

PART 1 - MATHEMATICS

Topic : Relations and functions (class 12)

SECTION-B : (Maximum Marks : 16)

- This section contains **ONE** paragraph.
- Based on each paragraph, there are **FOUR** questions.
- 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.

1. Let N denote the set of all positive integers. Consider the sets

$$A = \{1, 2, 3, 4, 5\} \text{ and } B = \{1, 2, 3, 4, 5, 6, 7\}.$$

Let S be the set of all functions $f: A \rightarrow B$ such that $f(2) \neq 2$ and $f(4) \neq 4$. Consider the set

$$T = \{f \in S : \text{there exists a function } g: B \rightarrow N \text{ such that } g(f(x)) = 2^x \text{ for all } x \in A\}.$$

Then the number of elements in the set T is _____.

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2. Let the set of all relations R on the set $\{a, b, c, d, e, f\}$, such that R is reflexive and symmetric, and R contains exactly 10 elements, be denoted by S .

Then the number of elements in S is _____.

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Paragraph for Questions 3 and 4

Let $S = \{1, 2, 3, 4, 5, 6\}$ and X be the set of all relations R from S to S that satisfy both the following properties:

- R has exactly 6 elements.
- For each $(a, b) \in R$, we have $|a - b| \geq 2$.

Let $Y = \{R \in X : \text{The range of } R \text{ has exactly one element}\}$ and $Z = \{R \in X : R \text{ is a function from } S \text{ to } S\}$.

Let $n(A)$ denote the number of elements in a set A .

3. If $n(X) = {}^m C_6$, then the value of m is _____.

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4. If the value of $n(Y) + n(Z)$ is k^2 , then $|k|$ is _____.

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Space for Rough Work

JEE ADVANCED RELATIONS AND FUNCTIONS (CLASS 12) — COUNTING RELATIONS AND FUNCTIONS (JEE) — PYQS

Test Pattern : JEE (Advanced)

ANSWER KEY

SECTION-B

[illegible]