



Zeal Education Society's
ZEAL POLYTECHNIC, PUNE.

NARHE | PUNE -41 | INDIA

FIRST YEAR (FY)

DIPLOMA IN COMPUTER ENGINEERING

SCHEME: I

SEMESTER: II

NAME OF SUBJECT: PROGRAMMING IN C

Subject Code: 22226

MSBTE QUESTION PAPERS & MODEL ANSWERS

- 1. MSBTE SUMMER-18 EXAMINATION**
- 2. MSBTE WINTER-18 EXAMINATION**
- 3. MSBTE SUMMER-19 EXAMINATION**
- 4. MSBTE WINTER-19 EXAMINATION**

22226

21718

3 Hours / 70 Marks

Seat No.



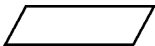
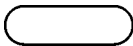
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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.
 - (7) Preferably, write the answers in sequential order.

Marks

1. Attempt any FIVE of the following :

10

- (a) Define :
 - (i) Two dimensional array
 - (ii) Multi-dimensional array
- (b) Give any four advantages of pointer.
- (c) Define type casting. Give any one example.
- (d) State any four decision making statements.
- (e) State any four math functions with its use.
- (f) State the use of following symbols used for flowchart drawing :
 - (i) 
 - (ii) 
 - (iii) 
 - (iv) 
- (g) State use of while loop with syntax.

[1 of 4]

P.T.O.

2. Attempt any THREE of the following :**12**

- (a) Develop a simple 'C' program for addition and multiplication of two integer numbers.
- (b) Explain how to pass pointer to function with example.
- (c) Explain following functions :

`getchar()`

`putchar()`

`getch()`

`putch()`

with suitable examples.

- (d) Develop a program to accept an integer number and print whether it is palindrome or not.

3. Attempt any THREE of the following :**12**

- (a) State the use of `printf()` & `scanf()` with suitable example.
- (b) Explain any four library functions under `conio.h` header file.
- (c) Explain how formatted input can be obtain, give suitable example.
- (d) Develop a program to find factorial of a number using recursion.

- 4. Attempt any THREE of the following :** **12**
- (a) Write a program to swap the values of variables $a = 10$, $b = 5$ using function.
 - (b) Develop a program using structure to print data of three students having data members name, class, percentage.
 - (c) Design a program to print a message 10 times.
 - (d) Draw a flowchart for checking whether given number is prime or not.
 - (e) Implement a program to demonstrate logical AND operator.
- 5. Attempt any TWO of the following :** **12**
- (a) Draw a flowchart of Do-while loop and write a program to add numbers until user enters zero.
 - (b) Give a method to create, declare and initialize structure also develop a program to demonstrate nested structure.
 - (c) Implement a program to demonstrate concept of pointers to function.
- 6. Attempt any TWO of the following :** **12**
- (a) Develop a program to swap two numbers using pointer and add swapped numbers also print their addition.
 - (b) Design a programme in C to read the n numbers of values in an array and display it in reverse order.
 - (c) Develop a program to find diameter, circumference and area of circle using function.
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MODEL ANSWER

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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 any equivalent 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.

Q. No	Sub Q.N.	Answer	Marking Scheme
1.	(a) Ans.	Attempt any FIVE of the following: Define: (i) Two dimensional array (ii) Multi-dimensional array (i) Two dimensional array Two dimensional array is a collection of similar type of data elements arranged in the form of rows & columns. <i>E.g.</i> Array can be declared as <code>int arr[3][3];</code> In this there can be 9 elements in an array with 3 rows and 3 columns. (ii) Multi-dimensional array: An array with more than one dimension is called as multi-dimensional array. <i>For example,</i> <code>float x[3][4];</code> Similarly, you can declare a three-dimensional (3d) array. For example, <code>float y[2][4][3];</code>	10 2M <i>Definitio</i> <i>n of two-</i> <i>dimensi</i> <i>onal</i> <i>array</i> 1M <i>Multi-</i> <i>dimensi</i> <i>onal</i> <i>array</i> 1M



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		Here, The array y can hold 24 elements.	
(b) Ans.	Give any four advantages of pointer. Advantages of pointer: 1. Pointers reduce the length and complexity of a program. 2. They increase execution speed. 3. A pointer enables us to access a variable that is defined outside the function. 4. Pointers are more efficient in handling the data tables. 5. The use of a pointer array of character strings results in saving of data storage space in memory. 6. It supports dynamic memory management.	2M <i>Any four advantages ½M each</i>	
(c) Ans.	Define type casting. Give any one example. Definition type casting: The conversion of one data type to another is known as type casting. The values are changed for the respective calculation only, not for any permanent effect in a program. <i>For example,</i> x=int (7.5) means 7.5 is converted to integer by truncating it i.e. 7 b=(int) 22.7/(int) 5.3 means 22.7 will be converted to 22 and 5.3 to 5 so answer will be 22/5=4 c=(double) total/num means the answer will be in float value. p=sin((int)x) means x will be converted to integer and then sine angle will be calculated.	2M <i>Definition of type casting 1M</i> <i>Any one correct Example 1M</i>	
(d) Ans.	State any four decision making statement. Decision making statement: 1. if statement 2. if-else statement 3. if-else-if ladder 4. Nested if-else statement 5. switch statement 6. conditional operator statement (? : operator)	2M <i>Any four correct decision making statements - ½ M each</i>	
(e) Ans.	State any four math functions with its use. <i>(Note: Any other relevant math function shall be considered)</i> Math Functions: sqrt() - square root of an integer abs() - absolute value of an integer	2M <i>Any four correct math</i>	



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		<p>sin() - compute the sine value of an input value cos()- compute the cosine value of an input value pow()- compute the power of a input value floor()- round down the input value ceil()- round up the input value</p>	<p><i>function with its use ½M each</i></p>
	<p>(f)</p> <p>Ans.</p>	<p>State the use of following symbols used for flowchart drawing:</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>(i) </p> <p>(iii) </p> </div> <div style="text-align: center;"> <p>(ii) </p> <p>(iv) </p> </div> </div> <p>(i) General processing</p> <p>(ii) Decision making</p> <p>(iii) Input/ Output statements</p> <p>(iv) Start / Stop</p>	<p>2M</p> <p><i>Correct use of symbols ½M each</i></p>
	<p>(g)</p> <p>Ans.</p>	<p>State use of while loop with syntax.</p> <p>While loop is used in programming to repeat a specific block of statement until some end condition is met.</p> <p>The <i>syntax</i> of a while loop is:</p> <pre>while (test Expression) { Statements... statements.... }</pre>	<p>2M</p> <p><i>Use of while loop 1M</i></p> <p><i>Syntax of while loop 1M</i></p>
2.	<p>(a)</p> <p>Ans.</p>	<p>Attempt any THREE of the following:</p> <p>Develop a simple ‘C’ program for addition and multiplication of two integer numbers.</p> <p><i>(Note: Any other relevant logic shall be considered)</i></p> <pre>#include<stdio.h> #include<conio.h> void main() { int a,b,add,mul;</pre>	<p>12</p> <p>4M</p> <p><i>Correct Logic 2M</i></p>



