

# KALAIMAGAL MATRIC HIGHER SECONDARY SCHOOL, MOHANUR.

STD : XI

MATHEMATICS

MARKS: 50

DATE:

ONE MARKS TEST-V (BB FULLY)

TIME: 30 min

Choose the correct answer:

50 x 1 = 50

1. If the function  $f: [-3,3] \rightarrow S$  defined by  $f(x) = x^2$  is onto, then  $S$  is

- 1)  $[-9,9]$       2)  $\mathbb{R}$       3)  $[-3,3]$       4)  $[0,9]$

2. The inverse of  $f(x) = \begin{cases} x & \text{if } x < 1 \\ x^2 & \text{if } 1 \leq x \leq 4 \\ 8\sqrt{x} & \text{if } x > 4 \end{cases}$  is

$$1) f^{-1}(x) = \begin{cases} x & \text{if } x < 1 \\ \sqrt{x} & \text{if } 1 \leq x \leq 16 \\ \frac{x^2}{64} & \text{if } x > 16 \end{cases} \quad 2) f^{-1}(x) = \begin{cases} -x & \text{if } x < 1 \\ \sqrt{x} & \text{if } 1 \leq x \leq 16 \\ \frac{x^2}{64} & \text{if } x > 16 \end{cases}$$

$$3) f^{-1}(x) = \begin{cases} x^2 & \text{if } x < 1 \\ \sqrt{x} & \text{if } 1 \leq x \leq 16 \\ \frac{x^2}{64} & \text{if } x > 16 \end{cases} \quad 4) f^{-1}(x) = \begin{cases} 2x & \text{if } x < 1 \\ \sqrt{x} & \text{if } 1 \leq x \leq 16 \\ \frac{x^2}{8} & \text{if } x > 16 \end{cases}$$

3. The function  $f: \mathbb{R} \rightarrow \mathbb{R}$  is defined by  $f(x) = \sin x + \cos x$  is

- 1) an odd function      2) neither an odd function nor an even function  
3) an even function      4) both odd function and even function

4. The function  $f: \mathbb{R} \rightarrow \mathbb{R}$  is defined by  $f(x) = \frac{(x^2 + \cos x)(1 + x^4)}{(x - \sin x)(2x - x^3)} + e^{-|x|}$  is

- 1) an odd function      2) neither an odd function nor an even function  
3) an even function      4) both odd function and even function

5. If 8 and 2 are the roots of  $x^2 + ax + c = 0$  and 3,3 are the roots of  $x^2 + dx + b = 0$ , then the roots of the equation  $x^2 + ax + b = 0$  are

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

6. If  $\frac{kx}{(x+2)(x-1)} = \frac{2}{x+2} + \frac{1}{x-1}$ , then the value of  $k$  is

- 1) 1      2) 2      3) 3      4) 4

7. The number of roots of  $(x+3)^4 + (x+5)^4 = 16$  is

- 1) 4      2) 2      3) 3      4) 0

8. If  $f(\theta) = |\sin \theta| + |\cos \theta|$ ,  $\theta \in \mathbb{R}$ , then  $f(\theta)$  is in the interval

- 1)  $[0, 2]$       2)  $[1, \sqrt{2}]$       3)  $[1, 2]$       4)  $[0, 1]$

9. The triangle of maximum area with constant perimeter 12m

- 1) is an equilateral triangle with side 4m      2) is an isosceles triangle with sides 2m, 5m, 5m  
3) is a triangle with sides 3m, 4m, 5m      4) Does not exist

10. If  $\sin \alpha + \cos \alpha = b$ , then  $\sin 2\alpha$  is equal to

- 1)  $b^2 - 1$ , if  $b \leq \sqrt{2}$       2)  $b^2 - 1$ , if  $b > \sqrt{2}$       3)  $b^2 - 1$ , if  $b \geq 1$       4)  $b^2 - 1$ , if  $b \geq \sqrt{2}$

11. The number of ways of choosing 5 cards out of a deck of 52 cards which include at least one king is

- 1)  ${}^{52}C_5$       2)  ${}^{48}C_5$       3)  ${}^{52}C_5 + {}^{48}C_5$       4)  ${}^{52}C_5 - {}^{48}C_5$

12. The number of rectangles that a chess board has

- 1) 81      2) 9<sup>9</sup>      3) 1296      4) 6561

13. If  $P_r$  stands for  $r P_r$  then the sum of the series  $1 + P_1 + 2P_2 + 3P_3 + \dots + n P_n$  is

- 1)  $P_{n+1}$       2)  $P_{n+1} - 1$       3)  $P_{n-1} + 1$       4)  $(n+1) P_{(n-1)}$

