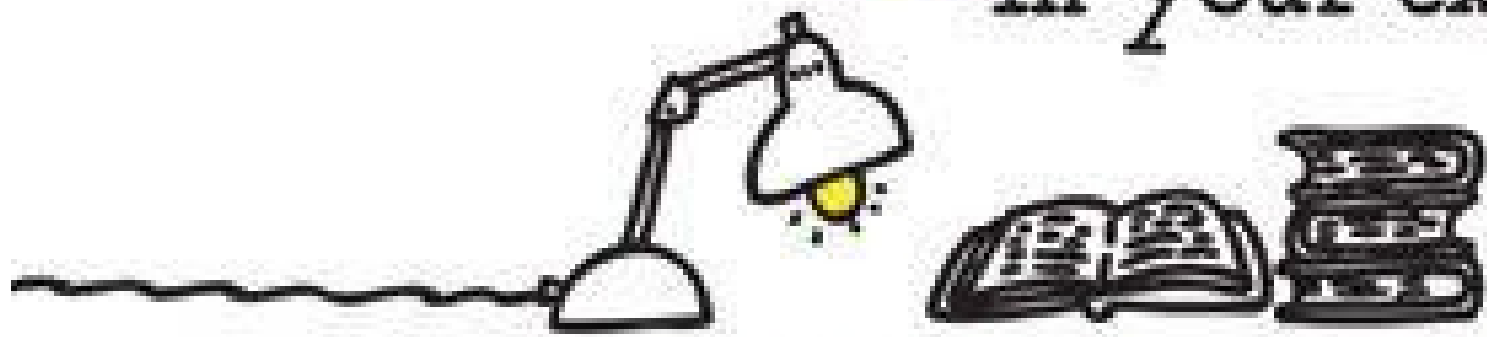
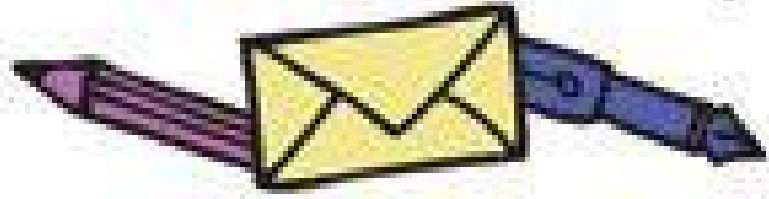


# Good Luck

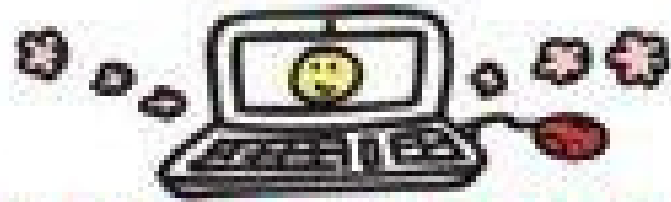
in your exams



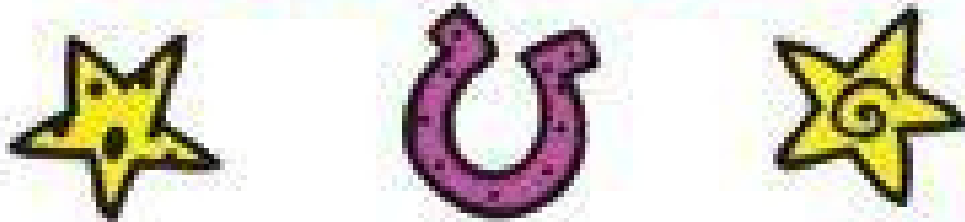
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## Best Of Luck

For success to be there with you in every walk of life. May all the dreams that your heart hold, dear, come true and may each day of life bring the best for you.



