

END TERM EXAMINATION

FIRST SEMESTER [B.TECH] MARCH 2023

Paper Code: ES-101

Subject: Programming in 'C'

Time: 3 Hours

Maximum Marks: 75

Note: Attempt five questions in all including Q. No.1 which is compulsory. Select one question from each unit. Scientific calculators are allowed.

Q1 Attempt the following questions:- (2.5x6=15)

- (a) Write a program in C to store elements in an array and print it.
- (b) What is a generic pointer. What is the size of a generic pointer for a system of 16-bits, 32 bits and 64-bits?
- (c) What is structure in C. How is it different from a Union. Explain with example how to create a structure and Union in C.
- (d) What is recursion? How is it different from iteration? Explain with the help of an example.
- (e) Find the output of the following program:

```
#include <stdio.h>
int main() {
    int var1 = 9, var2 = 9;
    printf("%d\n", var1++);
    printf("%d\n", ++var2);
    return 0;
}
```
- (f) What is file data structure? Give the syntax to open a file in C. What does the value of mode - 'r', 'w' and 'a' represent. Write the syntax for reading or writing a character in a file. What is returned if file does not get opened.

UNIT-1

Q2 (a) What would be the output obtained from the following four programs in C given below? (8)

(i)

```
#include <stdio.h>
int main()
{
    int p, q, r;
    p = 8 > 5 > 2;
    q = 8 > 5 > 0;
    r = 8 > 5 > 1;
    printf("%d %d %d", p, q, r);
    return 0;
}
```

(ii)

```
#include <stdio.h>
main() {
    int p = 21;
    int q = 10;
    int z;
    z = p + q;
    printf("Line 1 - Value of z is %d\n", z);
    z = p - q;
    printf("Line 1 - Value of z is %d\n", z);
    z = p * q;
    printf("Line 1 - Value of z is %d\n", z);
    z = p / q;
```

P.T.O.

```

printf("Line 1 - Value of z is %d\n", z );
z = p % q;
printf("Line 1 - Value of z is %d\n", z);
z = p++;
printf("Line 1 - Value of z is %d\n", z );
z = p-;
printf("Line 1 - Value of z is %d\n", z );
}

```

(iii) `#include <stdio.h>`
`int main()`

```

{
    int x;
    x = 10;
    if(x > 10)
        x -= 10;
    else if(x >= 0)
        x += 00;
    else if(x)
        x += 10;
    else
        x -= 10;

    printf("%d\n",x);
    return 0;
}

```

(iv) `#include <stdio.h>`

```

int main()
{
    unsigned char a=0xFA;
    a = (a>>4) | (a<<4);
    printf("a = %02X\n",a);
    return 0;
}

```

- (b) Explain with the help of an example the differences between: (7)
 (i) arithmetic, relational and logical operators.
 (ii) compiler, linker and preprocessor

OR

- Q3 (a) Write down the basic structure of a C program? What is the process of compiling and running a C program. What are C tokens? What is the difference between constant and a variable. (8)
 (b) What is an operand? What is an operator? Write a program in C for the following: (7)
 (i) if A is greater than 50, 0 is returned else 1 is returned.
 (ii) To return the number of bytes occupied by the operand which is integer.

UNIT-II

- Q4 (a) What is a string? What is the difference between a character array and a string? Write a program in C to demonstrate the following operations: (10)

- (i) declare a string
- (ii) different ways in which a string can be initialized
- (iii) read a string
- (iv) print a string

Please give proper comments in your program.

P.T.O.

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(b) What is the output of the following two programs in C:

(5)

```
(i) #include <stdio.h>
    #include <string.h>
    int main()
    {
        char str[20] = "ABCDEFGHJK";
        int s = strlen(str);
        str[3] = '\0';
        s += strlen(str);
        strcpy(str, "ABCDEF");
        s += strlen(str);
        strcat(str, "ABC");
        s += strlen(str);
        printf("%d\n", s);
        return 0;
    }
```

```
(ii) #include <stdio.h>
    int main()
    {
        unsigned char a=0xFA;
        char loop;
        for(loop=7; loop>=0; loop--)
            printf("%d ", (a & (1<<loop)) ? 1:0);
        printf("\n");
        return 0;
    }
```

OR

- Q5 (a) What is the difference between: (8)
- for and while loop
 - call by value and call by reference
- (b) Define array. How do we access elements in an array? Write at least four characteristics of an array. Write one scenario where you will use one dimensional array. Write another scenario where you will use multi-dimensional array. (7)

UNIT-III

- Q6 (a) Write a program in C to demonstrate the use of & (address of) and *(value at address) operator. What is the output of following program? (7)

```
# include <stdio.h>
void sun(int *ptr)
{
    *ptr = 50;
}

int main()
{
    int y = 20;
    sun(&y);
    printf("%d", y);
    return 0;
}
```

P.T.O.

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- (b) What is a structure? Is nested structure possible? What will happen when the following code is executed? What changes are required in the following code if there are 50 persons. (8)

```
struct Person {
    } person1, person2, p[20];
```

OR

- Q7 (a) Explain the usage of typedef and enumerations with appropriate examples. (5)
 (b) Write a program in C to show the basic declaration of pointer. (5)
 (c) Create a structure called 'Student' in C that can store name of a student, his age, his marks and date of birth. Then write a program to store data of 100 students using this structure called 'Student'. (5)

UNIT-IV

- Q8 (a) What do you mean by Linear and Binary Search? Given an array of integers nums that is sorted in ascending order, and an integer target, write a function to search target in nums. If target exists, then return its index. Otherwise, return -1. (7)
 (b) Write a program to find factorial of a number in C: (8)
 (i) using for loop
 (ii) using function
 (iii) using pointers
 (iv) using while loop

OR

- Q9 (a) What are standard libraries in C language? What are their advantages? Explain the function of the following: (6)

- (i) stdio.h
- (ii) time.h
- (iii) math.h
- (iv) assert.h

- (b) What is Insertion sort. Write a C program for insertion sort to arrange numbers of an array in ascending order. Also write another program that will arrange numbers in descending order. What is the best case, average case and the worst case complexity of insertion sort? (6)
 (c) What is the output of the following program: (3)

```
#include <stdio.h>
int main()
{
    int a=10,b=20,*p,s=0;

    p = &a;
    a++;
    (*p)++;
    s = a + b + *p;

    printf("%d\n",s);
    return 0;
}
```
