A3-R4: 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 **OMR ANSWER SHEET** only, supplied with 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 "OMR" answer sheet supplied with the question paper, following instructions therein.** **(1x10)**

1.1 In the passage of text, individual words and punctuation marks are known as
A) Constants
B) Keywords
C) Operators
D) Tokens

1.2 Choose the option that contains only valid hexadecimal integers.
A) 0x9F, 0xbcd, 0x1
B) 037, 0xx, 01000
C) 0x561u, 0x9h, 0xdd
D) H9F, HFF, HAA

1.3 Which one of the following are not valid variable names in C?
A) float_int, keyword, A1
B) ANSI, ascii, cpu
C) valid, variable, name
D) None of the above

1.4 What is the output of the following code?
main()
{   static int num=8;
**   printf("%d ",num=num-2);**
**   if(num!=0) main(); }**
A) 8 6 4 2
B) Infinite output
C) 6 4 2 0
D) Invalid because main function can't call itself.

1.5 What is the effect of the following code?
main() { int a[4] = {25, 16};
**   printf("%d %d", a[0] & a[1], a[1]|a[2]) ; }**
A) 16 16
B) Syntax error because of invalid operator symbol
C) 25 16
D) Syntax error because of invalid array initialization

1.6   What will be the output of the following code?
        main() { int c,d, *p1=&c,*p2=&d, x;
                c =10,d =4;
                x = –3* – *p2 / *p1 + 5;
                printf("%d ",x);
                }
A)   6
B)   Invalid syntax because / * is used for comments.
C)   8
D)   Invalid syntax because three binary operators can't be together in an expression.

1.7   What is the output of the following code?
        main(){ int a, b; a=b=4;
                b=a++;
                printf("%d %d %d %d", a++, --b, ++a, b--); }
A)   5 3 7 3
B)   Syntax error
C)   5 4 5 3
D)   6 2 6 4

1.8   When we declare an array
A)   Compiler declare array name itself as a constant pointer to base address
B)   A continuous file is allocated to store the elements value
C)   Index of elements is declared automatically
D)   All elements are initialized to zero

1.9   The do…while looping statement
A)   is executed only once if the condition is true.
B)   is also known as entry-controlled loop.
C)   is executed at least once if the condition is false.
D)   is unconditional looping statement..

1.10   What will be the output of the following code?
        struct { int si;
            double d;
            float *cp; } s ;
        void main() {
            printf("%d, %d, %d", sizeof(s.d), sizeof(s.cp), sizeof(s)); }
A)   4, 4, 12
B)   8, 2, 12
C)   10, 4, 16
D)   8, 4, 14

2. **Each statement below is either TRUE or FALSE. Choose the most appropriate one and ENTER in the "OMR" answer sheet supplied with the question paper, following instructions therein.** **(1x10)**

2.1 #define is known as preprocessor compiler directive.

2.2 The return type of malloc function is void.

2.3 sizeof( ) is a function that returns the size of a variable.

2.4 Only character or integer can be used in switch statement.

2.5 for(i=0; i<5;i++); statement has syntax error because of semicolon at the end.

2.6 Linking is the process of putting together other program file and functions that are required by the program.

2.7 'auto' keyword is used to declare a local variable.

2.8 Algorithm is the graphical representation of logic.

2.9 Size of the pointer variable depends on the data type that it points to.

2.10 Linked list must require continuous memory allocation unlike array.

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 "OMR" answer sheet supplied with the question paper, following instructions therein.** **(1x10)**

X		Y	
3.1	This concept is borrowed from structure for constructing data type	**A.**	long
3.2	Number of operators required in **?:** operator	**B.**	int
3.3	Data type of argument counter (argc) in command line argument	**C.**	union
3.4	Only this symbol is allowed in a valid variable name	**D.**	do…while
3.5	Keyword used to indicate global variable	**E.**	underscore
3.6	It is the exit controlled looping statement	**F.**	getc
3.7	To declare unsigned long integer variable this suffix is used with value	**G.**	double
3.8	To insert the comments in the program this symbol is used	**H.**	extern
3.9	Return type of *ftell* function	**I.**	array
3.10	This function is used to read a character from a file	**J.**	three
		K.	/*
		L.	while
		M.	UL

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 "OMR" answer sheet supplied with the question paper, following instructions therein.** **(1x10)**

A.	primitive	**B.**	goto	**C.**	and
D.	linked list	**E.**	derived	**F.**	fseek
G.	indirection	**H.**	local	**I.**	typedef
J.	free	**K.**	relational	**L.**	unary
M.	global				

4.1   Type casting is a _____ operator.

4.2   Array is _____ type of data type.

4.3   _____ is an unconditional jump statement.

4.4   _____ operator is used to compare two entities.

4.5   _____ data structure can grow or shrink in size during the execution of a program.

4.6   A variable declared inside a function is called _____ variable.

4.7   The _____ operator is true only when both the operands are true.

4.8   _____ keyword allows user to define an identifier that would represent an existing data type.

4.9   _____ function is used to move the file position to desired location within the file.

4.10   _____ function is used to change the memory size already allocated run time.

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

5.
a) Write a program to calculate number of vowels (a,e,i,o,u) separately in an entered string.

b) Explain the working of shorthand assignment operators, pre and post increment operator and the ternary operator.

c) What is pointer? How is it initialized? What is indirection operator? What is the scale factor of a pointer? What is the size of a pointer variable?

(6+4+5)

6.
a) Write a program having function *print_char*( ) which receives a character and *n* integer as arguments. The function should print *n* times the entered character.

b) Write a 'C' program to computer the average of every third integer lying between 1 and 200? Include appropriate documentation.

c) How to create a file in C? Why should a user close the file?

(5+5+5)

7.
a) Define recursion. Write a complete program to evaluate the given series using recursive function sum( ). Here *n* is user dependent.

$$1 + 2 + 3 + \ldots + n$$

b) How Compilation, Linking and Loading are related? Also explain the basic task of a Compiler, Linker and Loader?

c) How does passing an array as an argument to a function differ from call by value?

(6+4+5)

8.
a) Define two structures Metric and British that store distances. The Metric stores values in meters and centimeters and the British stores values in feet and inches. Write a program that reads both structure variables and add values contained in one variable of Metric to the contents of another variable of British. The program should display the result in both: equivalent centimeters and equivalent inches.

b) Write a program to create a link list. There should be 20 nodes in the list, each node contains an integer between 1-20. The list should be printed at the end.

(8+7)

9.

a)   Write a program to calculate the income tax of an employee for the current financial year. A user will enter his age and Total salary of the current year and program will calculate and display the payable Income Tax from the given table. Tax slabs are applicable after deducting Rs. 1,00,000 of saving from total salary for each employee. The tax slabs are as under: (Senior citizen: Age ≥ 60)

For All	Tax
Rs.0 to 2,00,000	0% of income
2,00,001 - 5,00,000	10% on income excess of 2,00,000
5,00,001 - 10,00,000	30,000+20% on income excess of 5,00,000
Above Rs.10,00,000	1,30,000+30% on income excess of 10,00,000

For Senior Citizen	Tax
Rs.0 to 2,50,000	0% of income
2,50,001 - 5,00,000	10% on income excess of 2,50,000
5,00,001 - 10,00,000	25,000+20% on income excess of 5,00,000
Above Rs.10,00,000	1,25,000+30% on income excess of 10,00,000

b)   Write a program that copies contents of a text file into another file. Use command line arguments to enter source and destination file name. If source file does not exist print appropriate message and terminate the program.

(10+5)