WINTER – 2022 EXAMINATION
MODEL ANSWER

Subject: Programming in C **Subject Code** 22226

Important Instructions to examiners:

1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills.
4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for anyequivalent figure drawn.
5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
7) For programming language papers, credit may be given to any other program based on equivalent concept.
8) As per the policy decision of Maharashtra State Government, teaching in English/Marathi and Bilingual (English + Marathi) medium is introduced at first year of AICTE diploma Programme from academic year 2021-2022. Hence if the students in first year (first and second semesters) write answers in Marathi or bilingual language (English +Marathi), the Examiner shall consider the same and assess the answer based on matching of concepts with model answer.

Q. No	Sub Q.N.	Answer	Marking Scheme
1.	a)	**Attempt any FIVE of the following:** **Define the terms:** **i) Flow chart** **ii) Algorithm**	**10** **2M** ***Each definition 1M***
	Ans.	**i) Flow chart:** Flow chart is a diagrammatic or pictorial representation of logic of the program. **ii) Algorithm:** Algorithm is a stepwise procedure for solving any problem in computer.	
	b)	**State any four data types used in 'C'**	**2M**
	Ans.	Four basic data types in 'C' are char, int, float and double.	***½M for each data type***
	c)	**List logical operators in 'C'**	**2M**
	Ans.	Logical Operators in C are: 1) OR (||)2) AND (&&)3) NOT (!)	***For all logical operators 2M***

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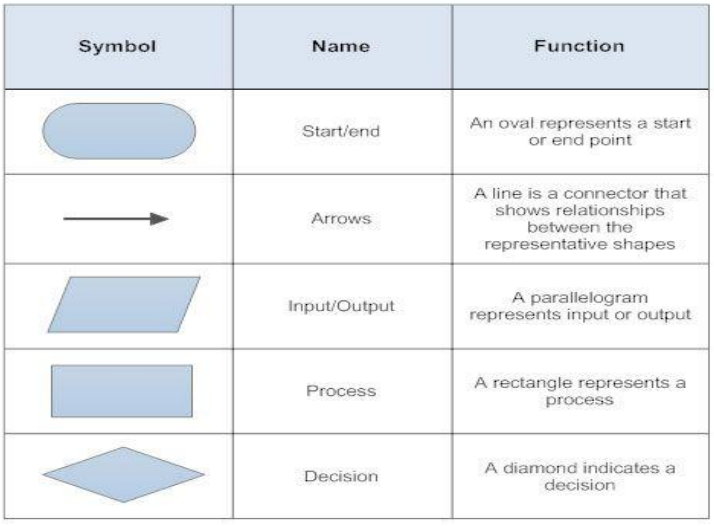
	d) Ans.	**Define structure. Give one example of structure declaration.**
		Definition of Structure:
		Structure is a collection of variables of similar or different data types which is represented by a single name.
		Example:
		struct bill
		{
		int consumer_id;
		char address[50];
		float amount;
		};
			2M
			Definition 1M
			Example 1M

	e) Ans.	**State any two advantages of function.** 1) Big code can be difficult to read, so when divided into smaller functions, it increases readability. 2) Program becomes modular. 3) It reduces complexity in debugging. 4) It enhances reusability of the code.	**2M** ***Any two advantages 1M each***
	f) Ans.	**Write the meaning of '&' and * with respect to pointer.** '&' is a unary operator in C which returns the memory address of the variable. This is also known as address of operator. '*' is a unary operator which returns the value pointed by a pointer variable.	**2M** ***Meaning of '&' 1M,*** ***Meaning of '*' 1M***
	g) Ans.	**Draw any two symbols used to construct flowchart. Also state their use**.  	**2M** ***Any two correct symbols and use : 1M each***

