KALAIMAGAL MATRIC HIGHER SECONDARY SCHOOL, MOHANUR.

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

DATE: | **ONE MARKS TEST-II (BB FULLY)** | **TIME: 30 min**

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

1. If A is a 3×3 non – singular matrix such that $AA^T = A^TA$ and $B = A^{-1}A^T$, then $BB^T =$
   1) A 2) B 3) I_3 4) B^T
2. If $A = \begin{bmatrix} 7 & 3 \\ 4 & 2 \end{bmatrix}$, Then $9I_2 - A =$
   1) A^{-1} 2) $\frac{A^{-1}}{2}$ 3) $3A^{-1}$ 4) $2A^{-1}$
3. If $A = \begin{bmatrix} 3 & 1 & -1 \\ 2 & -2 & 0 \\ 1 & 2 & -1 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{23} & a_{33} \end{bmatrix}$ then the value of a_{23} is
   1) 0 2) -2 3) -3 4) -1
4. If A^TA^{-1} is symemetic, then A^2 =
   1) A^{-1} 2) $(A^T)^2$ 3) A^T 4) $(A^{-1})^2$
5. If $\boldsymbol{A = \begin{bmatrix} 1 & \tan\frac{\theta}{2} \\ -\tan\frac{\theta}{2} & 1 \end{bmatrix}}$ and $AB = I_2$, then B =
   1) $\left(\cos^2\frac{\theta}{2}\right) A$ 2) $\left(\cos^2\frac{\theta}{2}\right) A^T$ 3) $(\cos^2\theta) I$ 4) $\left(\sin^2\frac{\theta}{2}\right) A^T$
6. The value of $\sum_{i=1}^{13}\left(i^n + i^{n-1}\right)$ is
   1) $1 + i$ 2) i 3) 1 4) 0
7. If $z = \frac{\left(\sqrt{3}+i\right)^3 (3i+4)^2}{(8+6i)^2}$, then $|z|$ is
   1) 0 2) 1 3) 2 4) 3
8. If $\left|z - \frac{3}{z}\right| = 2$, then the least value of $|z|$ is
   1) 1 2) 2 3) 3 4) 5
9. If $|z_1| = 1, |z_2| = 2, |z_3| = 3$ and $|9z_1z_2 + 4z_1z_3 + z_2z_3| = 12$, then the value of $|\boldsymbol{z_1 + z_2 + z_3}|$ is
   1) 1 2) 2 3) 3 4) 4
10. If $\frac{z-1}{z+1}$ is purely imaginary, then $|z|$ is
    1) $\frac{1}{2}$ 2) 1 3) 2 4) 3
11. If f and g are polynomials of degrees m and n respectively, and if $h(x) = (f \circ g)(x)$, then the degree of h is
    1) mn 2) $m+n$ 3) m^n 4) n^m
12. According to the rational root theorem, which number is not possible rational zero of $4x^7 + 2x^4 - 10x^3 - 5$?
    1) -1 2) $\frac{5}{4}$ 3) $\frac{4}{5}$ 4) 5

13. $\sin^{-1}\frac{3}{5}-\cos^{-1}\frac{12}{13}+\sec^{-1}\frac{5}{3}-\operatorname{cosec}^{-1}\frac{13}{12}$ is equal to

1) 2π 2) π 3) 0 4) $\tan^{-1}\frac{12}{65}$

14. If $\cot^{-1}x=\frac{2\pi}{5}$ for some $x\in R$, the value of $\tan^{-1}x$ is

1) $-\frac{\pi}{10}$ 2) $\frac{\pi}{5}$ 3) $\frac{\pi}{10}$ 4) $-\frac{\pi}{5}$

15. $\tan^{-1}\left(\frac{1}{4}\right)+\tan^{-1}\left(\frac{2}{9}\right)$ is equal to

1) $\frac{1}{2}\cos^{-1}\left(\frac{3}{5}\right)$ 2) $\frac{1}{2}\sin^{-1}\left(\frac{3}{5}\right)$ 3) $\frac{1}{2}\tan^{-1}\left(\frac{3}{5}\right)$ 4) $\tan^{-1}\left(\frac{1}{2}\right)$