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		<pre>clrscr(); printf("Enter value for a and b:"); scanf("%d%d",&a,&b); add=a+b; mul=a*b; printf("\nAddition of a and b=%d\n",add); printf("\nMultiplication of a and b=%d",mul); getch(); }</pre>	<p><i>Correct syntax</i> <i>2M</i></p>
(b)	<p>Explain how to pass pointer to function with example. <i>(Note: Any other example showing pointer as a parameter in function shall be considered)</i></p>		4M
Ans.	<p>When pointer (addresses) is passed to the function as an argument instead of value then function is called as call by reference.</p> <p>Example:</p> <pre>#include<stdio.h> #include<conio.h> int add(int *); void main() { int *ptr,pos=0; clrscr(); printf("Enter position:"); scanf("%d",&pos); ptr=&pos; printf("\nSum=%d",add(ptr)); getch(); } int add(int *p) { int i=0; int sum=0; for(i=1;i<=(*p);i++) { sum=sum+i; } return sum; }</pre>	<p><i>Explanation</i> <i>2M</i></p> <p><i>Example</i> <i>2M</i></p>	



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		In the above program function passes the address of 'pos' to the ptr. The value of ptr is passed while calling the function. In function definition in *p it takes value of ptr instead of address for performing addition of numbers up to specific position.	
(c)	Explain following functions: getchar() putchar() getch() putch() with suitable examples.		4M
Ans.	getchar() - It is function from stdio.h header file. This function is used to input a single character. The enter key is pressed which is followed by the character that is typed. The character that is entered is echoed. <i>Syntax:</i> ch=getchar(); <i>Example:</i> void main() { char ch; ch = getchar(); printf("Input Char Is :%c",ch); } During the program execution, a single character gets or read through the getchar(). The given value is displayed on the screen and the compiler waits for another character to be typed. If you press the enter key/any other characters and then only the given character is printed through the printf function. putchar() - It is used from standard input (stdio.h) header file. This function is the other side of getchar. A single character is displayed on the screen. <i>Syntax:</i> putchar(ch); void main() {	<i>Explanation of each function</i> 1M	



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	<pre>char ch='a'; putchar(ch); getch(); }</pre> <p>getch() - It is used from the console (conio.h) header file. This function is used to input a single character. The character is read instantly and it does not require an enter key to be pressed. The character type is returned but it does not echo on the screen. <i>Syntax:</i> ch=getch(); Where, ch - assigned the character that is returned by getch(). void main() { char ch; ch = getch(); printf("Input Char Is :%c",ch); }</p> <p>During the program execution, a single character gets or read through the getch(). The given value is not displayed on the screen and the compiler does not wait for another character to be typed. And then, the given character is printed through the printf function.</p> <p>putch()- It is used from console input output header file (conio.h) This function is a counterpart of getch(). Which means that it will display a single character on the screen. The character that is displayed is returned. <i>Syntax:</i> putch(ch); Where, ch - the character that is to be printed. void main() { char ch='a'; putch(ch) }</p>	
(d)	Develop a program to accept an integer number and print whether it is palindrome or not.	4M



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	Ans.	<p><i>(Note: If string is considered instead of number for palindrome checking, then that logic shall be considered)</i></p> <pre>#include<stdio.h> #include<conio.h> void main() { int n,num,rev=0,digit,i; clrscr(); printf("Enter the number: "); scanf("%d",&num); n=num; for(i=0;num!=0;++i) { digit=num%10; rev=rev*10+digit; num=num/10; } if(n==rev) printf("Number is palindrome"); else printf("Number is not palindrome"); getch(); }</pre>	<p><i>Correct Logic</i> 2M</p> <p><i>Correct syntax</i> 2M</p>
3.	(a) Ans.	<p>Attempt any THREE of the following: State the use of printf() & scanf() with suitable example. printf() & scanf(): printf() and scanf() functions are library functions in C programming language defined in "stdio.h".</p> <p>printf() function is used to print the character, string, float, integer, octal and hexadecimal values onto the output screen.</p> <p>scanf() function is used to read character, string, numeric data from keyboard.</p> <p>%d format specifier is used in printf() and scanf() to specify the value of an integer variable.</p> <p>%c is used to specify character, %f for float variable, %s for string variable, and %x for hexadecimal variable.</p>	<p>12 4M</p> <p><i>Explanation of printf, scanf</i> 1M each</p>



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		<p><i>Example:</i></p> <pre>#include<stdio.h> #include<conio.h> void main() { int i; clrscr(); printf("Enter a number"); scanf("%d",&i); printf("Entered number is: %d",i); getch(); }</pre>	<p><i>Example</i> 2M</p>
	<p>(b) Ans.</p>	<p>Explain any four library functions under conio.h header file.</p> <p>clrscr() -This function is used to clear the output screen. getch() -It reads character from keyboard getche()-It reads character from keyboard and echoes to o/p screen putch - Writes a character directly to the console. textcolor()-This function is used to change the text color textbackground()-This function is used to change text background</p>	<p>4M</p> <p><i>Any 4</i> <i>function</i> <i>1M each</i></p>
	<p>(c) Ans.</p>	<p>Explain how formatted input can be obtain, give suitable example.</p> <p>Formatted input: When the input data is arranged in a specific format, it is called formatted input. scanf function is used for this purpose in C. General syntax: scanf("control string", arg1, arg2..);</p> <p>Control string here refers to the format of the input data. It includes the conversion character %, a data type character and an optional number that specifies the field width. It also may contain new line character or tab. arg1, arg2 refers to the address of memory locations where the data should be stored.</p> <p><i>Example:</i> scanf("%d",&num1);</p> <p>Eg: #include<stdio.h> #include<conio.h> void main() {</p>	<p>4M</p> <p><i>Explana</i> <i>tion 2M</i></p> <p><i>Example</i> 2M</p>



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		<pre>int i; clrscr(); printf("Enter a number"); scanf("%d",&i); printf("Entered number is: %d",i); getch(); }</pre>	
	<p>(d)</p> <p>Develop a program to find factorial of a number using recursion. <i>(Note: Any other relevant logic shall be considered)</i></p> <p>Ans.</p>	<pre>#include<stdio.h> #include<conio.h> int factorial(int num) { if(num==1) { return 1; } else { return(num*factorial(num-1)); } } void main() { int num; int result; clrscr(); printf("Enter a number"); scanf("%d",&num); result=factorial(num); printf("Factorial of %d is %d",num,result); getch(); }</pre>	<p>4M</p> <p><i>Correct syntax 2M</i></p> <p><i>Correct logic 2M</i></p>
4.	<p>(a)</p> <p>Write a program to swap the values of variables a = 10, b = 5 using function. <i>(Note : Read swap as swap in the question)</i> <i>(Note: Any other logic using function shall be considered)</i></p> <p>Ans.</p>	<pre>#include<stdio.h> #include<conio.h></pre>	<p>12</p> <p>4M</p>



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	<pre>void swapvalues(int *i, int *j) { int temp; temp=*i; *i=*j; *j=temp; } void main() { int a=10; int b=5; clrscr(); printf("The values before swaping:\na=%d, b=%d",a,b); swapvalues(&a,&b); printf("\nThe values after swaping:\na=%d, b=%d",a,b); getch(); }</pre>	<p><i>Correct syntax</i> 2M</p> <p><i>Correct logic</i> 2M</p>
<p>(b)</p> <p>Ans.</p>	<p>Develop a program using structure to print data of three students having data members name, class, percentage. <i>(Note: Any other relevant logic shall be considered)</i></p> <pre>#include<stdio.h> #include<conio.h> void main() { struct student { char name[20]; char c[20]; int per; } s[3]; int i; clrscr(); for(i=0;i<3;i++) { printf("Enter name, class, percentage"); scanf("%s%s%d",&s[i].name,&s[i].c,&s[i].per); } for(i=0;i<3;i++) { printf("%s %s %d\n",s[i].name,s[i].c,s[i].per); } }</pre>	<p>4M</p> <p><i>Correct syntax</i> 2M</p> <p><i>Correct logic</i> 2M</p>