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2.	**a) Ans.**	**Attempt any <u>THREE</u> of the following:** **Explain any four guidelines for preparation of flow chart.** 1. The flowchart should be neat, clear and easy to follow. 2. Symbols should be used correctly to show flow of program. 3. There should not be any ambiguity in understanding the flowchart. 4. The flowchart is to be read from left to right and top to bottom.	**12** **4M** ***Any 4 guide-lines, 1M each***
	b) Ans.	**Differentiate between while loop and do while loop.** **while** | **do-while** Condition is checked first then statements are executed. | Statements are executed at least once, thereafter condition is checked. It is executed zero times, if condition is false. | At least once the statements are executed. No semicolon at the end of while. | Semicolon at the end of while. If there is a single statement, brackets are not required. | Brackets are always required. while loop is entry controlled loop. | do-while loop is exit controlled loop.	**4M** ***Any four relevant points 1M each***
	c) Ans.	**Explain declaration and initialization of one dimensional array using example.** **Declaration:** One dimensional array: An array is a collection of similar type of data which can share a common name. Declaration of one dimensional array: **Syntax:-** data type arrayname [size]; Eg :int arr[5]; This will declare array "arr" which can store 5 integers inside it. **Initialization:** Initialization can be done as design time or runtime. 1. Design time: This can be done by providing number of elements of the declared data type to an array at design time. Eg :int arr[5]={1,2,3,4,5};	**4M** ***Declaration 2M*** ***Initialization 2M***

		2. Runtime: For this loop structures like 'for' can be used to iterate through the locations of the array. Here the index of the array starts with 0 and ends with position one less than the total size of an array.
		Eg :
		int arr[5];
		for(i=0;i<5;i++)
		{
		scanf("%d",&arr[i]);
		}	

	d) **Ans.**	Write output for the following programming code: **#include<stdio.h>** **#include<conio.h>** **void main()** **{** **int x,y,a, b,*P1, *P2;** **x = 10;** **y = 20;** **P1 = &x;** **P2 = &y;** **a = *P1 * * P2 +20;** **b = *P1 * *P2 – 20;** **print f("x=%d, y = %d", x,y);** **print f("a=%d, b = %d", a,b);** **}** **Output:** x=10, y=20a=220, b=180	**4M** ***Correct output with x, y values : 2M*** ***a,b values : 2M***
3.	**a)** **Ans.**	**Attempt any <u>THREE</u> of the following:** **Explain data type conversion with example.** Type conversion: It is referred as Type Casting. It is used to convert one data type into another data type. **Implicit conversion** : It converts any intermediate values to the proper type automatically. Example: If one of the operands is double, the other will converted to double and the result will be in double data type. **Explicit conversion**: The process of converting one data type to another data type forcefully is known as explicit conversion. **Syntax : (data_type name) expression;**	**12** **4M** ***Explanation 3M*** ***Example 1M***

		Example: double x = 1.2; int sum = (int)x + 1; The above statement converts value of variable x from double to integer.	

	b)
	
	Ans.
		Explain any two string handling functions with syntax and example.
		1. strlen function:
		strlen( ) function in C gives the length of the given string. strlen( ) function counts the number of characters in a given string and returns the integer value.It stops counting the character when null character is found. Because, null character indicates the end of the string in C.
		Syntax:
		strlen(stringname);
		Example:
		Consider str1=”abc”
		strlen(str1); returns length of str1 as 3
		2. strcat() function:
		In C programming, strcat() concatenates (joins) two strings. It concatenates source string at the end of destination string.
		Syntax:
		strcat(destination string, source string);
		Example:
		Consider str1=”abc” and str2=”def”
		strcat(str1,str2); returns abcdef in str1 and str2 remains unchanged.
		3. strcpy() function
		strcpy( ) function copies portion of contents of one string into another string.
		Syntax:
		strcpy(destination string, source string);
		Example:
		Consider str1=”abc”
		strcpy(str1,str2); returns abcstr
		4.strcmp() function
		The strcmp function compares two strings which are passed as arguments to it. If the strings are equal then function returns value 0 and if they are not equal the function returns some numeric value.
		Syntax:
		strcmp(str1, str2);
			4M
			