14. If  ${}^nC_4, {}^nC_5, {}^nC_6$  are in AP the value of  $n$  can be

- 1) 14      2) 11      3) 9      4) 5

15. The  $n^{\text{th}}$  term of the sequence  $\frac{1}{2}, \frac{3}{4}, \frac{7}{8}, \frac{15}{16}, \dots$  is

- 1)  $2^n - n - 1$       2)  $1 - 2^{-n}$       3)  $2^{-n} + n - 1$       4)  $2^{n-1}$

16. The value of the series  $\frac{1}{2} + \frac{7}{4} + \frac{13}{8} + \frac{19}{16} + \dots$  is

- 1) 14      2) 7      3) 4      4) 6

17. The coefficient of  $x^5$  in the series  $e^{-2x}$  is

- 1)  $\frac{2}{3}$       2)  $\frac{3}{2}$       3)  $\frac{-4}{15}$       4)  $\frac{4}{15}$

18. If a vertex of a square is at the origin and its one side lies along the line  $4x + 3y - 20 = 0$ , then the area of the square is

- 1) 20 sq. units      2) 16 sq. units      3) 25 sq. units      4) 4 sq. units

19. If the lines represented by the equation  $6x^2 + 41xy - 7y^2 = 0$  make angles  $\alpha$  and  $\beta$  with  $x$  axis then  $\tan \alpha \tan \beta =$

- 1)  $-\frac{6}{7}$       2)  $\frac{6}{7}$       3)  $-\frac{7}{6}$       4)  $\frac{7}{6}$

20. The area of the triangle formed by the lines  $x^2 - 4y^2 = 0$  and  $x = a$  is

- 1)  $2a^2$       2)  $\frac{\sqrt{3}}{2}a^2$       3)  $\frac{1}{2}a^2$       4)  $\frac{2}{\sqrt{3}}a^2$

21.  $\theta$  is acute angle between the lines  $x^2 - xy - 6y^2 = 0$ , then  $\frac{2\cos\theta + 3\sin\theta}{4\sin\theta + 5\cos\theta}$  is

- 1) 1      2)  $-\frac{1}{9}$       3)  $\frac{5}{9}$       4)  $\frac{1}{9}$

22. If  $\lfloor . \rfloor$  denotes the greatest integer less than or equal to the real number under consideration are

$-1 \leq x < 0, 0 \leq y < 1, 1 \leq z < 2$ , then the value of the determinant  $\begin{vmatrix} \lfloor x \rfloor + 1 & \lfloor y \rfloor & \lfloor z \rfloor \\ \lfloor x \rfloor & \lfloor y \rfloor + 1 & \lfloor z \rfloor \\ \lfloor x \rfloor & \lfloor y \rfloor & \lfloor z \rfloor + 1 \end{vmatrix}$  is

- 1)  $\lfloor z \rfloor$       2)  $\lfloor y \rfloor$       3)  $\lfloor x \rfloor$       4)  $\lfloor x \rfloor + 1$

23. If  $A = \begin{vmatrix} -1 & 2 & 4 \\ 3 & 1 & 0 \\ -2 & 4 & 2 \end{vmatrix}$  and  $B = \begin{vmatrix} -2 & 4 & 2 \\ 6 & 2 & 0 \\ -2 & 4 & 8 \end{vmatrix}$ , then  $B$  is given by

- 1)  $B = 4A$       2)  $B = -4A$       3)  $B = -A$       4)  $B = 6A$

24. The matrix  $A$  satisfying the equation  $\begin{pmatrix} 1 & 3 \\ 0 & 1 \end{pmatrix} A = \begin{pmatrix} 1 & 1 \\ 0 & -1 \end{pmatrix}$  is

- 1)  $\begin{pmatrix} 1 & 4 \\ -1 & 0 \end{pmatrix}$       2)  $\begin{pmatrix} 1 & -4 \\ 1 & 0 \end{pmatrix}$       3)  $\begin{pmatrix} 1 & 4 \\ 0 & -1 \end{pmatrix}$       4)  $\begin{pmatrix} 1 & -4 \\ 1 & 1 \end{pmatrix}$