16. If $\cot^{-1}2$ and $\cot^{-1}3$ are two angles of a triangle, then the third angle is

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

17. The circle $x^2+y^2=4x+8y+5$ intersects the line $3x-4y=m$ at two distinct points if

1) $15<m<65$ 2) $35<m<85$ 3) $-85<m<-35$ 4) $-35<m<15$

18. The equation of the normal to the circle $x^2+y^2-2x-2y+1=0$ which is parallel to the line $2x+4y=3$ is

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

19. If the normals of the parabola $y^2=4x$ drawn at the end points of its latus rectum are tangents to the circle $(x-3)^2+(y+2)^2=r^2$, then the value of r^2 is

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

20. The ellipse $E_1:\frac{x^2}{9}+\frac{y^2}{4}=1$ is inscribed in a rectangle R whose sides are parallel to the coordinate axes. Another ellipse E_2 passing through the point $(0,4)$ circumscribes the rectangle R. The eccentricity of the ellipse is

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

21. Let C be the circle with centre at $(1,1)$ and radius = 1. If T is the circle centered at $(0,y)$ passing through the origin and touching the circle C externally, then the radius of T is equal to

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

22. If $\vec{a}.\vec{b}=\vec{b}.\vec{c}=\vec{c}.\vec{a}=0$, then the value of $[\vec{a},\vec{c},\vec{b}]$ is

1) $|\vec{a}|\,|\vec{b}|\,|\vec{c}|$ 2) $\frac{1}{3}|\vec{a}|\,|\vec{b}|\,|\vec{c}|$ 3) 1 4) -1

23. If $\vec{a}$ and $\vec{b}$ are unit vectors such that $[\vec{a},\vec{b},\vec{a}\times\vec{b}]=\frac{\pi}{4}$, then the angle between $\vec{a}$ and $\vec{b}$ is

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

24. The order and degree of the differential equation $\sqrt{\sin x}(dx+dy)=\sqrt{\cos x}(dx-dy)$ is

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

25. If the volume of the parallelepiped with $\vec{a}\times\vec{b},\vec{b}\times\vec{c},\vec{c}\times\vec{a}$ as coterminous edges is 8 cubic units, then the volume of the parallelepiped with $(\vec{a}\times\vec{b})\times(\vec{b}\times\vec{c})$, $(\vec{b}\times\vec{c}),(\vec{c}\times\vec{a})$ and $(\vec{c}\times\vec{a})\times(\vec{a}\times\vec{b})$ as coterminous edges is,

1) 8 cubic units 2) 512 cubic units 3) 64 cubic units 4) 24 cubic units

26. If $\vec{a}\times(\vec{b}\times\vec{c})=(\vec{a}\times\vec{b})\times\vec{c}$, where $\vec{a},\vec{b},\vec{c}$ are any three vectors such that $\vec{b}.\vec{c}\neq 0$ and $\vec{a}.\vec{b}\neq 0$, then $\vec{a}$ and $\vec{b}$ are

1) Perpendicular 2) parallel 3) inclined at an angle $\frac{\pi}{3}$ 4) inclined at an angle $\frac{\pi}{6}$

27. The angle between the lines $\frac{x-2}{3}=\frac{y+1}{-2}$, z = 2 and $\frac{x-1}{1}=\frac{2y+3}{3}=\frac{z+5}{2}$ is

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

28. Four buses carrying 160 students from the same school arrive at a football stadium. The buses carry, respectively, 42, 36, 34, and 48 students. One of the students is randomly selected. Let X denote the number of students that were on the bus carrying the randomly selected student. One of the 4 bus drivers is also randomly selected. Let Y denote the number of students on that bus. Then $\boldsymbol{E[X]}$ and $\boldsymbol{E[Y]}$ respectively are
1) 50, 40 2) 40, 50 3) 40.75, 40 4) 41, 41

29. The position of a particle moving along a horizontal line of any time t is given by $s(t) = 3t^2 - 2t - 8$. The time at which the particle is at rest is
1) $\boldsymbol{t = 0}$ 2) $\boldsymbol{t = \frac{1}{3}}$ 3) $\boldsymbol{t = 1}$ 4) $\boldsymbol{t = 3}$

30. The slope of the line normal to the curve $f(x) = 2\cos 4x$ at $x = \frac{\pi}{12}$ is
1) $-4\sqrt{3}$ 2) -4 3) $\frac{\sqrt{3}}{12}$ 4) $4\sqrt{3}$

31. The number given by the Rolle's theorem for the function $x^3 - 3x^2, x \in [0,3]$ is
1) 1 2) $\sqrt{2}$ 3) $\frac{3}{2}$ 4) 2

