Q. 1. (A) Select and write the correct answer from the given alternatives in each of the following questions :   [3]

(iii)   Let $U = \{1, 2, 3, 4, 5, 6, 7, 8\}$ be the universal set and $A = \{1, 2, 3\}$, $B = \{5, 7\}$, then $A \cap B'$ is

(a) A (b) B (c) A' (d) B'

(ii) If A, B and C are non-empty subsets of a set, then $(A - B) \cup (B - A)$ equals

(a) $(A \cap B) \cup (A \cup B)$ (b) $(A \cup B) - (A \cap B)$

(c) $A - (A \cap B)$ (d) $(A \cup B) - B$

(iii)   If $f : R \to R$ is defined by $f(x) = x^2 - 1$, then the value of $f[f(1)]$ is

(a) 0   (b) -1 (c) 1   (d) -2

Q.1 (B) State whether the following statements are True / False :   [2]

(i) $f(x) = x^2 - \dfrac{1}{x^2}$. Then $f(x) + f\left(-\dfrac{1}{x}\right) = \ldots\ldots\ldots$

(ii) If $f(x) = x^2 + 2$ and $g(x) = 5x - 8$, then $\left(\dfrac{f}{g}\right)(0) = \ldots\ldots\ldots$

(iii)   If $A = \{x / x^2 - 2x + 1 = 0\}$, $B = \{x / x^2 + 2x - 3 = 0\}$, $C = \{x / x^2 - 6x + 5 = 0\}$, then $A \cap B \cap C = \phi$.

Q.2 Attempt any three of the following questions   [9]

1)   Describe the following sets in Roster form

i) $\{x/x \text{ is a letter of the word 'MARRIAGE'}\}$

ii) $\{x/x \text{ is an integer}, -\dfrac{1}{2} < x < \dfrac{9}{2}\}$

iii) $\{x/x = 2n, n \in N\}$

2.)   Let $A = \{1, 2, 3, 4\}$, $B = \{4, 5, 6\}$, $C = \{5, 6\}$.

Find   i) $A \times (B \cap C)$

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

3.)   Find x, if $g(x) = 0$ where

(a) $g(x) = \dfrac{5x - 6}{7}$ (b) $g(x) = \dfrac{18 - 2x^2}{7}$

4.) From amongst 2000 literate individuals of a town, 70% read Marathi newspapers, 50% read English newspapers and 32.5% read both Marathi and English newspapers. Find the number of individuals who read.

i) at least one of the newspapers.

ii) neither Marathi nor English newspaper.

iii) Only one of the newspapers.

Q.3 Attempt any one of the following(Activity) [3]

1. Complete the following activity.

$A = \{\frac{1}{3x} / x \in N \ \& \ x < 8\}$

$B = \{\frac{1}{2x} / x \in N \ \& \ x \leq 8\}$

Find $A \cup B$, $A \cap B$, $A - B$, $B - A$

Solution :

Write set A & set B in list form

$A = \{................\}$

$B = \{................\}$

For $A \cup B$, [consider all elements from A as well as B, don't repeat elements]

$\therefore \ A \cup B = \{....................\}$

For $A \cap B$, [Take all the elements that are common in A and B]

$\therefore \ A \cap B = \{....................\}$

For $A - B$ [Take all the elements that are present in A but not in B]

$\therefore \ A - B = \{....................\}$

$B - A = \{....................\}$

2. $U = \{1,2,3,4,5,6,7,8\}$

$A = \{1,2,3,4,,5\}$ $, A' = \{................\}$

$B = \{4,5,6,7,8\}$ $, B' = \{................\}$

Complete the following activity.

A∪B = {......................}, n(A∪B) = ☐

A–B = {......................}, n(A–B) = ☐

B–A = {......................}, n(B–A) = ☐

A∩B = {......................}, n(A∩B) = ☐

i) $n(A–B) + n(A∩B) + n(B–A)$

= ☐ + ☐ + ☐

= ☐

ii) A∩B' = {......................}

A∩B' = A–B

iii) A'∩B = {......................}

A'∩B = B–A

Q.4 Attempt any two of the following   [8]

1.) If $f(x) = 2x^2 + 3$, $g(x) = 5x – 2$, then find

(a) $f \circ g$ (b) $g \circ f$

(c) $f \circ f$ (d) $g \circ g$

2.) If $f(x) = 3x + 5$, $g(x) = 6x – 1$, then find

(a) $(f+g)(x)$ (b) $(f–g)(2)$

(c) $(fg)(3)$ (d) $(f/g)(x)$ and its domain.

3.) 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:

i) $A∪(B∩C) = (A∪B)∩(A∪C)$

ii) $A∩(B∪C) = (A∩B)∪(A∩C)$