A3-R3: PROGRAMMING AND PROBLEM SOLVING THROUGH 'C' LANGUAGE

NOTE:

1.	There are **TWO PARTS** in this Module/Paper. **PART ONE** contains **FOUR** questions and **PART TWO** contains **FIVE** questions.
2.	**PART ONE** is to be answered in the **TEAR-OFF ANSWER SHEET** only, attached to the question paper, as per the instructions contained therein. **PART ONE** is **NOT** to be answered in the answer book.
3.	Maximum time allotted for **PART ONE** is **ONE HOUR**. Answer book for **PART TWO** will be supplied at the table when the answer sheet for **PART ONE** is returned. However, candidates, who complete **PART ONE** earlier than one hour, can collect the answer book for **PART TWO** immediately after handing over the answer sheet for **PART ONE**.

TOTAL TIME: 3 HOURS   **TOTAL MARKS: 100**
                                                          (PART ONE – 40; PART TWO – 60)

PART ONE
(Answer all the questions)

1. **Each question below gives a multiple choice of answers. Choose the most appropriate one and enter in the "tear-off" answer sheet attached to the question paper, following instructions therein.** **(1x10)**

1.1 Physically placing the machine instructions and data into main memory is done by
A) Linker
B) Loader
C) Code Generator
D) Interpreter

1.2 Choose the option that contains only Unary operators of C.
A) sizeof, (type conversion)
B) short hand operator, &
C) increment(++), >=, !
D) ==, !=

1.3 Which of the following is true for break and continue statements.
A) break transfers control out of loop, continue bypasses the remaining statements of loop.
B) break bypasses the remaining statements of loop, continue transfers control out of loop
C) both have same function
D) none of the above

1.4 To print whether the number is odd or even, choose the correct option.
A) `(a/2==0)?printf("Odd")::printf("Even");`
B) `(a%2==0)?printf("Odd"):printf("Even");`
C) `(a%2==1)?printf("Odd"):printf("Even");`
D) `(a/2==1)?printf("Even"):printf("Odd");`

1.5 What is the effect of the following code:
```
main() { int a[4] = {1,5};
         printf("%d", a[3]); }
```
A) 0
B) Syntax error because of improper initialization
C) 5
D) Syntax error because of invalid index

1.6   What will be the output of the following code?

```
main() { int a,b,c;
        a=1,b=10,c=2;
        for( ;c<3;c++);
        for( ;a<9,b>6;a++,b--)
        printf("%d",c);
    }
```

A)   Infinite 2 2 2 ……
B)   3 3 3 3
C)   2 2 2 2
D)   Infinite times 4 4 4 …

1.7   Which is the correct option for the following code?

```
main()  { char *str1="hello", *str2="hello";
        if(str1==str2)
            printf("equal");
        else
        printf("unequal");    }
```

A)   Output is **equal**
B)   Syntax error
C)   Error because two pointers cannot be compared
D)   Output is **unequal**

1.8   Maximum value of an unsigned integer is
A)   65535
B)   32767
C)   -32767
D)   -65535

1.9   The keyword **typedef** is used to
A)   create a type of function
B)   define the type of function
C)   define the type of a variable
D)   create a new data type name

1.10   For the following definition, which of the given option is correct?
```
       int a[10];
```
A)   a++;
B)   a=a+1;
C)   *a++;
D)   *a[1];

2. **Each statement below is either TRUE or FALSE. Choose the most appropriate one and ENTER in the "tear-off" sheet attached to the question paper, following instructions therein.** **(1×10)**

2.1   By default, return type of any user-defined function is void.

2.2   In else…if ladder, the else statement at last is optional.

2.3   There must be only one `main( )` function in a program.

2.4   There is only one ternary operator in 'C' which is Conditional operator.

2.5   `int a[ ]={4};` this statement allocates 4 bytes of memory.

2.6   `Float_int (float, float);` is an invalid function prototype.

2.7   `printf( )` is a user-defined function declared in `stdio.h` file.

