VNIT Nagpur
CPL Lab
Assignment 4
Maximum Marks: 10 (Could be scaled later)

Hard Deadline : Online submission 31st May, midnight

An abstract data structure is a collection, or aggregate, of data. The data may be booleans, numbers, characters, strings or other data structures.

In computer science, a **set** is an abstract data type that can store unique values, without any particular order. Sets are of two types: Static and dynamic.

Typical operations that may be provided by a static set structure *S* are:

- is_element_of(*x*,*S*): checks whether the value *x* is in the set *S*.
- is_empty(*S*): checks whether the set *S* is empty.
- size(*S*) or cardinality(*S*): returns the number of elements in *S*.
- enumerate(*S*): returns a list containing the elements of *S* in some arbitrary order.
- build(x_1,x_2,…,x_n,): creates a set structure with values x_1,x_2,…,x_n.

In addition to all above operations, dynamic set structures typically add:

- create(): creates a new, initially empty set structure.
- add(*S*,*x*): adds the element *x* to *S*, if it is not present already.
- remove(*S*, *x*): removes the element *x* from *S*, if it is present.

Following operations should be supported on two sets.

- union(*S*,*T*): returns the union of sets *S* and *T*.
- intersection(*S*,*T*): returns the intersection of sets *S* and *T*.
- difference(*S*,*T*): returns the difference of sets *S* and *T*.
- subset(*S*,*T*): a predicate that tests whether the set *S* is a subset of set *T*.4

Implement a set data structure using a hash table. For this assignment, you can consider a set of strings.

Programming language to be used: C, C++.