PART 1 - MATHEMATICS

Topic : Determinants

SECTION–1 : (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	: −2	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 −2 marks.

1. Let R^2 denote $R \times R$. Let

$S = \{(a, b, c) : a, b, c \in R \text{ and } ax^2 + 2bxy + cy^2 > 0 \text{ for all } (x, y) \in R^2 - \{(0, 0)\}\}$.

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

(A) $\left(2, \frac{7}{2}, 6\right) \in S$

(B) If $\left(3, b, \frac{1}{12}\right) \in S$, then $|2b| < 1$.

(C) For any given $(a, b, c) \in S$, the system of linear equations

$ax + by = 1$

$bx + cy = -1$

has a unique solution.

(D) For any given $(a, b, c) \in S$, the system of linear equations

$(a + 1)x + by = 0$

$bx + (c + 1)y = 0$

has a unique solution.

Solution

Space for Rough Work

SECTION–2 : (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 $S = \{A = \begin{pmatrix} 0 & 1 & c \\ 1 & a & d \\ 1 & b & e \end{pmatrix} : a, b, c, d, e \in \{0, 1\}$ and $|A| \in \{-1, 1\}\}$, where $|A|$ denotes the determinant of A.

Then the number of elements in S is _____.

[JEE Advanced 2024 Paper 1]

Scan or tap for the full solution

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Space for Rough Work

JEE ADVANCED DETERMINANTS — PYQS

Test Pattern : **JEE (Advanced)**

ANSWER KEY

SECTION–1

Ques.	1																
Ans.	B, C, D																

SECTION–2

Ques.	2																												
Ans.	16																												

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