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**M.K.MANIKANDAN**  
MATH TEACHER M.Sc.,M.Ed.  
**+91 99942 34848**

# HARDWORK NEVER FAILS



# ADARSH MATRIC HR SEC SCHOOL, PONNERI.

DATE: 24/05/2022

## PRE - BOARD EXAMINATION

CLASS: XI

SUBJECT: MATHEMATICS

MAX. MARKS: 90

TIME: 3 HRS

### PART - A

20X1=20

1. The range of the function  $f(x) = |\lfloor x \rfloor - x|$ ,  $x \in R$  is

- 1)  $[0, 1]$                       2)  $[0, \infty)$                       3)  $[0, 1)$                       4)  $(0, 1)$

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

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

3. The number of solutions of  $x^2 + |x - 1| = 1$  is

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

4. If then the  $\frac{1 - 2x}{3 + 2x - x^2} = \frac{A}{3 - x} + \frac{B}{x + 1}$  value of  $A + B$  is

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

5. If  $\tan 40^\circ = \lambda$ , then  $\frac{\tan 140^\circ - \tan 130^\circ}{1 + \tan 140^\circ \tan 130^\circ} =$

- a)  $\frac{1 - \lambda^2}{\lambda}$                       b)  $\frac{1 + \lambda^2}{\lambda}$                       c)  $\frac{1 + \lambda^2}{2\lambda}$                       d)  $\frac{1 - \lambda^2}{2\lambda}$

6.  $\frac{\sin(A - B)}{\cos A \cos B} + \frac{\sin(B - C)}{\cos B \cos C} + \frac{\sin(C - A)}{\cos C \cos A}$  is

- a)  $\sin A + \sin B + \sin C$                       b) 1                      c) 0                      d)  $\cos A + \cos B + \cos C$

7. There are 10 points in a plane and 4 of them are collinear. The number of straight lines

joining any two points is

- a) 45                      b) 40                      c) 39                      d) 38

8. If  $a$  is the arithmetic mean and  $g$  is the geometric mean of two number, then

- a)  $a \leq g$                       b)  $a \geq g$                       c)  $a = g$                       d)  $a > g$

9. Which of the following point lie on the locus of  $3x^2 + 3y^2 - 8x - 12y + 17 = 0$

- a) (0, 0)                      b) (-2, 3)                      c) (1, 2)                      d) (0, -1)



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10. The length of  $\perp$  from the origin to the line  $\frac{x}{3} - \frac{y}{4} = 1$ , is  
 a)  $\frac{11}{5}$       b)  $\frac{5}{12}$       c)  $\frac{12}{5}$       d)  $-\frac{5}{12}$
11. If  $A = \begin{bmatrix} \lambda & 1 \\ -1 & -\lambda \end{bmatrix}$  then for what value of  $\lambda$ ,  $A^2 = 0$ ?  
 a) 0      b)  $\pm 1$       c) -1      d) 1
12. Let A and B be two symmetric matrices of same order. Then which one of the following statement is not true?  
 a)  $A + B$  is a symmetric matrix      b)  $AB$  is a symmetric matrix  
 c)  $AB = (BA)^T$       d)  $A^T B = AB^T$
13. The vectors  $\vec{a} - \vec{b}, \vec{b} - \vec{c}, \vec{c} - \vec{a}$   
 a) parallel to each other      b) unit vectors  
 c) mutually perpendicular vectors      d) coplanar vector
14. If  $\vec{a}$  and  $\vec{b}$  having same magnitude and angle between them is  $60^\circ$  and their scalar product is  $\frac{1}{2}$  then  $|\vec{a}|$  is  
 a) 2      b) 3      c) 7      d) 1
15.  $\lim_{x \rightarrow 0} \frac{a^x - b^x}{x}$       (1)  $\log ab$       (2)  $\log \frac{a}{b}$       (3)  $\log \frac{b}{a}$       (4)  $\frac{a}{b}$
16. If  $y = \cos(\sin x^2)$ , then  $\frac{dy}{dx}$  at  $x = \sqrt{\frac{\pi}{2}}$  is      a) -2      b) 2      c)  $-2\sqrt{\frac{\pi}{2}}$       d) 0
17. The number of points in  $\mathbb{R}$  in which the function  $f(x) = |x-1| + |x-3| + \sin x$  is not differentiable, is  
 a) 3      b) 2      c) 1      d) 4
18.  $\int \tan^{-1} \sqrt{\frac{1-\cos 2x}{1+\cos 2x}} dx$  is  
 a)  $x^2 + c$       b)  $2x^2 + c$       c)  $\frac{x^2}{2} + c$       d)  $-\frac{x^2}{2} + c$
19.  $\int \frac{x+2}{\sqrt{x^2-1}} dx$  is  
 a)  $\sqrt{x^2-1} - 2 \log |x + \sqrt{x^2-1}| + c$       b)  $\sin^{-1} x - 2 \log |x + \sqrt{x^2-1}| + c$   
 c)  $2 \log |x + \sqrt{x^2-1}| - \sin^{-1} x + c$       d)  $\sqrt{x^2-1} + 2 \log |x + \sqrt{x^2-1}| + c$
20. If S and  $\bar{S}$  are two events such that S and  $\bar{S}$  then which of the following is correct?  
 a)  $S$       b)  $\bar{S}$       c)  $S$       d)  $\bar{S}$