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		<pre>getch(); }</pre>	
(c) Ans.	<p>Design a program to print a message 10 times. (Note: Any other relevant logic shall be considered)</p> <pre>#include<stdio.h> #include<conio.h> void main() { int i; clrscr(); for(i=0;i<10;i++) { printf("Welcome to C programming\n"); } getch(); }</pre>	4M Correct syntax 2M Correct logic 2M	
(d) Ans.	<p>Draw a flowchart for checking whether given number is prime or not. (Note: Any correct flowchart shall be considered)</p> <pre>graph TD Start([Start]) --> ReadNum[/Read num/] ReadNum --> Init[i=2 flag=1] Init --> IsIltNum{i < num?} IsIltNum -- no --> IsFlag1{is flag=1?} IsIltNum -- yes --> IsFlag0{is flag = 0?} IsFlag0 -- no --> IsFlag1 IsFlag0 -- yes --> RemCalc[rem = num mod i] RemCalc --> IsRemNot0{is rem != 0?} IsRemNot0 -- no --> Flag0[flag = 0] IsRemNot0 -- yes --> IncI[i = i + 1] IncI --> IsIltNum Flag0 --> IsFlag1 IsFlag1 -- no --> PrintNotPrime[/Print "number is not prime"/] IsFlag1 -- yes --> PrintPrime[/Print "number is prime"/] PrintNotPrime --> Stop([Stop]) PrintPrime --> Stop</pre>	4M Correct symbols 1M Correctness of flowchart 3M	



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	<p>(e)</p> <p>Ans.</p>	<p>Implement a program to demonstrate logical AND operator. <i>(Note: Any other relevant logic shall be considered)</i></p> <pre>#include<stdio.h> #include<conio.h> void main() { int i; int j; clrscr(); printf("Enter the values of i and j"); scanf("%d%d",&i,&j); if(i==5 && j==5) { printf("Both i and j are equal to 5"); } else { printf("Both the values are different and either or both are not equal to 5"); } getch(); }</pre>	<p>4M</p> <p><i>Correct Syntax 2M</i></p> <p><i>Correct logic 2M</i></p>
<p>5.</p>	<p>(a)</p> <p>Ans.</p>	<p>Attempt any TWO of the following: Draw a flowchart of Do-while loop and write a program to add numbers until user enters zero. Flowchart of Do-while loop:</p> <div style="text-align: center;"> <pre> graph TD Start(()) --> Body[Body of Loop] Body --> Test{Test expression} Test -- true --> Body Test -- false --> Statement[Statement just below Loop] Statement --> End(()) </pre> </div> <p style="text-align: center;"><small>Figure: Flowchart of do...while Loop</small></p>	<p>12 6M</p> <p><i>Correct Flowchart 3M</i></p>



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	<p>Program:- #include<stdio.h> #include<conio.h> void main() { int no,sum=0; clrscr(); do { printf("\n Enter a number:"); scanf("%d",&no); sum=sum+no; }while(no!=0); printf("\n Sum of entered numbers =%d",sum); getch(); }</p>	<p><i>Correct program 3M</i></p>
<p>(b) Ans.</p>	<p>Give a method to create, declare and initialize structure also develop a program to demonstrate nested structure. Declaration of structure:- struct structure_name { data_type member 1; data_type member 2; . . . data_type member n; } structure variable 1, structure variable 2,...., structure variable n;</p> <p>Example:- struct student { int rollno; char name[10]; }s1;</p> <p>Initialization:- struct student s={ 1,"abc"}; structure variable contains two members as rollno and name. the</p>	<p>6M</p> <p><i>Creation , declarati on 2M</i></p> <p><i>Initializ ation 1M</i></p>



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		<p>above example initializes rollno to 1 and name to "abc".</p> <p>Program:- #include<stdio.h> #include<conio.h> struct college { int collegeid; char collegename[20]; }; struct student { int rollno; char studentname[10]; struct college c; }; void main() { struct student s={1,"ABC",123,"Polytechnic"}; clrscr(); printf("\n Roll number=%d",s.rollno); printf("\n Student Name=%s",s.studentname); printf("\n College id=%d",s.c.collegeid); printf("\n College name=%s",s.c.collegename); getch(); }</p>	<p>Program 3M</p>
(c)	<p>Implement a program to demonstrate concept of pointers to function. (Note: Any other relevant program shall be considered)</p> <p>Ans. Pointer to function: include<stdio.h> int sum(int x, int y) { return x+y; } int main() { int s;</p>	<p>6M</p> <p>Correct logic 3M</p> <p>Correct syntax 3M</p>	



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		<pre>int(*fp)(int, int); fp = sum; s = fp(10,12); printf("Sum = %d",s); return 0; }</pre>	
6.	(a)	<p>Attempt any TWO of the following: Develop a program to swap two numbers using pointer and add swapped numbers also print their addition. <i>(Note: Any other relevant logic shall be considered)</i></p> <p>Ans.</p> <pre>#include<stdio.h> void swap(int *a,int *b) { int temp; temp=*a; *a=*b; *b=temp; } void main() { int x,y,sum; printf("\n Enter value for x:"); scanf("%d",&x); printf("\n Enter value for y:"); scanf("%d",&y); swap(&x,&y); printf("\nx=%d",x); printf("\ny=%d",y); sum=x+y; printf("Sum of x+y = %d",sum); }</pre>	12 6M <i>Correct logic for swappin g using pointer 4M</i> <i>Correct logic for addition & display 2M</i>
	(b)	<p>Design a programme in C to read the n numbers of values in an array and display it in reverse order. <i>(Note: Any other relevant logic shall be considered)</i></p> <p>Ans.</p> <pre>#include<stdio.h> #include<conio.h> #define max 50 void main() {</pre>	6M <i>Correct logic for input array 3M</i>



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		<pre>int a[max],i,n; clrscr(); printf("\n Enter number of elements:"); scanf("%d",&n); printf("\n Enter array element:"); for(i=0;i<n;i++) scanf("%d",&a[i]); printf("\n Array elements in reverse order:"); for(i=n-1;i>=0;i--) printf("\t%d",a[i]); getch(); }</pre>	<p><i>Correct logic to display in reverse 3M</i></p>
	<p>(c)</p> <p>Develop a program to find diameter, circumference and area of circle using function. <i>(Note: Any other relevant logic shall be considered)</i></p> <p>Ans.</p>	<pre>#include<stdio.h> #include<conio.h> void circle(float r) { float diameter,circumference,area; diameter=2*r; printf("\n Diameter=%f",diameter); circumference=2*3.14*r; printf("\n Circumference=%f",circumference); area=3.14*r*r; printf("\n Area=%f",area); } void main() { float radius; clrscr(); printf("\n Enter radius:"); scanf("%f",&radius); circle(radius); getch(); }</pre>	<p>6M</p> <p><i>Correct logic using function to find diameter 2M, circumference 2M, area 2M</i></p>

22226

11819

3 Hours / 70 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Illustrate your answers with neat sketches wherever necessary.
 - (3) Figures to the right indicate full marks.
 - (4) Assume suitable data, if necessary.
 - (5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.
 - (6) Preferably, write the answers in sequential order.

Marks

1. Attempt any FIVE of the following :

10

- (a) Define Algorithm.
- (b) Give the significance of `<math.h>` and `<stdio.h>` header files.
- (c) Give syntax of if-else ladder.
- (d) Define Array.
- (e) Write syntax and use of `pow()` function of `<math.h>` header file.
- (f) Define pointer. Write syntax for pointer declaration.
- (g) Draw and label symbols used in flow chart.