2.8   When an array is declared, name of array works as a constant pointer to base address.

2.9   Every string ends with character '\&'.

2.10   If file can not be opened, `fopen( )` returns Null pointer.

3. **Match words and phrases in column X with the closest related meaning/ word(s)/ phrase(s) in column Y. Enter your selection in the "tear-off" answer sheet attached to the question paper, following instructions there in. (1 × 10)**

	X		Y
3.1	It is also known as preprocessor compiler directive	**A.**	bound checking
3.2	Arguments, passed when function is called, is referred to as	**B.**	actual parameter
3.3	This operator is also known as dereferencing operator	**C.**	sizeof
3.4	It is the default storage class of any variable	**D.**	<<
3.5	This is the loop which must have semicolon at the end	**E.**	typedef
3.6	For an array, C does not provide this facility	**F.**	diamond
3.7	To represent condition in flowchart this symbol is used	**G.**	#define
3.8	When the size of array is not known in advance, this concept is used to store data	**H.**	Entry-controlled loop
3.9	It is the only keyword which is also an operator	**I.**	Indirection operator
3.10	Symbol of bitwise shift left operator	**J.**	do while
		K.	&
		L.	integer
		M.	>>
		N.	runtime initialization
		O.	auto
		P.	enum
		Q.	linked list
		R.	rectangle

4. Each statement below has blank space to fit one of the word(s) or phrase(s) in the list below. Enter your choice in the "tear-off" answer sheet attached to the question paper, following instructions there in. **(1×10)**

A.	break	**B.**	two	**C.**	one
D.	static	**E.**	structure	**F.**	global
G.	indirection	**H.**	type casting	**I.**	auto
J.	free	**K.**	array	**L.**	fseek
M.	continue	**N.**	fprintf	**O.**	malloc
P.	&	**Q.**	new	**R.**	fscanf

4.1 In switch statement, one of the optional key word is _____.

4.2 _____ is used to construct user defined data type using the existing ones.

4.3 _____ is used to skip body of the loop once.

4.4 To convert one data type into another for the evaluation purpose is called _____.

4.5 In for loop, initialization is done _____ time(s).

4.6 _____ operator is used to access the value of a variable using pointer.

4.7 _____ variable can be accessed by all the functions in the program.

4.8 _____ uses a single name to represent a collection of items of same type.

4.9 Using _____ function, we can write data to file.

4.10 _____ function is used to allocate memory at run time.

PART TWO
(Answer any **FOUR** questions)

5.
a) Explain the structure of a 'C' program.
b) Define recursion. Write a program to find a^n, where **a** is in float and **n** can be any positive or negative integer. Define a recursive function power() to perform the operation.
c) Draw a flow chart to find largest number from the three numbers.

(5+7+3)

6.
a) Write a program that takes a positive integer as input. If input is negative print appropriate message and prompt the user to enter positive number until correct input is received. For positive number, print its individual digit in words. For example, if input is 2694 then output should be: "Two Six Nine Four".
b) Differentiate between structure and union.
c) What is pointer? Explain scale factor of a pointer using example.

(10+3+2)

7.
a) How is an array passed as an argument to a user-defined function? Explain with suitable example.
b) Write a program to print all multiples of **p** up to number **n**. Both **p** and **n** are positive integers input by the user.
c) Write a program that calculates the net salary using entered basic salary.

Here, D.A.=27%, H.R.A.=10%, P.F.=12% of basic salary; and
       M.A.=Rs.100, T.A.=Rs.1600 are fixed and I.T.=Rs.1000.

Net salary = basic salary + (DA+HRA+MA+TA)-(PF+IT)

A program should print the output in the following format only:

```
ENTER BASIC SALARY (in Rs.) =40000
ALLOWANCES:
        D.A.    =10800.00
        H.R.A.  = 4000.00
        M.A.    =  100.00
        T.A.    = 1600.00
DEDUCTION:
        P.F.    = 4800.00
        I.T.    = 1000.00
--------------------------------------------
NET SALARY   = 50700.00
```

(5+5+5)

8.
a) Define a structure `Measure` having members `feet` and `inch` as integer. Write a program to add two variables and store it in third variable of the same type. Print the answer in the format: 5'6" + 3'9" = 9'3". (Note that the valid answer is 9'3" and not 8'15").
b) Write a program to create a link list of student records. The program reads the roll no and name of the student and adds a node at the end of the list. It stops when a negative roll no is entered by the user.
c) Write a program to read 10 integers in an array and print them in reverse order.

(6+5+4)

9.

a) Write a program to check whether the given string is palindrome or not.

b) Write a program segment to check whether the given year is leap year or not. (Should be evenly divisible by 4 or 400 but not by 100).

c) A file has 50 random characters in small letters. Write a program that takes as input a character from user, and calculates the frequency of that character in the file. If the character is not found in the file, print appropriate message.

(6+4+5)