

CHAPTER-2.

BASIC ALGEBRA

①. Solve  $|5x-12| < -2$

②. Solve

i)  $\frac{3(x-2)}{5} \leq \frac{5(2-x)}{3}$  , ii)  $\frac{5-x}{3} < \frac{x}{2} - 4$

③. If  $\alpha$  and  $\beta$  are the roots of the quadratic equation  $x^2 + \sqrt{2}x + 3 = 0$ , form a quadratic polynomial with zeroes  $\frac{1}{\alpha}, \frac{1}{\beta}$

④. Solve  $(2x+1)^2 - (3x+2)^2 = 0$

⑤. Find the zeros of the polynomial function  $f(x) = 4x^2 - 25$

⑥. Solve  $\frac{x^2 - 4}{x^2 - 2x - 15} \leq 0$

G. THIRUMOGGHI, M.Sc., B.Ed  
P.G. Assn. in PHYSICS,  
Akash Vidya Bharati Mat. Hr. Sec. School  
V. adhankattinur 631301  
Sankagiri (Tk), Salem (Dt).

⑦. Resolve the following rational expressions into partial fractions

i)  $\frac{1}{x^2 - a^2}$  , ii)  $\frac{x}{(x^2+1)(x-1)(x+2)}$  , iii)  $\frac{x}{(x-1)^3}$

⑧. Simplify  $\frac{1}{3-\sqrt{8}} - \frac{1}{\sqrt{8}-\sqrt{7}} + \frac{1}{\sqrt{7}-\sqrt{6}} - \frac{1}{\sqrt{6}-\sqrt{5}} + \frac{1}{\sqrt{5}-2}$

⑨. compute  $\log_9 27 - \log_{27} 9$

⑩. Prove  $\log \frac{a^2}{bc} + \log \frac{b^2}{ca} + \log \frac{c^2}{ab} = 0$

CHAPTER - 3

IMPORTANT QUESTION

① If  $y = \frac{2 \sin \alpha}{1 + \cos \alpha + \sin \alpha}$ , then prove that

$$\frac{1 - \cos \alpha + \sin \alpha}{1 + \sin \alpha} = y$$

② Express each of the following angle in radian measure

i)  $-205^\circ$     ii)  $30^\circ$     iii)  $330^\circ$

③ Prove that  $\frac{\cot(180^\circ + \theta) \sin(90^\circ - \theta) \cos(-\theta)}{\sin(270^\circ + \theta) \tan(-\theta) \operatorname{cosec}(360^\circ + \theta)} = \cos^2 \theta \cot \theta$

④ Expand

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

⑤ Prove that  $\sin 75^\circ - \sin 15^\circ = \cos 105^\circ + \cos 15^\circ$

⑥ Prove that  $\sin 4\alpha = 4 \tan \alpha \frac{1 - \tan^2 \alpha}{(1 + \tan^2 \alpha)^2}$

⑦ Solve  $\cos x + \sin x = \cos 2x + \sin 2x$

⑧ THEOREM 3.3

Law of Cosines.

⑨ In a  $\Delta ABC$ , Prove that  $\sin\left(\frac{B-C}{2}\right) = \frac{b-c}{a} \cos \frac{A}{2}$

⑩ If  $A+B+C = \pi$ , Prove that  $\cos^2 A + \cos^2 B + \cos^2 C = 1 - 2 \cos A \cos B \cos C$ .

G. THIRUMOORTHY, M.Sc., B.Ed.,  
P.G. Asst. in PHYSICS  
Akash Vidya Bhavan Mat. Hr. Sec. School,  
Vedhankattanur,  
Sankagiri (Tk), Salem Dist.