2. Attempt any THREE of the following :**12**

- (a) Write an algorithm to determine whether a given number is divisible by 5 or not.
- (b) Explain do – while loop with example.
- (c) Explain one dimension and two dimension arrays.
- (d) Write the output of following c program

```
#include<stdio.h>

int main ( )
{
    char *ptr;

    char str[]="MAHARASHTRA STATE BOARD OF TECHNICAL
    EDUCATION";

    ptr=str;

    ptr=ptr+11;

    printf("%s",++ptr);

    return 0;
}
```

3. Attempt any THREE of the following :**12**

- (a) Explain increment and decrement operator.
- (b) Explain User defined function with example.
- (c) Explain conditional operator with example.
- (d) Explain strlen() and strcpy() function with example.

4. **Attempt any THREE of the following :** **12**
- (a) Write algorithm and draw flow-chart to print even numbers from 1 to 100.
 - (b) Write a program to accept marks of four subjects as input from user. Calculate and display total and percentage marks of student.
 - (c) Write a program to accept the value of year as input from the keyboard & print whether it is a leap year or not.
 - (d) Write a program to accept a string as input from user and determine its length. [Don't use built in library function strlen()]
 - (e) Write a program to swap two numbers using call by value.
5. **Attempt any TWO of the following :** **12**
- (a) Write a program using switch statement to check whether entered character is VOWEL or CONSONANT.
 - (b) Write a program for addition of two 3×3 matrices.
 - (c) Write a program to Print values of variables and their addresses.
6. **Attempt any TWO of the following :** **12**
- (a) Write a program to declare structure employee having data member name, age, street and city. Accept data for two employees and display it.
 - (b) If the value of a number (N) is entered through keyboard. Write a program using recursion to calculate and display factorial of number (N).
 - (c) Write a program to accept two numbers from user and perform addition, subtraction, multiplication and division operations using pointer.
-



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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 any equivalent 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.

Q. No	Sub Q.N.	Answer	Marking Scheme
1.	(a) Ans	Attempt any FIVE of the following: Define Algorithm Algorithm:- Algorithm is a stepwise set of instructions written to perform a specific task.	10 2M Correct Definitio n 2M
	(b) Ans	Give the significance of <math.h> and <stdio.h> header files. “math.h” header file supports all the mathematical related functions in C language. stdio.h header file is used for input/output functions like scanf and printf.	2M Signific ance of each 1M
	(c) Ans	Give syntax of if-else ladder. if(condition_expression_One) { statement1; } else if (condition_expression_Two) { statement2;	2M Correct syntax 2M



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		<pre>} else if (condition_expression_Three) { statement3; } else { statement4; }</pre>	
	(d) Ans	Define Array. An array is a collection of data items, all of the same type, accessed using a common name. A one-dimensional array consists of similar type of multiple values in it. A two dimensional array consists of row and column.	2M <i>Definitio n of array</i> 2M
	(e) Ans	Write syntax and use of pow ()function of <math.h> header file. pow()- compute the power of a input value Syntax: double pow (double x, double y);	2M <i>Syntax and use of pow()</i> 1M each
	(f) Ans	Define pointer. Write syntax for pointer declaration. Definition: A pointer is a variable that stores memory address of another variable which is of similar data type. Declaration: datatype *pointer_variable_name;	2M <i>Definitio n of pointer</i> 1M, <i>Syntax</i> 1M
	(g)	Draw and label symbols used in flow chart.	2M



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	Ans	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #cccccc;"> <th style="padding: 5px;">Symbol</th> <th style="padding: 5px;">Name</th> <th style="padding: 5px;">Function</th> </tr> </thead> <tbody> <tr> <td style="padding: 10px;"></td> <td style="padding: 10px;">Process</td> <td style="padding: 10px;">Indicates any type of internal operation inside the Processor or Memory</td> </tr> <tr> <td style="padding: 10px;"></td> <td style="padding: 10px;">input/output</td> <td style="padding: 10px;">Used for any Input / Output (I/O) operation. Indicates that the computer is to obtain data or output results</td> </tr> <tr> <td style="padding: 10px;"></td> <td style="padding: 10px;">Decision</td> <td style="padding: 10px;">Used to ask a question that can be answered in a binary format (Yes/No, True/False)</td> </tr> <tr> <td style="padding: 10px;"></td> <td style="padding: 10px;">Connector</td> <td style="padding: 10px;">Allows the flowchart to be drawn without intersecting lines or without a reverse flow.</td> </tr> <tr> <td style="padding: 10px;"></td> <td style="padding: 10px;">Predefined Process</td> <td style="padding: 10px;">Used to invoke a subroutine or an Interrupt program.</td> </tr> <tr> <td style="padding: 10px;"></td> <td style="padding: 10px;">Terminal</td> <td style="padding: 10px;">Indicates the starting or ending of the program, process, or interrupt program</td> </tr> <tr> <td style="padding: 10px;"></td> <td style="padding: 10px;">Flow Lines</td> <td style="padding: 10px;">Shows direction of flow.</td> </tr> </tbody> </table>	Symbol	Name	Function		Process	Indicates any type of internal operation inside the Processor or Memory		input/output	Used for any Input / Output (I/O) operation. Indicates that the computer is to obtain data or output results		Decision	Used to ask a question that can be answered in a binary format (Yes/No, True/False)		Connector	Allows the flowchart to be drawn without intersecting lines or without a reverse flow.		Predefined Process	Used to invoke a subroutine or an Interrupt program.		Terminal	Indicates the starting or ending of the program, process, or interrupt program		Flow Lines	Shows direction of flow.	<p><i>Any Four Symbols</i> <i>½ M each</i></p>
Symbol	Name	Function																									
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2.	<p>(a) Ans</p>	<p>Attempt any THREE of the following: Write an algorithm to determine whether a given number is divisible by 5 or not Step 1- Start Step 2- Read / input the number. Step 3- if $n\%5==0$ then goto step 5. Step 4- else number is not divisible by 5 goto step 6. Step 5- display the output number is divisible by 5. Step 6- Stop</p>	<p>12 4M <i>Correct algorithm 4M</i></p>																								
	<p>(b) Ans</p>	<p>Explain do-while loop with example. Do-While statement:</p> <ul style="list-style-type: none"> • In some applications it is necessary to execute the body of the loop before the condition is checked; such situation can be handled by do statement. • At least once the body of loop will be executed. • do statement, first executes the body of the loop. • At the end of the loop, the test condition in the while statement is evaluated. If the condition is true, then it continues to execute body 	<p>4M <i>Explanation 2M,</i></p>																								



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	<p>of the loop once again.</p> <ul style="list-style-type: none">• This process continues as long as the condition is true.• When the condition becomes false, the loops will be terminated and the control goes to next statement after while statement. <p>Example:</p> <pre>#include <stdio.h> #include <conio.h> void main() { int i=1; clrscr(); printf("\n Odd numbers from 1 to 20 are \n"); do { if(i%2 != 0) printf("\n %d", i); i++; }while(i<=20); /* The loop iterates till the value of i is less than or equal to 20 */ getch(); }</pre>	<p><i>Any relevant Example</i> 2M</p>
<p>(c) Ans</p>	<p>Explain one dimension and two dimension arrays</p> <p>i) One dimensional array: An array is a collection of variables of the same type that are referred through a common name. A specific element in an array is accessed by an index. In C, all arrays consist of contiguous memory locations. The lowest address corresponds to the first element and the highest address to the last element. Syntax: data_type array_name[array_size];</p> <p>Example: int marks[10];</p> <p>ii) Two dimensional array : Two dimensional array is a collection of similar type of data elements arranged in the form of rows & columns. Example: Array can be declared as int arr[3][3]; In this there can be 9 elements in an array with 3 rows and 3 columns.</p>	<p>4M</p> <p><i>Explanation of one dimensional and two dimensional array</i> 2M each</p>



