Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

B.Tech Mid Term-I Examination 2022-23

Semester/Session: I Sem/ Group-1 **Branch: CS, DS,CE, ME**

Subject: PPS **Subject Code: 1FY3-06**

Time: 1½ Hours **Maximum Marks: 20**

Note: - Attempt all three questions from **Part A**, selecting two questions from **Part B** and one question from **Part C**.

Part A (All question compulsory) **3*2=6**

Q.1. Explain Break and Continue with example.

Q.2. What is difference for and do while loops?

Q.3. What do you mean by formal parameter and actual parameter in C?

Part B (Attempt any two question) **2*4=8**

Q.1 Explain different types of operator with an example?

Q.2 What do you mean by recursion function? Write a C program to print natural numbers in reverse from n to 1.

Q.3 Write a program to read a character and check character is vowel or not using switch case.

Part C (Attempt any one question) **1*6=6**

Q.1. What is function? Explain the function prototype. Write a program to calculate factorial of a number using recursion.

Q.2 Write a program to print the following patterns (both).

I)
```
1
21
321
4321
```

II)
```
*
**
***
****
```

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Solution of Question Paper

I Mid-Term Examination,December. -2022

Branch/Semester: CSE/DS/ME/CE I Semester	Subject: Programming for Problem Solving	Subject Code: 1FY3-06
Duration: 1.5 hours	Date: 21/12/2022 Session (I/II/III):II	Max Marks: 20
Submitted By: Shirish Nagar, Neeraj Gupta, Anoop Kumar Mehta, Palika Jajoo, Shalini Pathak		

PART A (short-answer type questions)

(All questions are compulsory) **(3*2=6)**

Q1. Explain Break and Continue with example? **[2]**

Ans:

Break : The break statement terminates or ends the smallest enclosing loop (i.e., **while**, do-while, for loop, or switch statement)

Example: The below program the inner for loop always ends when the value of the variable **j** becomes **2**

```
#include <stdio.h>
int main()
{
        int i = 0, j = 0;
        for (int i = 0; i < 5; i++) {
                printf("i = %d, j = ", i);
                for (int j = 0; j < 5; j++) {
                        // Break Statement
                        if (j == 2)
                                break;
                        printf("%d ", j);
                }
                printf("\n");
        }
        return 0;
}
```

Continue: This statement skips the rest of the loop statement and starts the next iteration of the loop to take place. Example: In the below program the inner for loop always skip the iteration when the value of the variable **j** becomes **2**.

```
#include <stdio.h>
int main()
{
        int i = 0, j = 0;
        for (int i = 0; i < 5; i++) {
                printf("i = %d, j = ", i);
                for (int j = 0; j < 5; j++) {
                        if (j == 2)
                                continue;
                        printf("%d ", j);
                }
                printf("\n");
        }
        return 0;
}
```

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Q2. What is difference for and do while loops? **[2]**

Ans:

For loop	Do-While loop
Statement(s) is executed once the condition is checked.	Condition is checked after the statement(s) is executed.
It might be that statement(s) gets executed zero times.	Statement(s) is executed at least once.
For the single statement, bracket is not compulsory.	Brackets are always compulsory.
Initialization may be outside or in condition box.	Initialization may be outside or within the loop.
for loop is entry controlled loop.	do-while is exit controlled loop.
for (init ; condition ; iteration) { statement (s); }	do { statement(s); } while (condition);

Q3. What do you mean by formal parameter and actual parameter in C? **[2]**

There are different ways in which parameter data can be passed into and out of methods and functions. Let us assume that a function *B()* is called from another function *A()*. In this case *A* is called the ***"caller function"*** and *B* is called the ***"called function or callee function"***. Also, the arguments which *A* sends to *B* are called *actual arguments* and the parameters of *B* are called *formal arguments*.

Formally,

Formal Parameter: A variable and its type as they appear in the prototype of the function or method.

Actual Parameter: The variable or expression corresponding to a formal parameter that appears in the function or method call in the calling environment.

PART B (Analytical/Problem solving questions)

(Attempt any 2 Questions) **(2*4=8)**

Q.1 Explain different types of operator with an example. **[4]**

In C, there are various types of operators available to perform various operations. Following are the list of operators present in C:-

1. Arithmetic Operators in C

The purpose of this operator is to perform mathematical operations like addition, subtraction, division, multiplication etc.

Operator	Functionality	Example
+	Addition between 2 operands.	A + B = 10

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–	Subtraction between 2 operands.	A – B = 0
*	Multiplication between 2 operands.	A * B = 25
/	Division between 2 operands.	B / A = 1
%	Modulus Operator and remainder of after an integer division.	B % A = 0

2. Increment / Decrement Operators

Operator	Functionality	Example
++	Increases the integer value by one.	A++ = 6
—	Decreases the integer value by one.	B– = 4

3. Assignment Operators: The purpose of this operator is to assign value to a variable. The most used assignment operator is "=".

