 4) $-\frac{40}{9}$

18. The radius of the circle passing through the point $(6,2)$ two of whose diameter are $x+y=6$ and $x+2y=4$ is

1) 10 2) $2\sqrt{5}$ 3) 6 4) 4

19. Tangents are drawn to the hyperbola $\frac{x^2}{9}-\frac{y^2}{4}=1$ parallel to the straight line $2x-y=1$. One of the points of contact of tangents on the hyperbola is

1) $\left(\frac{9}{2\sqrt{2}},\frac{-1}{\sqrt{2}}\right)$ 2) $\left(\frac{-9}{2\sqrt{2}},\frac{1}{\sqrt{2}}\right)$ 3) $\left(\frac{9}{2\sqrt{2}},\frac{1}{\sqrt{2}}\right)$ 4) $\left(3\sqrt{3},-2\sqrt{2}\right)$

20. Consider an ellipse whose centre is of the origin and its major axis is along *x*-axis. If its eccentrcity is $\frac{3}{5}$ and the distance between its foci is 6, then the area of the quadrilateral inscribed in the ellipse with diagonals as major and minor axis of the ellipse is

1) 8 2) 32 3) 80 4) 40

21. An ellipse has OB as semi minor axes, F and F' its foci and the angle FBF' is a right angle. Then the eccentricity of the ellipse is

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

22. If $\vec{a}$ and $\vec{b}$ are parallel vectors, then $[\vec{a},\vec{c},\vec{b}]$ is equal to

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

23. If $\vec{a},\vec{c},\vec{b}$ are non-coplanar, non-zero vectors such that $[\vec{a},\vec{c},\vec{b}]$=3 than $\{[\vec{a}\times\vec{b},\vec{b}\times\vec{c},\vec{c}\times\vec{a}]\}^2$ is equal to

1) 81 2) 9 3) 27 4) 18

24. If $\vec{a}=2\hat{\imath}+3\hat{\jmath}-\hat{k}$, $\vec{b}=\hat{\imath}+2\hat{\jmath}+-\hat{k}$, $\vec{c}=3\hat{\imath}+5\hat{\jmath}-\hat{k}$, then a vector perpendicular to $\vec{a}$ and lies in the plane containing is $\vec{b}$ *and* $\vec{c}$ is

1) $-17\hat{\imath}+21\hat{\jmath}-97\hat{k}$ 2) $17\hat{\imath}+21\hat{\jmath}-123\hat{k}$
3) $-17\hat{\imath}-21\hat{\jmath}+97\hat{k}$ 4) $-17\hat{\imath}-21\hat{\jmath}-97\hat{k}$

25. The angle between the line $\vec{r}=(\hat{\imath}+2\hat{\jmath}-3\hat{k})+t(2\hat{\imath}+\hat{\jmath}-2\hat{k})$ and the plane $\vec{r}.(\hat{\imath}+\hat{\jmath})+4=0$ is

1) 0° 2)30° 3) 45° 4)90°

26. The distance between the planes x+2y+3z=7=0 and 2x+ 4y+6z+7=0 is

1) $\frac{\sqrt{7}}{2\sqrt{2}}$ 2) $\frac{7}{2}$ 3) $\frac{\sqrt{7}}{2}$ 4) $\frac{7}{2\sqrt{2}}$

27. The volume of a sphere is increasing in volume at the rate of 3π cm3/sec. The rate of change of its radius when radius when radius is $\frac{1}{2}$ cm

1) 3 cm/s 2) 2cm/s (3) 1 cm/s (4) $\frac{1}{2}$ cm/s

28. Angle between $y^2 = x$ and $x^2 = y$ at the origin is

1) $\tan^{-1}\frac{3}{4}$ 2) $\tan^{-1}\left(\frac{4}{3}\right)$ 3) $\frac{\pi}{2}$ 4) $\frac{\pi}{4}$

29. The number given by the Mean value theorem for the function $\frac{1}{x}, x \in [1,9]$ is

1) 2 2) 2.5 3) 3 4) 3.5

30. The maximum slope of the tangent to the curve $y = e^x \sin x, x \in [0, 2\pi]$ is at

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

31. A circular template has a radius of 10 cm. The measurement of radius has an approximate error of 0.02 cm. Then the percentage error in calculating area of this template is