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	(d)	Write the output of following c program <pre>#include<stdio.h> int main() { char *ptr; char str[]="MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION"; ptr=str; ptr=ptr+11; printf("%s", ++ptr); return 0; } </pre> Ans Output : STATE BOARD OF TECHNICAL EDUCATION	4M <i>Correct output 4M</i>
3	(a) Ans	Attempt any THREE of the following: Explain increment and decrement operator. Increment operator is used to increment or increase the value of a variable by one. It is equivalent to adding one to the value of the variable. The symbol used is ++. The decrement operator is used to decrement or decrease the value of variable by 1. It is equivalent to subtracting one from the value of the variable. The symbol used is --. Syntax: ++var or var++ for increment and --var or var--for decrement. Example: <pre>int m=5; int n = ++m; printf("%d%d",m,n); </pre> When the increment operator is used prior to the variable name m, the value of the variable m is incremented first and then assigned to the variable n. The values of both the variable m and n here will be 6. But if the increment operator ++ is used after the variable name, then the value of the variable m is assigned to the variable n and then the value of m is increased. Therefore the values of m and n will be 6 and 5 respectively. Example for decrement operator <pre>int m=5; int n=-m; </pre>	12 4M <i>Explana tion of each 2M</i>



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	<pre>printf(“%d%d”,m,n); or #include<stdio.h> #include<conio.h> void main() { int m=4,n=6; clrscr(); printf("values of m and n before changing%d%d",m,n); m++; n--; printf("\nvalues after changing%d%d",m,n); getch(); }</pre>	
<p>(b) Ans</p>	<p>Explain User defined function with example.</p> <p>Functions are basic building blocks in a program. It can be predefined/ library functions or user defined functions. Predefined functions are those which are already available in C library. User defined functions are those which are written by the users to complete a specific task. Execution of a C program starts from main(). User defined functions should be called from main() for it to execute. A user defined function has a return type and a name. it may or may not contain parameters.</p> <p>The general syntax of a user defined function :</p> <p>Return_type func_name(parameter list)</p> <p>Example:</p> <pre>#include<stdio.h> #include<conio.h> void myFunc(int a) { printf("The value is: %d",a); } void main() { myFunc(10); getch() }</pre>	<p>4M</p> <p><i>Explanation with general syntax</i> 2M</p> <p><i>Example</i> 2M</p>



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	<p>(c) Ans</p>	<p>Explain conditional operator with example. Conditional operators return one value if condition is true and returns another value if condition is false. This operator is also called as ternary operator as it takes three arguments. Syntax : (Condition? true_value: false_value);</p> <p>Example: #include<stdio.h> #include<conio.h> void main() { int i; clrscr(); printf("Enter a number:"); scanf("%d",&i); i%2==0?printf("%d is even",i):printf("%d is odd",i) ; getch(); }</p>	<p>4M</p> <p><i>Explanation 2M</i></p> <p><i>Example 2M</i></p>
	<p>(d) Ans</p>	<p>Explain strlen() and strcpy() function with example. strlen()- this function is used to find the length of a string. It counts the number of characters comprising the string. Syntax: strlen(char[] str)- finds the length of the string str.</p> <p>Example: #include<stdio.h> #include<conio.h> #include<string.h> void main() { char str[] = "mystring"; int len=0; clrscr(); len=strlen(str); printf("Length of string is :%d",len); getch(); }</p> <p>strcpy()- this function is used to copy the contents of a string to other.</p>	<p>4M</p> <p><i>Explanation & Example of each 2M</i></p>



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		<p>Syntax: strcpy(char[] dest, char[] source)- copies the contents of the string source to destination.</p> <p>Example: #include<stdio.h> #include<conio.h> #include<string.h> void main() { char source[]="mystring"; char dest[10]; clrscr(); printf("%s%s",source,dest); strcpy(dest,source); printf("\n%s %s",source, dest); getch(); }</p>	
4	(a) Ans	<p>Attempt any THREE of the following Write algorithm and draw flow-chart to print even numbers from 1 to 100.</p> <p>Algorithm</p> <ol style="list-style-type: none">1. Start2. Initialize the variable i to 1.3. while i<=1004. if i%2==05. print the number6. increment value of i7. stop	12 4M <i>Algorithm 2M</i> <i>Flowchart 2M</i>



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	Flowchart	<pre>graph TD; Start([start]) --> Init[Initialize variable i=1]; Init --> Loop{Is i <= 100?}; Loop -- YES --> Check{Is i%2==0?}; Loop -- NO --> Stop([stop]); Check -- YES --> Print[Print i]; Check -- NO --> Inc[i=i+1]; Print --> Inc; Inc --> Loop;</pre>	
(b)	Ans	<p>Write a program to accept marks of four subjects as input from user. Calculate and display total and percentage marks of student.</p> <p><i>Note: Any other correct logic shall be considered</i></p> <pre>#include<stdio.h> #include<conio.h> void main() { float marks[4]; float total=0.0, perc=0.0; int i;</pre>	4M Relevant logic 2M Syntax 2M



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		<pre>clrscr(); for(i=1;i<=4;i++) { printf("Enter marks of subject %d",i); scanf("%f%",&marks[i]); } for(i=1;i<=4;i++){ total=total+marks[i]; } printf("Total is :%f",total); perc=total/4; printf("Percentage is %f",perc); getch(); }</pre>	
(c)	Write a program to accept the value of year as input from the keyboard & print whether it is a leap year or not.		4M
Ans	<pre>#include<stdio.h> #include<conio.h> void main() { int year; clrscr(); printf("Enter year"); scanf("%d",&year); if(year%4==0) { printf("Year %d is a leap year",year); } else { printf("Year %d is not a leap year",year); } getch(); }</pre>	<i>Correct Logic</i> 2M <i>Correct Syntax</i> 2M	
(d)	Write a program to accept a string as input from user and determine its length. [Don't use built in library function strlen()]		4M
Ans	<pre>#include<stdio.h> #include<conio.h> void main(){ char str[50]; int i, len=0; clrscr(); printf("Enter a string");</pre>	<i>Correct Logic</i> 2M <i>Correct Syntax</i> 2M	



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		<pre>scanf("%s",&str); for(i=0; str[i]!='\0'; i++){ len++; } printf("The length of string is %d",len); getch(); }</pre>	
	(e) Ans	<p>Write a program to swap two numbers using call by value.</p> <pre>#include<stdio.h> #include<conio.h> void swap(int a, int b) { int temp; temp=a; a=b; b=temp; printf("Numbers after swapping no1=%d and no2=%d",a,b); } void main() { int no1, no2; clrscr(); printf("Enter the 2 numbers"); scanf("%d%d",&no1,&no2); printf("Numbers before swapping no1=%d and no2= %d",no1, no2); swap(no1,no2); getch(); }</pre>	4M <i>Correct Logic</i> 2M <i>Correct Syntax</i> 2M
5	(a) Ans	<p>Attempt any TWO of the following:</p> <p>Write a program using switch statement to check whether entered character is VOWEL or CONSONANT</p> <p><i>Note : Assume that the entered character is only alphabet.</i></p> <pre>#include<stdio.h> #include<conio.h> void main() { char ch; clrscr(); printf("Enter character:"); scanf("%c",&ch);</pre>	12 6M <i>character input-</i> 2M



