IIT-MAIN IIT-ADV NEET OLYMPIAD HOMIBHABHA KVPY

THE GURUKUL

PRACTICE JEE NEET SAT CENTRE PRIVATE LIMITED

HOMIBHABHA, KVPY, NTSE, OLYMPIADS

VIII, IX, X, XI, XII, CBSE, ICSE, HSC, SSC, IGCSE, IB

NSEJS RMO NTSE NSEP NSEC NSEB

MATHEMATICS-XI

Topic:-Set Relation Function

Date:-24.08.2014

Time:-90 Minutes

F.M.:- 35

Instruction: All questions are compulsory

P.M.:- 20

1. If $f(x) = \dfrac{x^2 - 3x + 1}{x - 1}$, find $f(-2) + f\left(\dfrac{1}{3}\right)$. **[2]**

2. Find the domain and the range of the function $f(x) = 3x^2 - 5$. Also find $f(-3)$ and the numbers which are associated with the number 43 m its range. **[2]**

3. If $f(x) = x^2 - 3x + 5$, find x such that $f(2x) = f(x)$ **[2]**

4. Find the domain and the range of the function $f(x) = \sqrt{x-1}$. **[2]**

5. Describe the following sets in Roster form: **[3]**
   (i) $\{x \mid x$ is a letter of the word 'MARRIAGE'$\}$.
   (ii) $\{x \mid x$ is an integer, $-\dfrac{1}{2} < x < \dfrac{9}{2}\}$.
   (iii) $\{x \mid x = 2n, n \epsilon N\}$.

6. If A, B, C are the sets of the letters in the words 'college', 'marriage' and 'luggage' respectively then verify that $[A - (B \cup C)] = [(A - B) \cap (A - c)]$. **[3]**

7. Describe the following sets in set –Builder form: **[3]**
   (i) $\{0\}$
   (ii) $\{0, \pm 1, \pm 2, \pm 3\}$
   (iii) $\left\{\dfrac{1}{2}, \dfrac{2}{5}, \dfrac{3}{10}, \dfrac{4}{17}, \dfrac{5}{26}, \dfrac{6}{37}, \dfrac{7}{50}\right\}$.

8. If A = {1, 2, 3, 4}, B = {3, 4, 5, 6}, C = {4, 5, 6, 7, 8} and universal set, X = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}, then verify the following: **[3]**
   (i) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
   (ii) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
   (iii) $(A \cup B)' = A' \cap B'$

9. If A = {x | $6x^2 + x - 15 = 0$}, B = {x | $2x^2 - 5x - 3 = 10$}, C = {x | $2x^2 - x - 3 = 0$}, then find (i)(A $\cup$ B $\cup$ C) (ii) (A $\cap$ B $\cap$ C). **[3]**

10. Let R be a relation from Q to Q defined by R={(a, b): a, b$\in$Q and a−b$\in$z,} show that (i) (a, a)$\in$R for all a$\in$Q (ii) (a, b) $\in$R implies that (b, a) $\in$R implies that (b, a)$\in$R (iii) (a, b) $\in$R and (b, c) $\in$R implies that (a, c) $\in$R. **[4]**

11. Draw the graphs of the following real functions and hence find their range **[4]**
    $f(x) = \dfrac{1}{x}, x \in R, x \neq 0$.

12. If $f(x) = x - \dfrac{1}{x}$, Prove that $[f(x)]^3 = f(x^3) + 3f\left(\dfrac{1}{x}\right)$. **[4]**