PART 1 - MATHEMATICS

Topic : Probability (class 12)

SECTION–1 : (Maximum Marks : 6)

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

Full Marks	: +3	If ONLY the correct option is chosen;
Zero Marks	: 0	If none of the options is chosen (i.e. the question is unanswered);
Negative Marks	: −1	In all other cases.

1. Three students S_1, S_2, and S_3 are given a problem to solve. Consider the following events:

U: At least one of S_1, S_2, and S_3 can solve the problem,

V: S_1 can solve the problem, given that neither S_2 nor S_3 can solve the problem,

W: S_2 can solve the problem and S_3 cannot solve the problem,

T: S_3 can solve the problem.

For any event E, let P(E) denote the probability of E. If

$P(U)=\frac{1}{2}$, $P(V)=\frac{1}{10}$, and $P(W)=\frac{1}{12}$,

then P(T) is equal to [JEE Advanced 2025 Paper 1]

(A) $\frac{13}{36}$ (B) $\frac{1}{3}$ (C) $\frac{19}{60}$ (D) $\frac{1}{4}$

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2. A student appears for a quiz consisting of only true-false type questions and answers all the questions. The student knows the answers of some questions and guesses the answers for the remaining questions. Whenever the student knows the answer of a question, he gives the correct answer. Assume that the probability of the student giving the correct answer for a question, given that he has guessed it, is $\frac{1}{2}$. Also assume that the probability of the answer for a question being guessed, given that the student's answer is correct, is $\frac{1}{6}$. Then the probability that the student knows the answer of a randomly chosen question is

[JEE Advanced 2024 Paper 1]

(A) $\frac{1}{12}$ (B) $\frac{1}{7}$ (C) $\frac{5}{7}$ (D) $\frac{5}{12}$

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Space for Rough Work

SECTION–2 : (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.

3. Suppose that Box I contains 6 red balls and 9 green balls, and Box II contains 8 red balls and 12 green balls. All the balls of Box I and Box II are mixed together and a ball is chosen at random from them. Let E_1 be the event that the ball chosen belonged to Box I and let E_2 be the event that the ball chosen belonged to Box II. Let F_1 be the event that the ball chosen is red and let F_2 be the event that the ball chosen is green.

Then which of the following statements is (are) TRUE ? [JEE Advanced 2026 Paper 1]

(A) The events E_1 and F_1 are independent

(B) The events E_2 and F_2 are dependent

(C) The conditional probability $P(F_1 \mid E_1)$ is equal to the conditional probability $P(F_1 \mid E_2)$

(D) The conditional probability $P(F_1 \mid E_1)$ is greater than the conditional probability $P(F_2 \mid E_2)$

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Space for Rough Work

SECTION–3 : (Maximum Marks : 16)

- This section contains **FOUR** questions.
- The answer to each question is a **NUMERICAL VALUE**.
- For each question, enter the correct numerical value of the answer (in decimal notation, truncated / rounded-off to the **SECOND DECIMAL PLACE**; e.g. 6.25, 7.00, −0.33, −.30, 30.27, −127.30) 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.

4. A bookshelf contains 6 distinct books of Mathematics and 5 distinct books of Physics. From these 11 books, 6 books are chosen at random. Let X be the absolute value of the difference between the number of Mathematics books chosen and the number of Physics books chosen. If α is the mean of the random variable X, then the value of 77α is _____. [JEE Advanced 2026 Paper 2]

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5. A factory has a total of three manufacturing units, M_1, M_2, and M_3, which produce bulbs independent of each other. The units M_1, M_2, and M_3 produce bulbs in the proportions of 2:2:1, respectively. It is known that 20% of the bulbs produced in the factory are defective. It is also known that, of all the bulbs produced by M_1, 15% are defective. Suppose that, if a randomly chosen bulb produced in the factory is found to be defective, the probability that it was produced by M_2 is $\frac{2}{5}$.

If a bulb is chosen randomly from the bulbs produced by M_3, then the probability that it is defective is _____. [JEE Advanced 2025 Paper 2]

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6. Let X be a random variable, and let P(X = x) denote the probability that X takes the value x. Suppose that the points $(x, P(X=x))$, x = 0,1,2,3,4, lie on a fixed straight line in the xy-plane, and P(X = x) = 0 for all $x \in R - \{0, 1, 2, 3, 4\}$. If the mean of X is $\frac{5}{2}$, and the variance of X is α, then the value of 24α is _____.

[JEE Advanced 2024 Paper 1]

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7. A bag contains N balls out of which 3 balls are white, 6 balls are green, and the remaining balls are blue. Assume that the balls are identical otherwise. Three balls are drawn randomly one after the other without replacement. For i = 1,2,3, let W_i, G_i, and B_i denote the events that the ball drawn in the ith draw is a white ball, green ball, and blue ball, respectively. If the probability $P(W_1 \cap G_2 \cap B_3) = \frac{2}{5N}$ and the conditional probability $P(B_3 \mid W_1 \cap G_2) = \frac{2}{9}$, then N equals _____. [JEE Advanced 2024 Paper 2]

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JEE ADVANCED PROBABILITY (CLASS 12) — PYQS

Test Pattern : **JEE (Advanced)**

ANSWER KEY

SECTION–1

Ques.	1	2
Ans.	A	C

SECTION–2

Ques.	3
Ans.	A, C

SECTION–3

Ques.	4	5	6	7
Ans.	99 to 101	0.27 to 0.33	42	11

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