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	<pre>switch(ch) { case 'a': case 'e': case 'i': case 'o': case 'u': case 'A': case 'E': case 'I': case 'O': case 'U': printf("\n Entered character is VOWEL"); break; default: printf("\n Entered character is CONSONANT"); } getch(); }</pre>	<p><i>Display vowel- 2M</i></p> <p><i>Display consonant 2M</i></p>
<p>(b) Ans</p>	<p>Write a program for addition of two 3 x 3 matrices.</p> <pre>#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++)</pre>	<p>6M</p> <p><i>Input of two matrices 2M</i></p>



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	<pre>{ 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]; } } printf("\n\nAddition of two matrices is:"); for(i=0;i<3;i++) { for(j=0;j<3;j++) { printf("%d\t",c[i][j]); } } getch(); }</pre>	<p><i>Addition of matrices 2M</i></p> <p><i>Display of addition 2M</i></p>
(c)	<p>Write a program to Print values of variables and their addresses. <i>Note : 1) Variables can be of any data type. 2) Use of <u>&</u> or <u>pointer</u> to display address shall be considered.</i></p>	6M
Ans	<pre>#include<stdio.h> #include<conio.h> void main() { int a,b; clrscr(); a=5; b=10; printf("\n Value of a=%d",a); printf("\n Address of a=%u",&a); printf("\n Value of b=%d",b); printf("\n Address of b=%u",&b); getch(); }</pre>	<p><i>Display values of variable- 3M</i></p> <p><i>Display address of variable 3M</i></p>



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6	(a)	<p>Attempt any TWO of the following:</p> <p>Write a program to declare structure employee having data member name, age, street and city. Accept data for two employees and display it.</p> <p><i>Note : Two structure variables or array of structure variables shall be considered.</i></p> <p>Ans</p> <pre>#include<stdio.h> #include<conio.h> struct employee { char name[10],street[10],city[10]; int age; }; void main() { int i; struct employee e[2]; clrscr(); for(i=0;i<2;i++) { printf("\n Enter name:"); scanf("%s",&e[i].name); printf("\n Enter age:"); scanf("%d",&e[i].age); printf("\n Enter street:"); scanf("%s",&e[i].street); printf("\n Enter city:"); scanf("%s",&e[i].city); } for(i=0;i<2;i++) { printf("\n Name=%s",e[i].name); printf("\n Age=%d",e[i].age); printf("\n Street=%s",e[i].street); printf("\n City=%s",e[i].city); } getch(); }</pre>	12 6M <i>Declarat ion of structur e-2M</i> <i>Acceptin g data- 2M</i> <i>Displayi ng data2M</i>
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	<p>(b)</p> <p>Ans</p>	<p>If the value of a number (N) is entered through keyboard. Write a program using recursion to calculate and display factorial of number (N).</p> <pre>#include<stdio.h> #include<conio.h> int factorial(int N); void main() { int N,fact; clrscr(); printf("Enter number:"); scanf("%d",&N); fact=factorial(N); printf("\n Factorial is:%d",fact); getch(); } int factorial(int N) { if(N==1) return(1); else return(N*factorial(N-1)); }</pre>	<p>6M</p> <p><i>Main function definitio n-3M,</i></p> <p><i>Recursiv e function definitio n-3M</i></p>
	<p>(c)</p> <p>Ans</p>	<p>Write a program to accept two numbers from user and perform addition, subtraction, multiplication and division operations using pointer.</p> <pre>#include<stdio.h> #include<conio.h> void main() { int no1,no2,*ptr1,*ptr2,result; clrscr(); printf("Enter no1:"); scanf("%d",&no1); printf("\nEnter no2:"); scanf("%d",&no2); ptr1=&no1; ptr2=&no2; result=*ptr1+*ptr2;</pre>	<p>6M</p> <p><i>Acceptin g numbers 1M</i></p> <p><i>Pointer initializa tion-1M</i></p> <p><i>Addition 1M</i></p>



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	<pre>printf("\n Addition=%d",result); result=*ptr1-*ptr2; printf("\n Subtraction=%d",result); result=*ptr1**ptr2; printf("\n Multiplication=%d",result); result=*ptr1/(*ptr2); printf("\n Division=%d",result); getch(); }</pre>	<p><i>subtracti on-1M</i></p> <p><i>multiplic ation- 1M</i></p> <p><i>division- 1M</i></p>
--	--	--

22226

21819

3 Hours / 70 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.

1. Attempt any FIVE of the following :

Marks

10

- (a) Draw flowchart for checking whether given number is even or odd.
- (b) List any four keywords used in 'C' with their use.
- (c) Write the syntax of switch case statement.
- (d) State any two differences between while and do-while statement.
- (e) State difference between array and string.
- (f) Declare a structure student with element roll-no and name.
- (g) Distinguish between call by value and call by reference.

2. Attempt any THREE of the following :

12

- (a) State four arithmetic operations perform on pointer with example.
- (b) Draw flowchart for checking weather given number is prime or not.
- (c) Write a program to reverse the number 1234 (i.e. 4321) using function.
- (d) Differentiate between character array and integer array with respect to size and initialisation.

- 3. Attempt any THREE of the following : 12**
- (a) Write a program to sum all the odd numbers between 1 to 20.
 - (b) Explain any four bit-wise operator used in 'C' with example.
 - (c) With suitable example, explain how two dimensional arrays can be created.
 - (d) Explain any two string functions with example.
- 4. Attempt any THREE of the following : 12**
- (a) Draw flowchart for finding largest number among three numbers.
 - (b) Describe generic structure of 'C' program.
 - (c) Write a program to take input as a number and reverse it by while loop.
 - (d) Write a program to accept 10 numbers in array and arrange them in ascending order.
 - (e) Explain meaning of following statement with reference to pointers :
int *a, b;
b = 20;
*a = b;
A = &b;
- 5. Attempt any TWO of the following : 12**
- (a) Write a program to perform addition, subtraction, multiplication and division of two integer number using function.
 - (b) Define Array. Write a program to accept ten numbers in array. Sort array element and display.
 - (c) Write a program to print reverse of a entered string using pointer.
- 6. Attempt any TWO of the following : 12**
- (a) Explain recursion with suitable example. List any two advantages.
 - (b) Write a program to accept ten numbers and print average of it.
 - (c) Enlist different format specifiers with its use.
-



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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 any equivalent 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.

Q. No	Sub Q.N.	Answer	Marking Scheme
1.	(a) Ans.	<p>Attempt any FIVE of the following: Draw flowchart for checking whether given number is even or odd.</p> <pre>graph TD; Start([START]) --> Input[/Input Value A/]; Input --> Decision{IS a%2==0?}; Decision -- Yes --> PrintEven[/Print "The number is even"/]; PrintEven --> Stop([STOP]); Decision -- No --> PrintOdd[/Print "The number is odd"/]; PrintOdd --> Stop;</pre>	10 2M <i>Correct logic 1M</i> <i>Relevant symbol 1M</i>