## UNIT-4

### XI- MATHEMATICS -2022-2023

#### IMPORTANT QUESTION

1. Find the value of

i)  $3! \times 4!$

2. Evaluate  $\frac{n!}{r!(n-r)!}$  when

$$n=10, r=3$$

3. Find the value of  $n$  if

$$\frac{1}{8!} + \frac{1}{9!} = \frac{n}{10!}$$

4. Find the number of ways of arranging the letters of the word BANANA

5. If  ${}^{(n-1)}P_3 : {}^n P_4 = 1:10$  find  $n$ .

6. If  ${}^{10}P_{r-1} = 2 \times {}^6 P_r$  find  $r$

7.  ${}^n C_{12} = {}^n C_9$  find  ${}^{21} C_n$ .

8. prove that  ${}^{15}C_3 + 2{}^{15}C_4 + {}^{15}C_5 = {}^{17}C_5$

9. prove that  ${}^{35}C_5 + \sum_{r=0}^4 (39-r) C_4 = {}^{40}C_5$ .

10. By the principle of Mathematical Induction, prove that, for  $n \geq 1$

$$1 \cdot 2 + 2 \cdot 3 + 3 \cdot 4 + \dots + n \cdot (n+1) = \frac{n(n+1)(n+2)}{3}$$

G. THIRUMOORTHY, M.Sc. B.Ed  
P.G. Asst. in PHYSICS,  
Mash Vidya Bhavan Mat. Hr. Sec. School  
Varadhankattanur 631 201  
Sankaragiri (Tk), Salem (Dt)

CHAPTER-5

XI - 2022-2023

IMPORTANT QUESTIONS

1. Find the expansion of  $(2x+3)^5$
2. Expand  
i)  $(2x^2 - 3\sqrt{1-x^2})^4$
3. Prove that  $C_0^2 + C_1^2 + C_2^2 + \dots + C_n^2 = \frac{(2n)!}{(n!)^2}$ .
4. If  $a, b, c$  are respectively the  $p^{\text{th}}, q^{\text{th}}$  and  $r^{\text{th}}$  terms of a G.P., show that  $(q-r) \log a + (r-p) \log b + (p-q) \log c = 0$ .
5. Compute the sum of first  $n$  terms of the following series:  
i)  $8 + 88 + 888 + 8888 + \dots$
6. Find  $\sqrt[3]{65}$
7. Find  $\sqrt[3]{1001}$  approximately (two decimal places).
8. Find the coefficient of  $x^4$  in the expansion of  $\frac{3-4x+x^2}{e^{2x}}$
9. Find the value of  $\sum_{n=1}^{\infty} \frac{1}{2n-1} \left( \frac{1}{9^{n-1}} + \frac{1}{9^{2n-1}} \right)$ .
10. Expand  $(1+x)^{\frac{2}{3}}$  up to four terms for  $|x| < 1$ .

G. THIRUMOORTHY, M.Sc., B.Ed.,  
P.G. Asst. in PHYSICS,  
Mash Vidya Bhavan Mat. Hr. Sec. School  
Varadhankattanur 631301  
Sankagiri (Tk), Salem (Dt)

Chapter - 9

Limits and Continuity.

1.  $\lim_{n \rightarrow \infty} \frac{1 + 2 + 3 + \dots + n}{3n^2 + 7n + 2} = \frac{1}{6}$  verify it.
2. Show that  $\lim_{x \rightarrow 0^+} \left[ \left\lfloor \frac{1}{x} \right\rfloor + \left\lfloor \frac{2}{x} \right\rfloor + \dots + \left\lfloor \frac{15}{x} \right\rfloor \right] = 120$
3. Evaluate:  $\lim_{x \rightarrow \frac{\pi}{4}} \frac{4\sqrt{2} - (\cos x + \sin x)^5}{1 - \sin 2x}$
4. Evaluate limit  $\lim_{x \rightarrow 0} \frac{\sin x (1 - \cos x)}{x^3}$
5. 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  $(-\infty, \infty)$
6. Examine the continuity of  $e^x \tan x$ .
7. Find the positive integer  $n$  so that  $\lim_{x \rightarrow 3} \frac{x^n - 3^n}{x - 3} = 27$
8. Find  $\lim_{t \rightarrow 0} \frac{\sqrt{t^2 + 9} - 3}{t^2}$
9. Calculate  $\lim_{x \rightarrow 3} \frac{(x^2 + 6x + 5)}{x^3 - 8x + 7}$
10. Theorem

$$\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = n(a)^{n-1}$$

G. THIRUMORTHY, M.Sc., B.Ed.,  
P.G. Asst. in PHYSICS,  
Varadha Vidya Bhavan Mat. Hr. Sec. School,  
Sankagiri (Tk), Salem (Dt).