1) 0.2% 2) 0.4% 3) 0.04% 4) 0.08%

32. If $f(x, y) = e^{xy}$, then $\frac{\partial^2 f}{\partial x \partial y}$ is equal to

1) xye^{xy} 2) $(1+xy)e^{xy}$ 3) $(1+y)e^{xy}$ 4) $(1+x)e^{xy}$

33. If $g(x, y) = 3x^2 - 5y + 2y^2, x(t) = e^t$, and $y(t) = \cos t$ then $\frac{dg}{dt}$ is equal to

1) $6e^{2t} + 5\sin t - 4\cos t \sin t$ 2) $6e^{2t} - 5\sin t + 4\cos t \sin t$
3) $3e^{2t} + 5\sin t + 4\cos t \sin t$ 4) $3e^{2t} - 5\sin t + 4\cos t \sin t$

34. For any value of $n \in \mathbb{Z}$, $\int_0^{\pi} e^{\cos^2 x} \cos^3[(2n+1)x]\,dx$ is

1) $\frac{\pi}{2}$ 2) π 3) 0 4) 2

35. The value of $\int_0^1 x(1-x)^{99}\,dx$ is

1) $\frac{1}{11000}$ 2) $\frac{1}{10100}$ 3) $\frac{1}{10010}$ 4) $\frac{1}{10001}$

36. If $\frac{\Gamma(n+2)}{\Gamma(n)} = 90$ then n is

1) 10 2) 5 3) 8 4) 9

37. The value of $\int_0^{\pi} \sin^4 x\,dx$ is

1) $\frac{3\pi}{10}$ 2) $\frac{3\pi}{8}$ 3) $\frac{3\pi}{4}$ 4) $\frac{3\pi}{2}$

38. The order and degree of the differential equation $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^{1/3} + x^{1/4} = 0$ are respectively

1) 2, 3 2) 3, 3 3) 2, 6 4) 2, 4

39. The integrating factor of the differential equation $\frac{dy}{dx} + y = \frac{1+y}{\lambda}$ is

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

40. If p and q are the order and degree of the differential equation $y\frac{dy}{dx} + x^3\left(\frac{d^2y}{dx^2}\right) + xy = \cos x$, when

1) $p < q$ 2) $p = q$ 3) $p > q$ 4) p exists and q does not exist

41. The general solution of the differential equation $\log\left(\frac{dy}{dx}\right) = x + y$ is

1) $e^x + e^y = C$ 2) $e^x + e^{-y} = C$ 3) $e^{-x} + e^y = C$ 4) $e^{-x} + e^{-y} = C$

42. The solution of the differential equation $\frac{dy}{dx} = \frac{y}{x} + \frac{\phi\left(\frac{y}{x}\right)}{\phi'\left(\frac{y}{x}\right)}$ is

1) $x\phi\left(\frac{y}{x}\right) = k$ 2) $\phi\left(\frac{y}{x}\right) = kx$ 3) $y\phi\left(\frac{y}{x}\right) = k$ 4) $\phi\left(\frac{y}{x}\right) = ky$

43. Let X be random variable with probability density function $f(x) = \begin{cases} \frac{2}{x^3} & x \geq 1 \\ 0 & x < 1 \end{cases}$ Which of the following statement is correct

1) both mean and variance exist 2) mean exists but variance does not exist
3) both mean and variance do not exist 4) variance exists but Mean does not exist.

44. If the function $f(x) = \frac{1}{12}$ for $a < x < b$, represents a probability density function of a continuous random variable X, then which of the following cannot be the value of a and b?

1) 0 and 12 2) 5 and 17 3) 7 and 19 4) 16 and 24

45. On a multiple-choice exam with 3 possible destructives for each of the 5 questions, the probability that a student will get 4 or more correct answers just by guessing is

1) $\frac{11}{243}$ 2) $\frac{3}{8}$ 3) $\frac{1}{243}$ 4) $\frac{5}{243}$

46. The random variable X has the probability density function $f(x) = \begin{cases} ax + b & 0 < x < 1 \\ 0 & otherwise \end{cases}$ and $E(X) = \frac{7}{12}$, then a and b are respectively

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

47. Which one of the following is a binary operation on $\mathbb{N}$?

1) Subtraction 2) Multiplication 3) Division 4) All the above

48. If $a * b = \sqrt{a^2 + b^2}$ on the real numbers then $*$ is

1) commutative but not associative 2) associative but not commutative
3) both commutative and associative 4) neither commutative nor associative

49. Which one is the inverse of the statement $(p \vee q) \rightarrow (p \wedge q)$?

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

50. In the last column of the truth table for $\neg(p \vee \neg q)$ the number of final outcomes of the truth value 'F' are

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