25. Let  $A$  and  $B$  be two symmetric matrices of same order. Then which one of the following statement is not true?

- 1)  $A + B$  is a symmetric matrix      2)  $AB$  is a symmetric matrix  
3)  $AB = (BA)^T$       4)  $A^T B = AB^T$

26. Vectors  $\vec{a}$  and  $\vec{b}$  are inclined at an angle  $\theta = 120^\circ$ . If  $|\vec{a}|=1$ ,  $|\vec{b}|=2$ , then  $[(\vec{a}+3\vec{b}) \times (3\vec{a}-\vec{b})]^2$  is equal to  
 1) 225      2) 275      3) 325      4) 300
27. If the projection of  $5\hat{i} - \hat{j} - 3\hat{k}$  on the vector  $\hat{i} + 3\hat{j} + \lambda\hat{k}$  is same as the projection of  $\hat{i} + 3\hat{j} + \lambda\hat{k}$  on  $5\hat{i} - \hat{j} - 3\hat{k}$ , then  $\lambda$  is equal to  
 1)  $\pm 4$       2)  $\pm 3$       3)  $\pm 5$       4)  $\pm 1$
28. If the points whose position vectors  $10\hat{i} + 3\hat{j}, 12\hat{i} - 5\hat{j}$  and  $a\hat{i} + 11\hat{j}$  are collinear then  $a$  is equal to  
 1) 6      2) 3      3) 5      4) 8
29. If  $\vec{a} = \hat{i} + 2\hat{j} + 2\hat{k}$ ,  $|\vec{b}|=5$  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  
 1)  $\frac{7}{4}$       2)  $\frac{15}{4}$       3)  $\frac{3}{4}$       4)  $\frac{17}{4}$
30. The value of  $\lim_{x \rightarrow 0} \frac{\sin x}{\sqrt{x^2}}$  is  
 1) 1      2) -1      3) 0      4) Limit does not exist
31. At  $x = \frac{3}{2}$  the function  $f(x) = \frac{|2x-3|}{2x-3}$  is  
 1) continuous      2) discontinuous      3) differentiable      4) non-zero
32. The function  $f(x) = \begin{cases} \frac{x^2-1}{x^3+1} & x \neq -1 \\ P & x = -1 \end{cases}$  is not defined for  $x = -1$ . The value of  $f(-1)$  so that function extended by this value is continuous is  
 1)  $\frac{2}{3}$       2)  $-\frac{2}{3}$       3) 1      4) 0
33. Let a function  $f$  be defined by  $f(x) = \frac{x-|x|}{x}$  for  $x \neq 0$  and  $f(0) = 2$ . Then  $f$  is  
 1) continuous everywhere      2) continuous everywhere  
 3) continuous for all  $x$  except  $x = 1$       4) continuous for all  $x$  except  $x = 0$
34. If  $g(x) = (x^2+2x+1)f(x)$  and  $f(0) = 5$  and  $\lim_{x \rightarrow 0} \frac{f(x)-5}{x} = 4$ , then  $g'(0)$  is  
 1) 20      2) 14      3) 18      4) 12
35. The derivative of  $f(x) = x|x|$  at  $x = -3$  is  
 1) 6      2) -6      3) does not exist      4) 0
36. If  $f(x) = \begin{cases} ax^2 - b & -1 < x < 1 \\ \frac{1}{|x|} & elsewhere \end{cases}$  is differentiable at  $x = 1$ , then  
 1)  $a = \frac{1}{2}, b = \frac{-3}{2}$       2)  $a = -\frac{1}{2}, b = \frac{3}{2}$       3)  $a = -\frac{1}{2}, b = \frac{-3}{2}$       4)  $a = \frac{1}{2}, b = \frac{3}{2}$
37. The number of points in  $\mathbb{R}$  in which the function  $f(x) = |x-1| + |x-3| + \sin x$  is not differentiable, is  
 1) 3      2) 2      3) 1      4) 4
38.  $\int \frac{\sec^2 x}{\tan^2 x - 1} dx$   
 1)  $2 \log \left| \frac{1 - \tan x}{1 + \tan x} \right| + c$       2)  $\log \left| \frac{1 + \tan x}{1 - \tan x} \right| + c$       3)  $\frac{1}{2} \log \left| \frac{\tan x + 1}{\tan x - 1} \right| + c$       4)  $\frac{1}{2} \log \left| \frac{\tan x - 1}{\tan x + 1} \right| + c$