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## PART – B

NOTE: i) ANSWER ANY SEVEN QUESTIONS

7 X 2 = 14

ii) QUESTION NUMBER 30 IS COMPULSORY

21. In the set  $Z$  of integers, define  $mRn$  if  $m - n$  is a multiple of 12. Prove that  $R$  is an equivalence relation.

22 . Resolve into partial fraction  $\frac{1}{x^4 - 1}$

23 . Expand (i)  $\sin (A + B + C)$  (ii)  $\tan (A + B + C)$

24 . If  ${}^n P_r = 720$ , and  ${}^n C_r = 120$ , find  $n, r$

25 . Find the path traced out by the point  $\left(ct, \frac{c}{t}\right)$  here  $t \neq 0$  is the parameter and  $c$  is a constant.

26 . Evaluate: 
$$\begin{vmatrix} 2014 & 2017 & 0 \\ 2020 & 2023 & 1 \\ 2023 & 2026 & 0 \end{vmatrix}$$

27 . Find the angle between the vectors  $2\hat{i} + \hat{j} - k$  and  $\hat{i} + 2\hat{j} + \hat{k}$  using vector product.

28 . Find the relation between  $a$  and  $b$  if  $\lim_{x \rightarrow 3} f(x)$  exists where

$$f(x) = \begin{cases} ax + b & \text{if } x > 3 \\ 3ax - 4b + 1 & \text{if } x < 3 \end{cases}$$

29 . Differentiate :  $y = \sqrt{x + \sqrt{x}}$

30. Evaluate :  $\int (\tan x + \cot x)^2 dx$

## PART – C

NOTE: (i) ANSWER ANY SEVEN QUESTIONS

7 X 3 = 21

(ii) QUESTION NUMBER 40 IS COMPULSORY

31. The formula for converting from Fahrenheit to Celsius temperatures is  $y = \frac{5x}{9} - \frac{160}{9}$ . Find the inverse of this function and determine whether the inverse is also a function.

32. Find the square root of  $7 - 4\sqrt{3}$ .

33 . If  $\theta + \phi = \alpha$  and  $\tan \theta = k \tan \phi$ , then prove that  $\sin (\theta - \phi) = \frac{k-1}{k+1} \sin \alpha$ .

34 . Prove that  $\frac{(2n)!}{n!} = 2^n (1.3.5 \dots (2n - 1))$



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35 . Evaluate  $98^4$ .

36 . Rewrite  $\sqrt{3}x + y + 4 = 0$  in to normal form.

37 . Express the matrix  $A = \begin{bmatrix} 1 & 3 & 5 \\ -6 & 8 & 3 \\ -4 & 6 & 5 \end{bmatrix}$  as the sum of a symmetric and a skew-symmetric matrices.

