

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:

i. R has exactly 6 elements.

ii. 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]