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(b)	List any four keywords used in ‘C’ with their use. <i>(Note: Any other relevant keyword in ‘C’ may be considered).</i>	2M																																																				
	Ans.																																																					
	<table border="1"><thead><tr><th>Keyword</th><th>Use</th></tr></thead><tbody><tr><td>auto</td><td>It is used to declare auto storage class variable.</td></tr><tr><td>break</td><td>It is used to exit from block or loop.</td></tr><tr><td>case</td><td>It is used to represent possible case inside switch case statement</td></tr><tr><td>char</td><td>Used for declaration of character type variable</td></tr><tr><td>const</td><td>It is used to declare a constant.</td></tr><tr><td>continue</td><td>It is used pass control at the beginning of the loop</td></tr><tr><td>default</td><td>It is used to represent default case inside switch case statement.</td></tr><tr><td>do</td><td>It is used to execute loop in association with while condition.</td></tr><tr><td>double</td><td>Used for declaration of double type variable</td></tr><tr><td>else</td><td>It is used with if statement to transfer control to statement when condition is false.</td></tr><tr><td>enum</td><td>It is used to declare enumerated data.</td></tr><tr><td>extern</td><td>It is used to declare extern storage class variable</td></tr><tr><td>float</td><td>Used for declaration of float type variable</td></tr><tr><td>for</td><td>Used for repetitive execution of statements</td></tr><tr><td>goto</td><td>It is used to transfer control from one statement to another</td></tr><tr><td>if</td><td>It is used for condition checking</td></tr><tr><td>int</td><td>Used for declaration of integer type variable</td></tr><tr><td>long</td><td>Used for declaration of long type variable</td></tr><tr><td>register</td><td>It is used to declare register storage class variable</td></tr><tr><td>return</td><td>It is used to return value from function.</td></tr><tr><td>short</td><td>Used for declaration of short type variable</td></tr><tr><td>signed</td><td>Used for declaration of signed type variable</td></tr><tr><td>sizeof</td><td>It returns memory size allocated to variable or data type</td></tr><tr><td>static</td><td>It is used to declare static storage class variable</td></tr><tr><td>struct</td><td>It is used to declare user defined data type structure</td></tr></tbody></table>	Keyword	Use	auto	It is used to declare auto storage class variable.	break	It is used to exit from block or loop.	case	It is used to represent possible case inside switch case statement	char	Used for declaration of character type variable	const	It is used to declare a constant.	continue	It is used pass control at the beginning of the loop	default	It is used to represent default case inside switch case statement.	do	It is used to execute loop in association with while condition.	double	Used for declaration of double type variable	else	It is used with if statement to transfer control to statement when condition is false.	enum	It is used to declare enumerated data.	extern	It is used to declare extern storage class variable	float	Used for declaration of float type variable	for	Used for repetitive execution of statements	goto	It is used to transfer control from one statement to another	if	It is used for condition checking	int	Used for declaration of integer type variable	long	Used for declaration of long type variable	register	It is used to declare register storage class variable	return	It is used to return value from function.	short	Used for declaration of short type variable	signed	Used for declaration of signed type variable	sizeof	It returns memory size allocated to variable or data type	static	It is used to declare static storage class variable	struct	It is used to declare user defined data type structure	<p><i>Any four keywords 1M</i></p> <p><i>Use 1M</i></p>
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		<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 30%;">switch</td> <td>It is used to make decision from multiple number of inputs</td> </tr> <tr> <td>typedef</td> <td>Used to redefine the name of an existing variable type.</td> </tr> <tr> <td>union</td> <td>It is used to declare the data type union</td> </tr> <tr> <td>unsigned</td> <td>Used for declaration of unsigned type variable</td> </tr> <tr> <td>void</td> <td>Specify that function does not return any value</td> </tr> <tr> <td>volatile</td> <td>It is used to declare a volatile variable</td> </tr> <tr> <td>while</td> <td>Used for repetitive execution of statements</td> </tr> </tbody> </table>	switch	It is used to make decision from multiple number of inputs	typedef	Used to redefine the name of an existing variable type.	union	It is used to declare the data type union	unsigned	Used for declaration of unsigned type variable	void	Specify that function does not return any value	volatile	It is used to declare a volatile variable	while	Used for repetitive execution of statements	
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	<p>(c) Ans.</p>	<p>Write the syntax of switch case statement.</p> <pre>switch(variable) { case value1: statements break; case value2: statements; break; . . . default: statements; break; }</pre>	<p>2M</p> <p><i>Correct syntax 2M</i></p>														
	<p>(d) Ans.</p>	<p>State any two differences between while and do-while statement. <i>(Note: Any 2 points shall be considered).</i></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">while</th> <th style="width: 50%; text-align: center;">Do-while</th> </tr> </thead> <tbody> <tr> <td>In 'while' loop the controlling condition appears at the start of the loop.</td> <td>In 'do-while' loop the controlling condition appears at the end of the loop.</td> </tr> <tr> <td>The iterations do not occur if, the condition at the first iteration, appears false.</td> <td>The iteration occurs at least once even if the condition is false at the first iteration.</td> </tr> <tr> <td>It is an entry controlled loop</td> <td>It is an exit controlled loop</td> </tr> <tr> <td>while(condition) { body</td> <td>do { body</td> </tr> </tbody> </table>	while	Do-while	In 'while' loop the controlling condition appears at the start of the loop.	In 'do-while' loop the controlling condition appears at the end of the loop.	The iterations do not occur if, the condition at the first iteration, appears false.	The iteration occurs at least once even if the condition is false at the first iteration.	It is an entry controlled loop	It is an exit controlled loop	while(condition) { body	do { body	<p>2M</p> <p><i>Any two differences 1M each</i></p>				
while	Do-while																
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		}	}while(condition);	
(e)	State difference between array and string.			2M
Ans.	<i>(Note: Any two valid points shall be considered).</i>			
	Array	String		
	Array can be of any type like int, float, char.	String can contain only characters.		<i>Any two points 1M for each</i>
	Element Elements in an array can be accessed using its position like a[2].s in an array can be accessed using its position like a[2].	Characters in string are accessed sequentially from first to last.		
	Array does not end with a null character	String is ended with a '\0' character.		
	Array size once declared cannot be changed	String size can be modified using pointer.		
(f)	Declare a structure student with element roll-no and name.			
Ans.	<pre>struct student { int roll_no; char name[20]; };</pre>			<i>Correct declaration on 2M</i>
(g)	Distinguish between call by value and call by reference.			2M
Ans.	<i>(Note: Any two points shall be considered).</i>			
	Call by value	Call by reference		
	A copy of actual arguments is passed to respective formal arguments.	The address of actual arguments is passed to formal arguments		<i>Any two points 1M each</i>
	Actual arguments will remain safe, they cannot be modified accidentally.	Alteration to actual arguments is possible within from called function; therefore the code must handle arguments carefully else you get unexpected results.		
	Address of the actual and formal arguments are different	Address of the actual and formal arguments are the same		
	Changes made inside the function is not reflected in other functions	Changes made in the function is reflected outside also.		
2.	Attempt any THREE of the following:			12
(a)	State four arithmetic operations perform on pointer with			4M



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	<p>Ans.</p>	<p>example. (<i>Note: Code snippet shall be considered</i>) The pointer arithmetic is done as per the data type of the pointer. The basic operations on pointers are Increment: It is used to increment the pointer. Each time a pointer is incremented, it points to the next location with respect to memory size . Example, If ptr is an integer pointer stored at address 1000, then ptr++ shows 1002 as incremented location for an int. It increments by two locations as it requires two bytes storage. Decrement: It is used to decrement the pointer. Each time a pointer is decremented, it points to the previous location with respect to memory size. Example, If the current position of pointer is 1002, then decrement operation ptr-- results in the pointer pointing to the location 1000 in case of integer pointer as it requires two bytes storage. Addition When addition operation is performed on pointer, it gives the location incremented by the added value according to data type. Eg: If ptr is an integer pointer stored at address 1000, Then ptr+2 shows $1000+(2*2) = 1004$ as incremented location for an int. Subtraction When subtraction operation is performed on the pointer variable, it gives the location decremented by the subtracted value according to data type. Eg: If ptr is an integer pointer stored at address 1004, Then ptr-2 shows $1004-(2*2) = 1000$ as decremented location for an int.</p>	<p><i>Each operation with example</i> 1M</p>
	<p>(b)</p>	<p>Draw flowchart for checking whether given number is prime or</p>	<p>4M</p>