38 . Three vectors  $\vec{a}, \vec{b}$  and  $\vec{c}$  are such that  $|\vec{a}| = 2, |\vec{b}| = 3, |\vec{c}| = 4$ , and  $\vec{a} + \vec{b} + \vec{c} = \vec{0}$  find  $4\vec{a} \cdot \vec{b} + 3\vec{b} \cdot \vec{c} + 3\vec{c} \cdot \vec{a}$

39 . Differentiate:  $y = (x^2 + 5)\log(1+x)e^{-3x}$

40 . If for two events A and B,  $P(A) = \frac{3}{4}, P(B) = \frac{2}{5}$  and  $A \cup B = S$  (simple space), find the conditional probability  $P(A/B)$ .

## PART -D

**NOTE : ANSWER ALL THE QUESTION**

**7 X 5 = 35**

41. (a) If  $f : \mathbb{R} \rightarrow \mathbb{R}$  is defined by  $f(x) = 2x - 3$  prove that  $f$  is a bijection and find its inverse.

(OR)

(b) If the letters of the word GAREN are permuted in all possible ways and the strings thus formed are arranged in the dictionary order, then find the ranks of the words (i) GARDEN (ii) DANCER.

42. (a) If  $\frac{\log x}{y-z} = \frac{\log y}{x-z} = \frac{\log z}{x-y}$ , then prove that  $xyz = 1$ .

(OR)

(b) Show that  $\frac{\sin 8x \cos x - \sin 6x \cos 3x}{\cos 2x \cos x - \sin 3x \sin 4x} = \tan 2x$ .

43. (a) Prove that  $(1 + \tan 1^\circ)(1 + \tan 2^\circ)(1 + \tan 3^\circ) \dots (1 + \tan 44^\circ)$  is a multiple of 4.

(OR)

(b) Prove that  $\sqrt{\frac{1-x}{1+x}}$  is approximately equal to  $1 - x + \frac{x^2}{2}$  when  $x$  is very small.

44. (a) Find  $p$  and  $q$ , if the following equation represents a pair of perpendicular lines

$$6x^2 + 5xy - py^2 + 7x + qy - 5 = 0$$

(OR)

(b) If  $P_1$  and  $P_2$  are the lengths of the perpendiculars from the origin to the straight lines  $x \sec \theta + y \operatorname{cosec} \theta = 2a$  and  $x \cos \theta - y \sin \theta = a \cos 2\theta$ , then prove that

$$P_1^2 + P_2^2 = a^2$$



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45. (a) Show that 
$$\begin{vmatrix} 2bc - a^2 & c^2 & b^2 \\ c^2 & 2ca - b^2 & a^2 \\ b^2 & a^2 & 2ab - c^2 \end{vmatrix} = \begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}^2. \quad (\text{OR})$$

(b) The medians of a triangle are concurrent.

46. (a) Show that the function 
$$\begin{cases} \frac{x^3 - 1}{x - 1}, & \text{if } x \neq 1 \\ 3, & \text{if } x = 1 \end{cases}$$
 is continuous on  $(-\infty, \infty)$   
(OR)

(b) Find  $y''$  if  $x^4 + y^4 = 16$ .

47. (a) Integrate the following with respect to  $x$  
$$\frac{2x + 3}{\sqrt{x^2 + 4x + 1}}$$

(OR)

(b) The chances of X, Y and Z becoming managers of a certain company are  $4 : 2 : 3$ . The probability that bonus scheme will be introduced if X, Y and Z become managers are 0.3, 0.5 and 0.4 respectively. If the bonus scheme has been introduced, what is the probability that Z was appointed as the manager

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I hope that you  
Forget nothing  
I hope you never  
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I hope your luck  
Never runs out  
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Achieve perfection  
I hope that your results  
Call for a celebration...  
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