			Any two function with Correct syntax and example 2M each

		Example: Consider str1=”abc” and str2=”abc” Then strcmp(str1,str2) returns 0 as both the strings are same.	
	c) **Ans.**	**Describe scanf() function with its syntax and example.** **scanf() function**: It is used to accept input from user during execution of a program. **Syntax: scanf("Control string",arg1,arg2,...,argn);** control string specifies the field format in which the data is to be entered. Control string contains conversion character % and a data type character and optional number specifying the field width. The arguments arg1,arg2,...,argn specify the address of locations where the data is stored. Control string and arguments are separated with comma. It can also have blanks, tabs, or newlines. **Example: scanf("%d%f",&a, &b);** In the above example, %d inside control string indicates integer data type whereas %f inside control string indicates float data type. Ampersand symbol (&) written before variable name is used to retrieve address / memory location of variable. This scanf ( ) function accepts one integer value and stores it in variable a and one float value that is stored in variable b.	**4M** ***Description 2M*** ***Syntax 1M*** ***Example 1M***

	d)
	
	Ans.
		Describe how recursive function is used in calculating factorial of a number.
		Recursive function :
		Recursion is a process of calling a function by itself. a recursive function body contains a function call statement that calls itself repetitively.
		
		Example: for calculating factorial of a number using recursion
		function call from main() : fact(n); // consider n=5
		Function definition:
		int fact(int n)
		{
		if(n==1)
		return 1;
		else
		return(n*fact(n-1));
		}
			4M
			Relevant description 4M

		In the above recursive function a function call fact (n-1) makes a recursive call to fact function. Each time when a function makes a call to itself, it save its current status in stack and then executes next function call. When fact ( ) function is called from main function, it initializes n with 5. Return statement inside function body executes a recursive function call. In this call, first value of n is stored using push ( ) operation in stack (n=5) and a function is called again with value 4(n-1). In each call, value of n is push into the stack and then it is reduce by 1 to send it as argument to recursive call. When a function is called with n=1, recursive process stops. At the end all values from stack are retrieved one by one using pop ( ) operation to perform multiplication to calculate factorial of number.	
4.	**a)** **Ans.**	**Attempt any <u>THREE</u> of the following:** **Write an algorithm and draw a flowchart to find largest number from three numbers.** **Algorithm:** Step 1:Start Step 2:Declare variables no1,no2,no3 Step 3: Accept / Initialize values for variables no1,no2,no3 Step 4: If no1 >no2 and no1>no3 then display "no1 is largest" otherwise check if no2>no1 and no2>no3 then display "no2 is largest" otherwise display "no3 is largest" Step 5: Stop **Flowchart**	**12** **4M** ***Algorithm 2M*** ***Flowchart 2M***

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		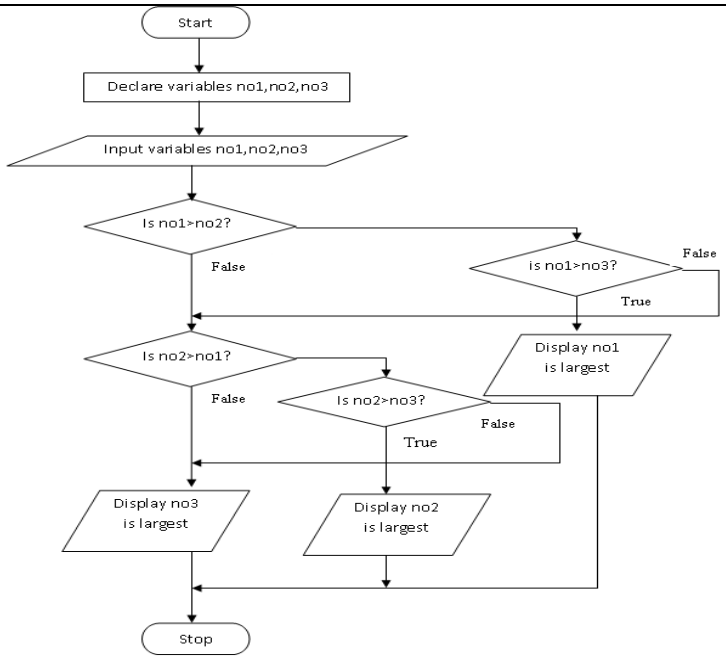	

	b)
	