Operator	Example
=	a=b or b=a
+=	a += b or a = a+b
-=	a -=b or a = a-b
*=	a *= b or a = a*b
/=	a /= b or a = a/b
%=	a %= b or a = a%b

4. **Relational Operators in C:** These operators are mainly used for checking relationships between operands. With the help of this operator, you can check whether one operand is equal to or greater than the other operand or not. It returns 1 when the relation is true. And when it is false, it returns 0.

Operator	Functionality	Example
==	Equal to	5==5 will be 1
>	Greater than	5>6 will be 0
<	Less than	6<7 will be 1
>=	Greater than equal to	2 >= 1 will be 1
<=	Less than equal to	1 <= 2 will be 1
!=	Not equal to	5 != 6 will be 1

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5. Logical Operators in C: Logical operators are mostly used for decision making. A logical operator returns either 0 or 1 whether the condition is true or false.

Operator	Functionality
&& (Logical AND)	True only if all conditions satisfy.
|| (Logical OR)	True only if either one condition satisfies.
! (Logical Not)	True only if the operand is 0.
^ (Logical XOR)	True if operands are unequal, False otherwise

6. ***Conditional Operator in C:*** *Also known as Ternary operator. The main purpose of conditional operators is in decision making statements. It is similar to an if-else statement.*

Syntax of a conditional operator:- **Expression1? statement1: statement2;**

- Expression1 is a Boolean expression; it can be either true or false.
- If the Expression1 returns true then statement1 will get executed.
- If the Expression1 returns false then statement2 will get executed.

Q.2 What do you mean by recursion function? Write a C program to print natural numbers in reverse from n to 1? **[4]**

Ans. A Recursive function is a function which calls itself from its previous value to generate subsequent value. This function calls itself during its execution. When a recursive procedure gets repeated, it is called **recursion.**

```
// C program to all natural numbers in reverse from n to 1

#include <stdio.h>
int main()
{
    int i, n;
    printf("Enter starting value n: ");
    scanf("%d", &n);

// Run loop from n to 1 and decrement 1 in each iteration

    for(i=n; i>=1; i--)
    {
        printf("%d\n", i);
    }
    return 0;
}
```

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Q3. Write a program to read a character and check character is vowel or not using switch case? [4]

```c
// C program to check vowel or consonant using switch case

#include <stdio.h>
int main()
{
    char ch;

    /* Input an alphabet from user */

    printf("Enter any alphabet: ");
    scanf("%c", &ch);

    /* Switch value of ch */
    switch(ch)
    {
        case 'a':
        case 'e':
        case 'i':
        case 'o':
        case 'u':
        case 'A':
        case 'E':
        case 'I':
        case 'O':
        case 'U':
            printf("Vowel");
            break;
        default:
            printf("Consonant");
    }
    return 0;
}
```

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PART C (Descriptive/Analytical/Problem solving/Design questions)

(Attempt any 1 Question) **(1*6=6)**

Q1. What is function? Explain the function prototype? Write a program to calculate factorial of a number using recursion. **[6]**

Functions in C are the basic building blocks of a C program. A function is a set of statements enclosed within curly brackets ({}) that take inputs, do the computation, and provide the resultant output. We can call a function multiple times, thereby allowing reusability and modularity in C programming. It means that instead of writing the same code again and again for different arguments, we can simply enclose the code and make it a function and then call it multiple times by merely passing the various arguments.

Function Prototype:

A function prototype or function declaration refers to a declaration of the function that informs the program regarding the type of value returned. Furthermore, this value is returned by the function, number, and type of arguments. This prototype refers to a declaration of a function that specifies the type signature and the function's name.

A function declaration has the following parts –

return_type function_name(parameter list);

Program to calculate factorial of a number using recursion.

```
#include<stdio.h>
long int fact(int n);
int main() {
    int n;
    printf("Enter a positive integer: ");
    scanf("%d",&n);
    printf("Factorial of %d = %ld", n,
fact(n));
    return 0;
}
long int fact(int n) {
    if (n>=1)
        return n*fact(n-1);
    else
        return 1;
}
```

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Q2. Write a program to print the following patterns **[6]**

(I)
1
21
321
4321

```
#include <stdio.h>
int main() {
   int i, j, rows;
   printf("Enter the number of rows: ");
   scanf("%d", &rows);
   for (i = 1; i <= rows; ++i) {
      for (j = i; j >= 1; --j) {
         printf("%d ", j);
      }
      printf("\n");
   }
   return 0;
}
```

(II)
*
**
***
****

```
#include <stdio.h>
int main() {
   int i, j, rows;
   printf("Enter the number of rows: ");
   scanf("%d", &rows);
   for (i = 1; i <= rows; ++i) {
      for (j = 1; j <= i; ++j) {
         printf("* ");
      }
      printf("\n");
   }
   return 0;
}
```