

## Assignment No. 1

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Div - A Roll no - 8

Sub - Data Structures Lab.

Aim: To study & understand the concept of python.

Problem definition:

In second year, computer engineering class, group A students play cricket, group B students play badminton and group C students play football. Write a python program using functions to compute following -

- List of students who play both cricket & badminton
- List of students who play either cricket or badminton but not both
- Number of students who play neither cricket nor badminton
- Number of students who play cricket & football but not badminton.

Learning objectives:

To understand basic techniques & strategies of algorithm using concepts of python

Learning outcomes:

Students will be able to use algorithms on various linear data structure using sequential organization to solve real life problems.



Theory:

Python:

Python is a high-level, interpreted, interactive & object-oriented scripting language. Python is designed to be highly readable. It uses English keywords frequently where as other languages use punctuation, and it has fewer syntactical constructions than other languages.

Set Operations:

We have to perform here different set operations like Union, Intersections, Difference, Symmetric Difference.

Universal set  $U$ :

Often a discussion involves subsets of some particular set called the universe of discourse, universal set or space. The elements of a space are often called the points of the space. We denote the universal set by  $U$ .

Example. The set of all even integers could be considered a subset of a universal set consisting of all the integers. Or they could be considered a subset of a universal set consisting of all the rational numbers. Or of all the real numbers.

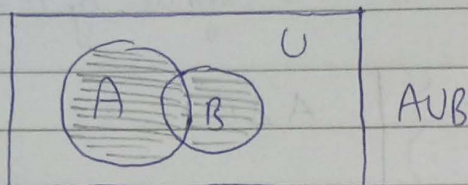
Often the universal set may not be explicitly stated & it may be unclear as to just what it is. At other times it will be clear.

1. Union Operations:- In set theory the union of collection of sets ~~is~~ is the set of all distinct elements in the collection. The union of two sets  $A$  &  $B$  is the set consisting of all elements in the  $A$  plus all elements in  $B$  & is denoted by  $A \cup B$  or  $A + B$ .



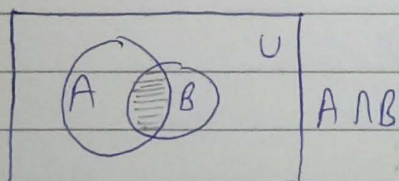
Example: If  $A = \{a, b, c, d\}$  &  $B = \{b, c, e, f, g\}$  then

$$A \cup B = \{a, b, c, d, e, f, g\}$$



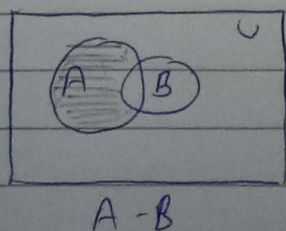
2. Intersection operation: In set theory intersection is a operation where we collect common elements of different sets. The intersection of two sets  $A$  &  $B$  is the set consisting of all elements that occur in both  $A$  &  $B$ . It is denoted by  $A \cap B$ ,  $A \cdot B$  or  $AB$ .

Example: If  $A = \{a, b, c, d\}$  &  $B = \{b, c, e, f, g\}$  then  $A \cap B = \{b, c\}$



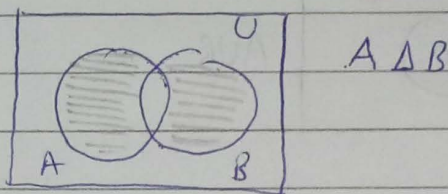
3. Difference Operation: It is a generalization of the idea of the compliment of sets & as such is sometimes called the relative compliment of  $T$  with respect to  $S$  where  $T$  &  $S$  are two sets. The set consisting of all elements of a set  $A$  that do not belong to a set  $B$  is called the difference of  $A$  &  $B$  & denoted by  $A - B$ .

Example. If  $A = \{a, b, c, d\}$  &  $B = \{b, c, e, f, g\}$  then  $A - B = \{a, d\}$





4. Symmetric Difference: The symmetric difference between two sets  $S$  &  $T$  is the union of  $S-T$  &  $T-S$ . The symmetric difference using Venn diagram of two subsets  $A$  &  $B$  is a subset of  $U$ , denoted by  $A \Delta B$  & is defined by  $A \Delta B = (A-B) \cup (B-A)$



Input: Enter the total number of students in class, also enter the student who plays cricket, badminton & football.

Output: Union, intersection, set difference of entered students.

Algorithm / Pseudo code:

1. Function for union:

```
def find_union_set(A, B, C):
    for i in range(len(A)):
        C.append(A[i])
    for i in range(len(B)):
        flag = search_set(A, B[i]);
        if (flag == 0):
            C.append(B[i])
```

2. Function for Intersection:

```
def find_intersection_set(A, B, C):
    for i in range(len(A)):
        flag = search_set(B, A[i]);
        if (flag == 1):
            C.append(A[i])
```



### 3. Function for Difference :

```
def find_difference_set(A,B,C):  
    for i in range(len(A)):  
        flag = search_set(B, A[i]);  
        if (flag == 0):  
            C.append(A[i])
```

Software required: Open source Python, Programming tool like Jupyter Notebook, Pycharm, Spyder.

Conclusion: Thus, we have studied use of set operations using python.