	Ans.
		Write a program to convert temperature in Fahrenheit degrees to Centigrade degrees.
		#include<stdio.h>
		#include<conio.h>
		void main()
		{
		float celsius, fahrenheit;
		printf("Enter temperature in Fahrenheit: ");
		scanf("%f", &fahrenheit);
		celsius = (fahrenheit - 32) * 5 / 9;
		printf("Temperature in Fahrenheit =%f Temperature in Centigrade =%f", fahrenheit, celsius);
		getch();
		}
			4M
			
			Input temperature 1M
			
			Conversion 2M
			
			Display in Centigrade 1M

	c)	**Write a C program to print following pattern using loop.** **1** **2 2** **3 3 3** **4 4 4 4** **5 5 5 5 5**	**4M**

	Ans.	#include<stdio.h>
		#include<conio.h>
		void main()
		{
		int i,j,n;
		clrscr();
		for(i=1;i<=5;i++)
		{
		for(j=1;j<=i;j++)
		{
		printf("%d",i);
		}
		printf("\n");
		}
		getch();
		}
			Correct logic 2M
			
			Correct syntax 2M

	d)
	
	Ans.
		Write a program to declare an array of 5 elements and display sum of all array elements.
		Accepting input from user
		#include<stdio.h>
		#include<conio.h>
		void main()
		{
		int a[5],i,sum=0;
		clrscr();
		printf("Enter array elements:");
		for(i=0;i<5;i++)
		scanf("%d",&a[i]);
		for(i=0;i<5;i++)
		sum=sum+a[i];
		printf("\n Sum= %d",sum);
		getch();
		}
		
		OR
		#include<stdio.h>
		#include<conio.h>
		void main()
		{
			4M
			Correct logic 2M
			
			Correct syntax 2M

		int a[5]={1,2,3,4,5},i,sum=0; // Array initialization at the time of declaration
		clrscr();
		for(i=0;i<5;i++)
		sum=sum+a[i];
		printf("\n Sum= %d",sum);
		getch();
		}	

	e)
	Ans.
		Write a C program using function to find area of circle.
		Note: Any type of function declaration and definition shall be considered (with return value or no return value or with parameter or no parameter)
		#include<stdio.h>
		#include<conio.h>
		void area(float radius)
		{
		float a;
		a=3.14*radius*radius;
		printf("Area of circle= %f",a);
		}
		void main()
		{
		float r;
		printf("Enter the radius of circle : ");
		scanf("%f", &r);
		area(r);
		getch();
		}
			4M
			Main function 2M
			Function to calculate area 2M

5.	**a)**
	Ans.
		Attempt any <u>TWO</u> of the following:
		Write a C program with comments to reverse the digit of integer number. For example the number 12345 should be displayed as 54321.
		#include<stdio.h>
		#include<conio.h>
		void main()
		{
		int num, res=0,ans=0;
		clrscr();
		printf("Enter the number");
			12
			6M
			Correct Input 2M,
			Correct Reverse Function: 2M,

		scanf("%d", &num);
		while(num!=0)
		{
		res=num%10;
		ans=ans*10+res;
		num=num/10;
		}
		printf("Reverse number is %d", ans);
		getch();
		}
			Correct Output: 2M