32. If $u(x,y) = e^{x^2+y^2}$, then $\frac{\partial u}{\partial x}$ is equal to
1) $e^{x^2+y^2}$ 2) $2xu$ 3) x^2u 4) y^2u

33. The change in the surface area $S = 6x^2$ of a cube when the edge length varies from x_0 to $x_0 + dx$ is
1) $12x_0 + dx$ 2) $12x_0 dx$ 3) $6x_0 dx$ 4) $6x_0 + dx$

34. If $f(x,y,z) = xy + yz + zx$, then $f_x - f_z$ is equal to
1) $z - x$ 2) $y - z$ 3) $x - z$ 4) $y - x$

35. The value of $\int_0^{\frac{2}{3}} \frac{dx}{\sqrt{4-9x^2}}$ is
1) $\boldsymbol{\frac{\pi}{6}}$ 2) $\boldsymbol{\frac{\pi}{2}}$ 3) $\boldsymbol{\frac{\pi}{4}}$ 4) π

36. If $f(t) = \int_0^x t\cos t\, dt$, then $\frac{df}{dx}$ =
1) $\cos x - x\sin x$ 2) $\sin x + x\cos x$ 3) $x\cos x$ 4) $x\sin x$

37. The volume of solid of revolution of the region bounded by $y^2 = x(a-x)$ about x-axis is
1) πa^3 2) $\boldsymbol{\frac{\pi a^3}{4}}$ 3) $\boldsymbol{\frac{\pi a^3}{5}}$ 4) $\boldsymbol{\frac{\pi a^3}{6}}$

38. The value of $\int_0^1 \left(\sin^{-1} x\right)^2 dx$ is
1) $\boldsymbol{\frac{\pi^2}{4} - 1}$ 2) $\boldsymbol{\frac{\pi^2}{4} + 2}$ 3) $\boldsymbol{\frac{\pi^2}{4} + 1}$ 4) $\boldsymbol{\frac{\pi^2}{4} - 2}$

39. The solution of the differential equation $2x\frac{dy}{dx} - y = 3$ represents
1) straight lines 2) circles 3) parabola 4) ellipse

40. The solution of the differential equation $\frac{dy}{dx} = 2xy$ is
1) $y = ce^{x^2}$ 2) $y = 2x^2 + c$ 3) $y = ce^{-x^2} + c$ 4) $y = x^2 + c$

41. The number of arbitrary constants in the general solutions of order n and $n+1$ are respectively
1) $n-1,\ n$ 2) $n,\ n+1$ 3) $n+1,\ n+2$ 4) $n+1,\ n$

42. The number of arbitrary constants in the particular solution of a differential equation of third order is
1) 3 2) 2 3) 1 4) 0

43. A random variable X has binomial distribution with $n = 25$ and $p = 0.8$ then standard deviation of X is
1) 6 2) 4 3) 3 4) 2

44. If $P(X = 0) = 1 - P(X = 1)$. If $E[X] = 3Var(X)$, then $\boldsymbol{P(X = 0)}$.
1) $\frac{2}{3}$ 2) $\frac{2}{5}$ 3) $\frac{1}{5}$ 4) $\frac{1}{3}$

45. Let X have a Bernoulli distribution with mean 0.4, then the variance of $(2X - 3)$ is
1) 0.24 2) 0.48 3) 0.6 4) 0.96

46. If in 6 trials, X is a binomial variate which follows the relation $9P(X = 4) = P(X = 2)$, then the probability of success is
1) 0.125 2) 0.25 3) 0.375 4) 0.75

47. A binary operation on a set S is a function from
1) $S \to S$ 2) $(S \times S) \to S$ 3) $S \to (S \times S)$ 4) $(S \times S) \to (S \times S)$

48. If a compound statement involves 3 simple statements, then the number of rows in the truth table is
1) 9 2) 8 3) 6 4) 3

49. Which one is the contrapositive of the statement $(p \vee q) \to r$?
1) $\neg r \to (\neg p \wedge \neg q)$ 2) $\neg r \to (p \vee q)$ 3) $r \to (p \wedge q)$ 4) $p \to (q \vee r)$

50. The truth table for $(p \wedge q) \vee \neg q$ is given below

p	q	$(p \wedge q) \vee (\neg q)$
T	T	(a)
T	F	(b)
F	T	(c)
F	F	(d)

Which one of the following is true?

	(a)	(b)	(c)	(d)
(1)	T	T	T	T
(2)	T	F	T	T
(3)	T	T	F	T
(4)	T	F	F	F