PART 1 - MATHEMATICS

Topic : Sequences and series

SECTION–A : (Maximum Marks : 4)

- This section contains **ONE** question.
- Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is(are) correct answer(s).
- For each question, choose the option(s) corresponding to (all) the correct answer(s).
- Answer to each question will be evaluated according to the following marking scheme :

Full Marks	: +4	ONLY if (all) the correct option(s) is(are) chosen;
Partial Marks	: +3	If all the four options are correct but ONLY three options are chosen;
Partial Marks	: +2	If three or more options are correct but ONLY two options are chosen, both of which are correct;
Partial Marks	: +1	If two or more options are correct but ONLY one option is chosen and it is a correct option;
Zero Marks	: 0	If none of the options is chosen (i.e. the question is unanswered);
Negative Marks	: −1	In all other cases.

- For example, in a question, if **(A), (B) and (D)** are the ONLY three options corresponding to correct answers, then choosing ONLY (A), (B) and (D) will get +4 marks; choosing ONLY (A) and (B) will get +2 marks; choosing ONLY (A) and (D) will get +2 marks; choosing ONLY (B) and (D) will get +2 marks; choosing ONLY (A) will get +1 mark; choosing ONLY (B) will get +1 mark; choosing ONLY (D) will get +1 mark; choosing no option (i.e. the question is unanswered) will get 0 marks; and choosing any other combination of options will get −1 marks.

1. Let $S = \left\{a + b\sqrt{2} : a, b \in Z\right\}$, $T_1 = \left\{\left(-1+\sqrt{2}\right)^n : n \in N\right\}$, and $T_2 = \left\{\left(1+\sqrt{2}\right)^n : n \in N\right\}$.

Then which of the following statements is (are) TRUE? [JEE Advanced 2024 Paper 1]

(A) $Z \cup T_1 \cup T_2 \subset S$

(B) $T_1 \cap \left(0, \frac{1}{2024}\right) = \phi$, where φ denotes the empty set.

(C) $T_2 \cap (2024, \infty) \neq \phi$

(D) For any given $a, b \in Z$, $\cos\left(\pi\left(a + b\sqrt{2}\right)\right) + i\sin\left(\pi\left(a + b\sqrt{2}\right)\right) \in Z$ if and only if b = 0, where $i = \sqrt{-1}$.

Scan or tap for the full solution

Space for Rough Work

SECTION–B : (Maximum Marks : 4)

- This section contains **ONE** question.
- The answer to each question is a **NON-NEGATIVE INTEGER**.
- For each question, enter the correct integer corresponding to the answer in the place designated to enter the answer.
- Answer to each question will be evaluated according to the following marking scheme :

Full Marks : +4 If ONLY the correct answer is entered;
Zero Marks : 0 In all other cases.

2. Let R denote the set of all real numbers. Let $f : R \longrightarrow R$ be a function such that $f(x) > 0$ for all $x \in R$, and $f(x + y) = f(x)f(y)$ for all $x, y \in R$.

Let the real numbers $a_1, a_2, \ldots, a_{50}$ be in an arithmetic progression. If $f(a_{31}) = 64f(a_{25})$, and

$$\sum_{i=1}^{50} f(a_i) = 3(2^{25} + 1),$$

then the value of

$$\sum_{i=6}^{30} f(a_i)$$

is _____.

[JEE Advanced 2025 Paper 1]

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JEE ADVANCED SEQUENCES AND SERIES — GEOMETRIC PROGRESSION AND GEOMETRIC MEAN — PYQS

Test Pattern : **JEE (Advanced)**

ANSWER KEY

SECTION–A

Ques.	1																
Ans.	**A, C, D**																

SECTION–B

Ques.	2																												
Ans.	**96**																												