39.  $\int x^2 e^{\frac{x}{2}} dx$  is

- 1)  $x^2 e^{\frac{x}{2}} - 4xe^{\frac{x}{2}} - 8e^{\frac{x}{2}} + c$   
 3)  $2x^2 e^{\frac{x}{2}} - 8xe^{\frac{x}{2}} + 16e^{\frac{x}{2}} + c$

- 2)  $2x^2 e^{\frac{x}{2}} - 8xe^{\frac{x}{2}} - 16e^{\frac{x}{2}} + c$   
 4)  $x^2 \frac{e^{\frac{x}{2}}}{2} - \frac{xe^{\frac{x}{2}}}{4} + \frac{e^{\frac{x}{2}}}{8} + c$

40.  $\int \frac{1}{x\sqrt{(\log x)^2 - 5}} dx$  is

- 1)  $\log |x + \sqrt{x^2 - 5}| + c$   
 3)  $\log |\log x + \sqrt{(\log x)^2 - 5}| + c$

- 2)  $\log |\log x + \sqrt{\log x - 5}| + c$   
 4)  $\log |\log x - \sqrt{(\log x)^2 - 5}| + c$

41.  $\int e^{\sqrt{x}} dx$  is

- 1)  $2\sqrt{x}(1 - e^{\sqrt{x}}) + c$   
 3)  $2e^{\sqrt{x}}(1 - \sqrt{x}) + c$

- 2)  $2\sqrt{x}(e^{\sqrt{x}} - 1) + c$   
 4)  $2e^{\sqrt{x}}(\sqrt{x} - 1) + c$

42. If a and b are chosen randomly from the set {1, 2, 3, 4} with replacement, then the probability of the real roots of the equation  $x^2 + ax + b = 0$  is

- 1)  $\frac{3}{16}$       2)  $\frac{5}{16}$       3)  $\frac{7}{16}$       4)  $\frac{11}{16}$

43. In a certain college 4 % of the boys and 1 % of the girls are taller than 1.8 meter. Further 60 % of the students are girls. If a student is selected at random and is taller than 1.8 meters, then the probability that the student is a girl is

- 1)  $\frac{2}{11}$       2)  $\frac{3}{11}$       3)  $\frac{5}{11}$       4)  $\frac{7}{11}$

44. The probability of two events A and B are 0.3 and 0.6 respectively. The probability that both A and B occur simultaneously is 0.18. The probability that neither A nor B occurs is

- 1) 0.1      2) 0.72      3) 0.42      4) 0.28

45. If m is a number such that  $m \leq 5$ , then the probability that quadratic equation  $2x^2 + 2mx + m + 1 = 0$  has real roots is

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

46. The function  $f: [0, 2\pi] \rightarrow [-1, 1]$  defined by  $f(x) = \sin x$  is

- 1) one-to-one      2) onto      3) bijection      4) cannot be defined

47. The sum up to n terms of the series  $\frac{1}{\sqrt{1+\sqrt{3}}} + \frac{1}{\sqrt{3+\sqrt{5}}} + \frac{1}{\sqrt{5+\sqrt{7}}} + \dots$  is

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

48. If the two straight lines  $x + (2k-7)y + 3 = 0$  and  $3kx + 9y - 5 = 0$  are perpendicular then the value of k is

- 1)  $k = 3$       2)  $k = \frac{1}{3}$       3)  $k = \frac{2}{3}$       4)  $k = \frac{3}{2}$

49. If  $a \neq b$ ,  $b, c$  satisfy  $\begin{vmatrix} a & 2b & 2c \\ 3 & b & c \\ 4 & a & b \end{vmatrix} = 0$ , then  $abc =$

- 1)  $a+b+c$       2) 0      3)  $b^3$       4)  $ab+bc$

50. If  $\vec{a}$  and  $\vec{b}$  are two vectors of magnitude 2 and inclined at angle  $60^\circ$ , then the angle between  $\vec{a}$  and  $\vec{a} + \vec{b}$  is

- 1)  $30^\circ$       2)  $60^\circ$       3)  $45^\circ$       4)  $90^\circ$