CLASS XI
SAMPLE PAPER
MATHS

[Set, Relation and Function and Mathematical Induction]

Time: - 1hr   F.M-30

(Answer ALL questions)

1)
 a) What is the value of $|P (P (P (\phi)))|$=?
 b) Write the smallest and largest subset of {1, 2, 3}.
 c) $\phi \times A$ =? Where A is any set.
 d) Find x, y if, $(x + y, 1) = (1, x - y)$.
 e) State with reason, which of the following are sets and which are not:
   (i)   Collection of all sets.
   (ii)   All natural numbers having at least one prime factor.
 f) If $|A|$=m and $|B|$=n, the find the number of relations defined from A to B?
 g) Let f ={(1,3),(2,4),(3,7)}, f ={(3,2),(4,3),(7,1)}.   Determine fog and gof.
 h) Draw the graph of $y = \log_a x$ on your answer sheet where $0 \leq a \leq 1$ and write its range.
 i) If $f(x)=\log_2 x$, then find $f^{-1}(x)$=?
 j) If $f\left(x + \dfrac{1}{x}\right) = x^2 + \dfrac{1}{x^2}, x \neq 0$, find f(x) = ?

2) Prove by method of induction that if $|A|$=n, then $|P (A)|=2^n$.
 or   Prove by induction that $4^{n+1} + 15n + 14$ is divisible by 9.

3) If $| A | = m$, $|B| = n$, then find :
 a) $| A \times B |$=?   c) $| P(A \times B) |$=?
 b) $| P (A) \times P (B) |$=?

4)   Suppose that in a class consist of a set S of 100 students, 70 of which pass in Mathematics and 60 in Physics. If no one failed in the both subjects, determine the number of students who passed in both subject?

5) : Let $f(x) = \sqrt{x}$ and $g(x) = x$ be two functions defined over the set of

nonnegative real numbers. find $(f + g)(x), (f - g)(x), (fg)(x)$, and $\left(\dfrac{f}{g}\right)(x)$.

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6) Let $A = \{1,2\}, B = \{1,2,3,4\}, C = \{5,6\}$ be sets, then verify that:

$$A \times (B \cap C) = (A \times B) \cap (A \times C)$$

7) Find the Domain and Range of the function $f(x) = \sqrt{9 - x^2}$

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