B1.3-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. (1 x 10)

1.1
```
int z,   x=5, y=-10, a=4, b=2;
         z=x++ - --y * b / a;
```
What will be the final value of z?

A) 5
B) 6
C) 10
D) 11

1.2 With every use of memory allocation function, what function should be used to release allocated memory which is no longer needed?

A) dropmem( )
B) dealloc( )
C) release( )
D) free( )

1.3
```
int warr[3][2][2] = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12};
```
What will be the value of warr[2][1][0]?

A) 5
B) 7
C) 9
D) 11

1.4
```
char *ptr;
char myString[ ] = "abcdefg";
ptr = myString;
ptr += 5;
```
The pointer ptr points to which string?

A) fg
B) efg
C) defg
D) cdefg

1.5 Suppose that x is initialized as:

```
short int x; /* assume x is 16 bits in size */
```

What is the maximum number that can be printed using printf ("%d\n", x),

A) 127
B) 128
C) 255
D) 32,767

1.6 When applied to a variable, what does the unary "&" operator yield?

A) The variable's address
B) The variable's right value
C) The variable's binary form
D) The variable's value

1.7 How is a variable accessed from another file?

A) via the extern specifier.
B) via the auto specifier.
C) via the global specifier.
D) via the pointer specifier.

1.8 What does the following function print?

```
func(int i)
      {if(i%2) return 0;
            else return 1;}
      main( )
      {
            int=3;
                  i=func(i);
                  i=func(i);
                  printf("%d", i);
      }
```

A) 3
B) 1
C) 0
D) 2

1.9 Given the piece of code

```
int a[50];
int *pa;
pa=a;
```

To access the 6th element of the array which of the following is incorrect?

A) *(a+5)
B) a[5]
C) pa[5]
D) *(*pa + 5)

1.10 Regarding the scope of the variables; identify the incorrect statement:

A) automatic variables are automatically initialized to 0
B) static variables are automatically initialized to 0
C) the address of a register variable is not accessible
D) static variables cannot be initialized with any expression

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 x 10)

2.1 'C' programs are converted into machine language with the help of an interpreter.
2.2 Every 'C' program must contain a *main( )*.
2.3 *Putchar( )* is used only for single character input.
2.4 *calloc(…)* allocates a block of memory for an array of elements of a certain size.
2.5 A *printf( )* statement can generate only one line of output.
2.6 A switch expression can be of any data type.
2.7 'While' is an entry as well as exit controlled loop statement.
2.8 'C' treats character string simply as arrays of characters.
2.9 A function in 'C' should have at least one argument.
2.10 *sprintf(…)* writes data to the character array whereas *printf(…)* writes data to the standard output device.

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 therein. (1 x 10)

X		Y	
3.1	Data structure used by malloc for object creation	**A.**	%
3.2	Operator for giving remainder	**B.**	call by reference
3.3	do-while	**C.**	entry controlled loop
3.4	while	**D.**	a^=b^=a^=b
3.5	func1(x, y) is an example of	**E.**	object file
3.6	assignment of a with b	**F.**	heap
3.7	Which is not portable?	**G.**	call by value
3.8	Which is not possible in C?	**H.**	exit controlled loop
3.9	Swan a and b without temporary variable	**I.**	a = b
3.10	Compiler converts a source File to	**J.**	binary file
		K.	No match
		L.	#
		M.	textfile
		N.	a > b

4. Each statement below has a 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 therein. (1 x 10)

A.	Macro	**B.**	One or zero	**C.**	Randomly
D.	External	**E.**	Max	**F.**	True
G.	String	**H.**	Automatic	**I.**	Extern
J.	Register	**K.**	Dynamic	**L.**	SWITCH
M.	Word Not Available	**N.**	EOF	**O.**	Arbitrary
P.	typeDef				

4.1 An external variable definition must not begin with storage class specifier _____.

4.2 A register variable is expected to be placed in the machine _____.

4.3 For _____ and static variables, initialisers must be constant expressions.

4.4 When a function calls itself, each invocation gets a fresh set of _____ variables, independent of the previous invocation.

4.5 #define statement calls for simplest type of _____ substitution.

4.6 The function lseek provide a way to read or write a file in _____ order.

4.7 printf("%.*s", max, s) can be used to print at most _____ characters from a string s.

4.8 FILE is defined with a(n) _____ statement.

4.9 The process of allocating memory at run time is known as _____.

4.10 The function getchar( ) returns _____ when there is no more input character.

PART TWO

(Answer any **FOUR** questions)

5.

a) What is structured programming? Explain and give examples of relevant constructs using pseudo-code. Highlight the advantages and disadvantages of structured programming.

b) What is an execution error? Differentiate it from syntactic error. Give examples.

c) It is said that 'C' is a middle level assembly language. Mention those features of 'C' which enable this description.

(8+3+4)

6.

a) Write and explain the action of WHILE statement. Develop a program in 'C' language to compute the average of every third integer number lying between 1 and 100. Include appropriate documentation.

b) Develop a function to calculate sum of n even integers starting from a given even integer.

c) Identify all the compound statements which appear in the following program segment:

```
{
      sum=0;
      do    {
            scanf("%d", &i);
            if (i < 0)
                  {
                        i=-i;
                        ++flag;
                  }
            sum += i;
      } while (i != 0);
}
```

(7+5+3)

7.

a) Define an array. How are arrays processed in 'C'? Illustrate by taking two-dimensional arrays as examples.

b) What are subscripts? How are they specified? What restrictions apply to the values that can be assigned to subscripts in 'C' language?

c) Write a 'C' program that will enter a line of text, store in an array and then display backwards. The length of the line should be undefined, (being terminated by ENTER key), but less than 80 characters.

(4+4+7)

8.

a) What is a pointer in 'C'? How is a pointer variable declared? Give examples and explain. Enumerate the utility of pointer variables.

b) A program in 'C' language contains the following declaration:

static int x[8] = {1,2,3,4,5,6,7,8};

i) What is the meaning of x?

ii) What is the meaning of (x + 2)?

iii) What is the meaning of *x?

iv) What is the meaning of (*x + 2)?

v) What is the meaning of *(x + 2)?

c) What is a structure? How does a structure differ from a union? Give examples. For what kind of applications, union data structure is useful? How are arrays different from structure?

(4+5+6)

9.

a) How can a procedure be defined in 'C'? Give an example. Bring out the differences between function and procedure.

b) Draw a flowchart and then develop an interactive 'C' program which finds whether a given integer number is prime or not. Make use of a function subprogram.

(6+9)