	b) Ans.	**Write a program to add two 3 x 3 matrices. Display the addition.**
		#include<stdio.h>
		#include<conio.h>
		void main()
		{
		int a[3][3],b[3][3],c[3][3],i,j;
		clrscr();
		printf("Enter first matrix elements:\n");
		for(i=0;i<3;i++)
		{
		for(j=0;j<3;j++)
		{
		scanf("%d",&a[i][j]);
		}
		}
		printf("\nEnter second matrix elements:\n");
		for(i=0;i<3;i++)
		{
		for(j=0;j<3;j++)
		{
		scanf("%d",&b[i][j]);
		}
		}
		for(i=0;i<3;i++)
		{
		for(j=0;j<3;j++)
		{
		c[i][j]=a[i][j]+b[i][j];
			6M
			Declaration of variables 1M,
			Input matrices 2M,
			Calculating addition 2M,
			Display addition 1M

```
    }
    }
    printf("\n\nAddition of two matrices is:\n");
    for(i=0;i<3;i++)
    {
    for(j=0;j<3;j++)
    {
    printf("%d ",c[i][j]);
    }
    printf("\n");
    }
    getch();
    }
```

c) **Write a program to find largest number from an array using pointer.** — **6M**

Ans.

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int n,*ptr,i,largest=0;
clrscr();
printf("Enter how many numbers u want::");
scanf("%d",&n);
   for(i=0;i<n;i++)
   {
      printf("\nEnter Number %d :: ",i+1);
      scanf("%d",(ptr+i));
   }
   largest=*ptr;
   for(i=1;i<n;i++)
   {
      if(*(ptr+i)>largest)
      largest=*(ptr+i);
   }
printf("\nThe Largest Number is %d \n",largest);
getch();
}
```

Accepting array elements 2M,

finding largest element using pointer 3M,

Display of largest element 1M

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6.		**Attempt any TWO of the following:**	**12**
	a)	**Write a C program to declare structure employee having data member name, age, designation and salary. Accept and display information of 1 employee.**	**6M**

	Ans.	#include<stdio.h>
		#include<conio.h>
		struct employee
		{
		char name[20],designation[10];
		int age;
		long salary;
		};
		void main()
		{
		int i;
		struct employee e;
		clrscr();
		printf("\n Enter name:");
		scanf("%s",&e.name);
		printf("\n Enter age:");
		scanf("%d",&e.age);
		printf("\n Enter designation:");
		scanf("%s",&e.designation);
		printf("\n Enter salary:");
		scanf("%ld",&e.salary);
		printf("\n\nEmployee's data is:");
		printf("\n Name=%s",e.name);
		printf("\n Age=%d",e.age);
		printf("\n Designation=%s",e.designation);
		printf("\n Salary=%ld",e.salary);
		getch();
		}
			Declaration of structure- 2M,
			Accepting data- 2M,
			Displaying data -2M

	b)	**Write a program to find factorial of a number using recursion**	**6M**

	Ans.	#include<stdio.h>
		#include<conio.h>
		int factorial(int no)
		{
		if(no==1)
		return(1);
			Recursive function 4M,

		else
		return(no*factorial(no-1));
		}
		void main()
		{
		int fact,no;
		clrscr();
		printf("\n Enter number: ");
		scanf("%d",&no);
		fact=factorial(no);
		printf("\n Factorial number=%d",fact);
		getch();
		}
			Main function 2M

	c)
	
	Ans.
		Write a C program using pointer to read an array of characters and print them in reverse order.
		#include<stdio.h>
		#include<conio.h>
		void main()
		{
		char str[10],*ptr;
		int l=0;
		clrscr();
		printf("Enter string:");
		scanf("%s",str);
		ptr=str;
		while(*ptr!='\0')
		{
		l=l+1;
		ptr=ptr+1;
		}
		while(l>0)
		{
		ptr=ptr-1;
		printf("%c",*ptr);
		l=l-1;
		}
		getch();
		}
			6M
			
			Accepting string 1M, Pointer initialization 1M,
			
			Logic of reverse using pointer 3M,
			
			Displaying reverse string 1M