Bihar Engineering University, Patna

B.Tech. 1st Semester Examination, 2023

Course: B.Tech. *Time: 03 Hours*

Code: 100104 *Subject: Programming for Problem Solving* *Full Marks: 70*

Instructions:-

(i) The marks are indicated in the right-hand margin.
(ii) There are NINE questions in this paper.
(iii) Attempt FIVE questions in all.
(iv) Question No. 1 is compulsory.

Q.1 ***Choose the correct answer of the following (Any seven question only):*** **[2 x 7 = 14]**

(a) What is the output of the following code?

```
int x = 10;
x++;
printf("%d", x);
```

(i) Error (ii) 10 (iii) 11 (iv) 9

(b) Which function is used to dynamically allocate memory in C?

(i) malloc() (ii) calloc() (iii) realloc() (iv) all of the above

(c) What is the output of the following code?

```
#include<stdio.h>
int main() {
char *p = 0;
*p = 'a';
printf("%c", *p);
return 0;}
```

(i) It will print 'a' (ii) It will print 0 (iii) Compile time error (iv) Runtime error

(d) What are the elements present in the array of the following C code?

```
int array[6] = {5};
```

(i) 5, 5, 5, 5, 5, 5 (ii) 5, 0, 0, 0, 0, 0

(iii) 6, 6, 6, 6, 6, 6 (iv) (garbage), (garbage), (garbage), (garbage), (garbage), 5

(e) What will be the output of the following C code?

```
void main(){
int i = 0;
while (i < 10){
i++;
printf("hi\n");
while (i < 8){
i++;
printf("hello\n");}}}
```

(i) hi is printed 8 times, hello 7 times and then hi 2 times

(ii) hi is printed once, hello 7 times

(iii) hi is printed once, hello 7 times and then hi 2 times

(iv) None of the above.

(f) What does the following declaration mean?

```
int (*ptr) [10];
```

(i) ptr is array of pointers to 10 integers. (ii) ptr is a pointer to an array of 10 integers.

(iii) ptr is an array of 10 integers. (iv) ptr is a pointer to array of 10 characters.

(g) C is _____ type of programming language?

(i) Object Oriented (ii) Procedural

(iii) Bit level language (iv) Functional

(h) Choose the right C statement.

(i) int my_age = 10; (ii) int my,age = 10;

(iii) my age = 10; (iv) All are correct

(i) Consider the following integer 2D array, which is stored in memory with the base address 1400. What would be the address of the element 14? [Assume that an integer value takes 4 bytes of memory space.]

```
int a[3][5]={{1,2,3,4,5},{6,7,8,9,10},{11,12,13,14,15}};
```

(i) 1440 (ii) 1444 (iii) 1448 (iv) 1452

(j) Consider the following declaration of the variables:

```
int x, A[5][6], *p=&A[0][0];
```

Which of the following is/are the correct expression(s) to access A[3][5] and assign it to x?

(i) x=*(p+23); (ii) x=*(p+28); (iii) x=*(*(A+5)+3); (iv) x=*(*(A+3)+5);

Q.2 (a) Explain the difference between auto and static type storage variables with suitable example codes. [7]

(b) Differentiate between structures and unions in C. Write a C program to detect whether the computer is little endian or big endian using unions. [7]

Q.3 (a) Write an efficient C program to search if the integer 24 is present in the given sorted array or not. If it is present, print the index where it is found. [7]

(b) Explain the insertion sort algorithm and its steps using an example. Consider the array: [5, 2, 4, 6, 1, 3]. [7]

Q.4 (a) Describe the concept of pointers in C programming language. Explain how pointers work and discuss their importance in programming, particularly in memory management and efficient data manipulation. [7]

(b) Write a C program to copy contents of one file to another. While doing so replace all lowercase characters to their equivalent uppercase characters. [7]

Q.5 (a) Write a C Program to find the Euclidian distance between two points P(x, y) and Q(a, b) using structure representation of points P and Q. [7]

(b) Differentiate between call-by-value and call-by-reference with suitable examples. [7]

Q.6 (a) Define arrays in C and explain their declaration and usage. Write a C program to reverse the content of an integer array without using auxiliary array. [7]

(b) Define implicit and explicit type casting in C. Provide code examples illustrating when each type of casting occurs and their potential side effects. [7]

Q.7 (a) Explain the concept of nested loops. Describe how the **break** and **continue** statements alter the flow of control within C loops. [7]

(b) Explain the concept of algorithmic complexity and its significance in computer science. Using examples, illustrate how different algorithms exhibit various orders of complexity, such as constant time (**O(1)**), linear time (**O(n)**), logarithmic time (**O(log n)**), quadratic time (**O(n^2)**), and exponential time (**O(2^n)**). [7]

Q.8 (a) The first 6 numbers of the Fibonacci series are: 0 1 1 2 3 5. Write a C program using recursion to find and print the Fibonacci series for first *n* terms. [7]

(b) Write a C program using recursion to find factorial of a given number *n*. [7]

Q.9 (a) Write a C program for the following: [7]

(i) Reverse a string without using strrev().

(ii) Concatenate two strings without using strcat().

(b) Write a C program to find result matrix after multiplying two given matrices using 2-D arrays. Check the multiplication criteria also while deriving the logic. [7]