BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI (RAJ.)

CS F111 Computer Programming

LABORATORY SESSION #9

(Structures, recursion)

Define Structures

Syntax of struct

```
struct structureName {
  dataType member1;
  dataType member2;
  ...
};
```

Example,

```
struct Person {
  char name[50];
  int citNo;
  float salary;
};
```

Create struct Variables

```
struct Person {
  // code
};
int main() {
  struct Person person1, person2, p[20];
  return 0;
}
```

Access Members of a Structure

```
person2.salary
```

Example,

```
#include <stdio.h>
#include <string.h>
```

```c
// create struct with person1 variable
struct Person {
  char name[50];
  int citNo;
  float salary;
} person1;

int main() {
 // assign value to name of person1
  strcpy(person1.name, "George Orwell");
// assign values to other person1 variables
  person1.citNo = 1984;
  person1. salary = 2500;
  // print struct variables
  printf("Name: %s\n", person1.name);
  printf("Citizenship No.: %d\n", person1.citNo);
  printf("Salary: %.2f", person1.salary);

  return 0;
}
```

Practice Exercise

1 Write a program to create a structure named company which has name, address, phone and noOfEmployee as member variables. Read name of company, its address, phone and noOfEmployee. Finally display these members‟ value.

2 Define a structure “complex” (typedef) to read two complex numbers and perform addition, subtraction of these two complex numbers and display the result.

3

```c
#include <stdio.h>
int main()
{
   int i = 7;
   int arr[5] = {i, 2*i, 3*i}, *pa, *pb;
   pa = &arr[0];
   pb = arr+4;
   for (i = -4; i <= 0; ++i)
      printf("%d, ",pb[i]); /* negative array index! */
   putchar('\n');

   printf("pb - pa = %ld\n", pb-pa); /* pointer subtraction
*/
   return 0;
```

```
14 }
```

Several interesting concepts are illustrated in the above program.

(a) What aspects of array initialization are illustrated (lines 5, 9)? Write in your lab notebook.

(b) What aspects of pointer arithmetic are illustrated (lines 9, 12)? Record them.

(c) Try subtracting two pointers of different data types (e.g., `char *` and `int *`). Try adding two pointers of the same type; multiplying; adding a floating point number to a pointer. Write down which of these the compiler permits.

4 It is required to write a program for an ATM machine which dispenses currency notesin denominations of Rs. 2000, Rs. 500, and Rs. 100. The user is asked to enter the desired amount (a multiple of 100) and the ATM machine dispenses this amount usingminimum number of notes.

(a) Write a C program that uses a function `void get_denominations(int)` that computes the minimum number of notes required ofeach denomination for desired amount and stores them in external/global variables`no_of_2000`, `no_of_500`, and `no_of_100`. The `main()` function should then print out these values.

(b) Suppose the three variables are not global, but declared within `main()`. Write a modified function with the name `get_denominations2()` and use it in `main()` to print out the values.