CLASS-XI

MATHEMATICS

SESSION: 2025-26

TIME: 3 Hour

FIRST TERM EXAMINATION

MM:80

SET-1

Francisco !		
General	10.5	tructions:

a)	All questions are compulsory,
	Paper is divided into 5 sections:
	SECTION-A (18 Multiple Choice Questions and 2 Assertion-Reasoning Questions.
	tach question carry one mark)
	SECTION-B (5 Very Short Answer (VSA)-type questions of 2 marks each)
	SECTION-C (6 Short Answer (SA)-type questions of 3 marks each)
	SECTION D. (1)

SECTION-D (4 Long Answer (LA)-type questions of 5 marks each)
SECTION-E (Case Based Questions, Each question carry four marks)

c)	of section B,	verall choice. However in 3 questions of Section C,	nternal choice has been pro 2 questions of Section D, tempt any one of the two	ovided in 2 questions 1 part of two
ĺ.	The value of	$\frac{\text{SECTION-A (Each sin 75°-cos 75°}}{\cos 75°+\sin 75°} \text{ is:}$	h question carry one ma	rk)
	A) 0	B) $\frac{1}{\sqrt{3}}$	C) $\frac{\sqrt{3}}{2}$	D) √3
3.	A) 3 Given set $A =$	B) 1/3	ommon ratio of the G.P. i C) 2 en the solution of the ineq	D) 1/2
	in set A is: A) {0,1,2,3,4 Which term o	,5} B) A Tthe G.P. 2, 8, 32	C) {2,3,4,5,6} up to n terms is 512?	D) {2,3,4,5}
	A) 4	B) 5 ms are there in the expa	C) 6 insion of $(a^2 - 2ab + b^2)^5$	D) 9
	A) 6 If ${}^{n}C_{10} = {}^{n}C_{2}$,	B) 5 then " C_{11} is:	C) 10	D) 11
	A) 11	B) 12	C) 10	D) 121
	Was to the second	of the Complex numbe B) $-i - 26$ s 270 revolutions in one	or $i^{2025} - 26$ is: C) $i + 26$ the minute. Through how the	D) $-i + 26$ nany radians does it
	turn in I secon	d?	n. 5π	D) 10π
. 1	f A and B are A) 4	two sets such that $n(A \mid B)$ 5	$\cap B'$) = 8 and $n(A) = 12$, C) 6	D) 8

10. If $f(x) = (\sin x + \cos x)^3$, then $f(\pi)$ is: C) -1 11. Let $A = \{0,1,9\}$, $B = \{2,0,5\}$ and $C = \{0,-2,6\}$, then the number of elements in D) 8 C) 12 A) 5 A) 5 B) 6

12. Multiplicative inverse of 4 – 3i is: A) $\frac{4}{5} - \frac{3}{5}i$ B) $\frac{4}{5} + \frac{3}{5}i$ C) $-\frac{4}{5} + \frac{3}{5}i$ D) $-\frac{4}{5} - \frac{3}{5}i$ 13. Let $A = \{2, 3\}$, $B = \{3, 4, 5\}$ and $U = \{1, 2, 3, 4, 5, 6\}$ then $(A \cup B)'$ is: A) \emptyset B) $\{1, 5\}$ C) $\{1, 6\}$ D) (6,2) A) \emptyset 14. Domain of the function $f(x) = \frac{x^2 + 3x + 5}{x^2 - 5x + 4}$ is:

B) \emptyset C) $R - \{1, 4\}$ D) (1,4) 15. A function $f(x) = \begin{cases} 2x - 3, 0 \le x < 4 \\ x^2 - 5, x \ge 4 \end{cases}$, then f(4) is: D) 9 16. Let $A = \{-1, 0, 1, 2, \{3, 7\}, 4, 5, 6\}$ then which of the following statement is incorrect: A) {3,7} ∈ A B) $\{3,7\} \subset A$ D) $\{(3,7)\} \subset A$ C) {1,4} ⊂ A 17. The degree measure corresponding to $-\frac{5\pi}{3}$ is: A) - 270° C) - 120 ° 18. The additive inverse of $\frac{5+\sqrt{2}i}{1-\sqrt{2}i}$ is:

ASSERTION-REASON BASED QUESTIONS

C) $-1+2\sqrt{2}i$

D) $1+2\sqrt{2}i$

In the following questions, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

- (A) Both (A) and (R) are true and (R) is the correct explanation of (A).
- (B) Both (A) and (R) are true but (R) is not the correct explanation of (A).
- (C) (A) is true but (R) is false.

A) $1-2\sqrt{2}i$ B) $-1-2\sqrt{2}i$

- (D) (A) is false but (R) is true.
- Assertion (A): The maximum value of 3sin x-4sin³ x+2 is 4.
 Reason (R): For real x, -1≤sin x≤1
- Assertion (A): The number of non-empty subsets of the set containing letters of the word 'SECTION' is 127.