## MATHEMATICS - 2022-2023

- 1) If  $P(A)$  denotes the power set of  $A$ , then find  $n(P(P(P(\emptyset))))$ .
- 2) Let  $f, g : \mathbb{R} \rightarrow \mathbb{R}$  be defined as  $f(x) = 2x - |x|$  and  $g(x) = 2x + |x|$ . Find  $f \circ g$ .
- 3) Write the values of  $f$  at  $-3, 5, 2, -1, 0$  if.

$$f(x) = \begin{cases} x^2 + x - 5 & \text{if } x \in (-\infty, 0). \\ x^2 + 3x - 2 & \text{if } x \in (3, \infty). \\ x^2 & \text{if } x \in (0, 2). \\ x^2 - 3 & \text{otherwise.} \end{cases}$$

- 4) Find the domain of  $\frac{1}{1 - 2 \sin x}$ .

- 5) Find the range of the function  $\frac{1}{2 \cos x - 1}$ .

- 6) From the curve  $y = \sin x$ , draw  $y = \sin |x|$  (Hint:  $\sin(-x) = -\sin x$ ).

- 7) From the curve  $y = |x|$ , draw (i)  $y = |x-1| + 1$ .  
ii)  $y = |x+1| - 1$ .

- 8) If  $f : [-2, 2] \rightarrow B$  is given by  $f(x) = 2x^3$ , then find  $B$  so, that if  $f$  is onto.

G. THIRUMOORTHY, M.Sc., B.Ed.,  
P.G. Asst. in PHYSICS,  
Akash Vidya Bhavan Mat. Hr. Sec. School,  
Varedhankattanur 633 301  
Sankagiri (Tk), Salem (Dt)

1) Integrate the following with respect to  $x$  :

i).  $x^n$       ii).  $\sqrt[3]{x^4}$ .

2) Integrate the following with respect to  $x$  :

i).  $(1+x^2)^{-1}$       ii).  $(1-x^2)^{-\frac{1}{2}}$

3) Integrate the following with respect to  $x$  :

i).  $e^{3x-6}$ .      ii).  $e^{8-7x}$ .

4) Integrate the following with respect to  $x$  :

i).  $\frac{1}{\sqrt{1-(4x)^2}}$

5) Integrate the following with respect to  $x$  :

i).  $\operatorname{cosec}(5x+3)\cot(5x+3)$ .

6) Evaluate the following integrals:

i).  $\frac{12}{(4x-5)^3} + \frac{6}{3x+2} + 16e^{4+3}$ .

G. THIRUMOORTHY, M.Sc., B.Ed.,  
P.G. Asst. in PHYSICS,  
Mash Vidya Bhavan Mat. Hr. Sec. School,  
Varadbankattannur 637 201  
Sankarini (TK), Salem (Dt)

7) If  $f'(x) = 3x^2 - 4x + 5$  and  $f(1) = 3$ , then find  $f(x)$ .

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

9) Integrate the following with respect to  $x$  :

i).  $e^{2x} \sin x$       ii).  $e^{-x} \cos 2x$ .

10). If  $\int f(x) dx = g(x) + c$ , then  $\int f(x)g'(x) dx$ .

i).  $\int f(x)g(x) dx$ .

G. THIRUMOORTHY, M.Sc., B.Ed.,  
P.G. Asst. in PHYSICS,  
Akash Vidya Bhavan Mat. Hr. Ser. School,  
Vadharankattur 637 201  
Sankagiri (Tk), Salem (Dt).