Reason (R): The number of subsets of a set having n elements is 2n.

SECTION-B (Each question carries two marks)

21. Find the value of n if " $P_3 = 42$ " $P_3, n > 4$.

How many numbers lying between 100 and 1000 can be formed with the digits 0, 1, 2, 3, 4, 5 if the repetition of digits is not allowed.

22. If all letters of the word "RANK" are arranged as in dictionary, what will be 21st word?

23. Let $R = \{(x, y): y = x + 1 \text{ and } x, y \in \{0, 1, 2, 4, 5\}\}$. Write R in roster form. Write its domain and range.

24. Draw graph of the function: $f(x) = \begin{cases} -x, x < 0 \\ x^2, x \ge 0 \end{cases}$

OR

Let $f = \{(1,1),(2,3)\}$ be a function from Z to Z defined by f(x) = ax + b. Find the function.

25. Find x + y, if x and y are real numbers and (x-iy)(3-5i) is conjugate of -3+4i.

SECTION-C (Each question carry three marks)

- 26. IQ of a person is given by the formula IQ = MA × 100, where MA is the mental age and CA is the chronological age. If 60 ≤ IQ ≤ 100 for a group of 10 year old children, find the range of their mental age. Taking MA as x, represent its value on number line.
- 27. Verify De Morgan's law, using Venn diagram.

28. Let A be set of all letters of the word "TAMILNADU",

 $X = \{x : x \text{ is a vowel and } x \in A\}$ and $Y = \{y : y \text{ is a consonant and } y \in A\}$ Write X and Y in roster form and find the following:

$$i)A-X$$
 $ii)$ $A-Y$ $iii)X \cup Y$ $iv)X \cap Y$

OR

If n(U) = 50, n(A) = 3x, n(B) = 2x and $n(A \cap B) = x = n(A \cup B)'$, find i)x ii) n(A - B) iii) $n(A \cup B)$

29. Simplify:
$$\frac{\cos(\pi+x)\cos(-x)}{\sin(\pi-x)\cos(\frac{\pi}{2}+x)} = \frac{\tan(\pi-x)\tan(\frac{\pi}{2}+x)}{\cos(\frac{3\pi}{2}+x)\cos(\frac{5\pi}{2}+x)}$$
OR

Prove that: $(\cos x + \cos y)^2 + (\sin x - \sin y)^2 = 4\cos^2 \frac{x+y}{2}$

20. Find the range of the following functions:

i)
$$-|2x-3|+5$$
 ii) $2-3\sin x$ iii) $\sqrt{25-x^2}$

31 If
$$a+ib=\frac{c+i}{c-i}$$
, where a,b,c are real, prove that $\frac{b}{a}=\frac{2c}{c^2-1}$ and find a^2+b^2 .

Express $\frac{3-4i}{(4-2i)(1+i)}$ in the standard form and find its modulus.

SECTION-D (Each question carry five marks)

32. How many words can be formed by taking four letters at a time from the letters of the word "MATHEMATICS". OR

In how many ways can the letters of the word "SISTER" be arranged if:

Words start with R and end with S.

ii) All S's occur together

iii) There are always 3 letters between S and E.

33. Find $(a+b)^4 - (a-b)^4$ and hence evaluate : $(\sqrt{5} + \sqrt{3})^4 - (\sqrt{5} - \sqrt{3})^4$.

34/The ratio of the A.M. and G.M. of two positive numbers a and b is m:n. Show that :

$$a:b=(m+\sqrt{m^2-n^2}):(m-\sqrt{m^2-n^2})$$

OR

Find the sum to first n terms of the series: $0.7 + 0.77 + 0.777 + \dots$

35. Prove that : $\cos 10^{\circ} \cos 30^{\circ} \cos 50^{\circ} \cos 70^{\circ} = \frac{3}{16}$.

SECTION-E CASE BASED QUESTIONS (Each question carry four marks)

36. Some students decided to save some portion of pocket money and their savings form a geometric progression. The savings of the 5th and 3rd students are Rs. 2025 and Rs.225 respectively.

Based on the above information, answer the following questions:

- Find the common ratio of the progression.
- ii) Find the amount saved by the first student.
- iii) Find the ratio of the savings of 4th student to 2nd student.

OR

Find the total saving of first 5 students.

- 37. In a competitive examination paper consists of 10 questions divided into two sections I and II, each containing 5 questions. A student is required to attempt 7 questions. In how many ways the student select the questions if:
 - The student selects exactly 4 questions from the section I.
 - ii) The student selects all questions from the section I.
 - iii) The student selects at least 3 questions from the section I.

OR-

The student selects at most 4 questions from the section I.

38. During tree plantation drive, a rectangular park is used for planting saplings. Length of the park is three times its width. Width of the park is x metres.

Based on the above information, answer the following questions:

- i) Find the least value of x if the minimum perimeter of the park is 160m.
- ii) If the perimeter of the triangle is at most 200 m, then what is the maximum value of x?