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	<p>Ans.</p>	<p>not.</p> <pre>graph TD; Start([Start]) --> Set[Set i=2, flag=0]; Set --> Input[/Inputno/]; Input --> Cond1{if i < no/2}; Cond1 -- NO --> Prime[/prime/]; Cond1 -- Yes --> Cond2{no%i==0}; Cond2 -- NO --> Inc[i=i+1]; Inc --> Cond1; Cond2 -- Yes --> SetFlag[Set flag=1]; SetFlag --> Cond3{if flag==1}; Cond3 -- NO --> Prime; Cond3 -- Yes --> NotPrime[/notprime/]; Prime --> Stop([Stop]); NotPrime --> Stop;</pre>	<p><i>Correct logic 2M</i></p> <p><i>Symbols 2M</i></p>
	<p>(c)</p> <p>Ans.</p>	<p>Write a program to reverse the number 1234 (i.e. 4321) using function. (Note: Any other correct logic shall be considered).</p> <pre>#include<stdio.h> #include<conio.h> void findReverse(); void main() { findReverse(); } void findReverse() {</pre>	<p>4M</p> <p><i>Correct syntax 2M</i></p> <p><i>Correct logic 2M</i></p>



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		<pre>int num, res=0,ans=0; clrscr(); printf("Enter the number"); scanf("%d", &num); while(num!=0) { res=num%10; ans=ans*10+res; num=num/10; } printf("Reverse number is %d", ans); getch(); }</pre>										
	<p>(d)</p> <p>Ans.</p>	<p>Differentiate between character array and integer array with respect to size and initialisation.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Parameter</th> <th style="width: 35%;">Character Array</th> <th style="width: 40%;">Integer Array</th> </tr> </thead> <tbody> <tr> <td>Size</td> <td>Last location in character array is filled with '\0' so the array size should be so declared that it should have one last location for '\0' character.</td> <td>No extra location than the number of elements is required.</td> </tr> <tr> <td>Initialization</td> <td>Initialization can be done like : char str[4]={'a','b','c','\0'}; char str[4]="abc";</td> <td>Initialization can be done like : int arr[4]={1,2,3,4};</td> </tr> </tbody> </table>	Parameter	Character Array	Integer Array	Size	Last location in character array is filled with '\0' so the array size should be so declared that it should have one last location for '\0' character.	No extra location than the number of elements is required.	Initialization	Initialization can be done like : char str[4]={'a','b','c','\0'}; char str[4]="abc";	Initialization can be done like : int arr[4]={1,2,3,4};	<p>4M</p> <p><i>Each parameter 2M</i></p>
Parameter	Character Array	Integer Array										
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3.	<p>(a)</p> <p>Ans.</p>	<p>Attempt any THREE of the following:</p> <p>Write a program to sum all the odd numbers between 1 to 20. <i>(Note: Any other correct logic shall be considered).</i></p> <pre>#include<stdio.h> #include<conio.h> void main() { int sum=0,i; clrscr(); for(i=1;i<=20;i++)</pre>	<p>12</p> <p>4M</p> <p><i>Correct logic 2M</i></p>									



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		<pre> { if(i%2==1) sum=sum+i; } printf("sum of odd no"s between 1 to 20 is %d",sum); getch(); } </pre>	<p><i>Correct syntax</i> 2M</p>
	<p>(b) Ans.</p>	<p>Explain any four bit-wise operator used in ‘C’ with example. Bitwise operators:</p> <p>Bitwise OR – It takes 2 bit patterns and performs OR operations on each pair of corresponding bits. The following example will explain it.</p> <pre> 1010 1100 ----- OR 1110 </pre> <p>Bitwise AND – & It takes 2 bit patterns and performs AND operations with it.</p> <pre> 1010 1100 ----- AND 1000 ----- </pre> <p>The Bitwise AND will take pair of bits from each position, and if only both the bit is 1, the result on that position will be 1. Bitwise AND is used to Turn-Off bits.</p> <p>Bitwise NOT One’s complement operator (Bitwise NOT) is used to convert each “1-bit to 0-bit” and “0-bit to 1-bit”, in the given binary pattern. It is a unary operator i.e. it takes only one operand.</p> <pre> 1001 NOT 0110 ----- </pre> <p>Bitwise XOR ^ Bitwise XOR ^, takes 2 bit patterns and perform XOR operation with it.</p>	<p>4M</p> <p style="text-align: right;"><i>Explanation with example of any four bitwise operator</i> 1M each</p>



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		<pre>0101 0110 ----- XOR 0011 -----</pre> <p>Left shift Operator – << The left shift operator will shift the bits towards left for the given number of times. int a=2<<1;</p> <p>Right shift Operator – >> The right shift operator will shift the bits towards right for the given number of times. int a=8>>1;</p>	
	<p>(c) Ans.</p>	<p>With suitable example, explain how two dimensional arrays can be created.</p> <p>The array which is used to represent and store data in a tabular form is called as two dimensional array. Such type of array is specially used to represent data in a matrix form.</p> <p>Declaration of two dimensional arrays: <i>Syntax:-</i> Data type arrayname [row size] [column size]; <i>Eg:</i> int arr[3][4]; This will declare array “arr” with 3 rows and 4 columns. A two-dimensional array can be considered as a table which will have x number of rows and y number of columns. A two-dimensional array a, which contains three rows and four columns can be shown as follows –</p>	<p>4M</p> <p><i>Explanation 2M</i></p>



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	<table border="1"><thead><tr><th></th><th>Column 0</th><th>Column 1</th><th>Column 2</th><th>Column 3</th></tr></thead><tbody><tr><th>Row 0</th><td>a[0][0]</td><td>a[0][1]</td><td>a[0][2]</td><td>a[0][3]</td></tr><tr><th>Row 1</th><td>a[1][0]</td><td>a[1][1]</td><td>a[1][2]</td><td>a[1][3]</td></tr><tr><th>Row 2</th><td>a[2][0]</td><td>a[2][1]</td><td>a[2][2]</td><td>a[2][3]</td></tr></tbody></table> <p>Thus, every element in the array a is identified by an element name of the form a[i][j], where 'a' is the name of the array, and 'i' and 'j' are the subscripts that uniquely identify each element in 'a'.</p> <p>Example :</p> <pre>main() { int a[2][2]={{1,2},{4,5}}; int i,j; for(i=0;i<2;i++) { for(j=0;j<2;j++) { printf("%d",a[i][j]); } printf("\n"); } }</pre>		Column 0	Column 1	Column 2	Column 3	Row 0	a[0][0]	a[0][1]	a[0][2]	a[0][3]	Row 1	a[1][0]	a[1][1]	a[1][2]	a[1][3]	Row 2	a[2][0]	a[2][1]	a[2][2]	a[2][3]	<p><i>Example</i> <i>2M</i></p>
	Column 0	Column 1	Column 2	Column 3																		
Row 0	a[0][0]	a[0][1]	a[0][2]	a[0][3]																		
Row 1	a[1][0]	a[1][1]	a[1][2]	a[1][3]																		
Row 2	a[2][0]	a[2][1]	a[2][2]	a[2][3]																		
<p>(d) Ans.</p>	<p>Explain any two string functions with example.</p> <p>Strlen function:</p> <p>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.</p> <p>Syntax:</p> <p>strlen(stringname);</p> <p>Example:</p> <p>Consider str1="abc"</p> <p>strlen(str1); returns length of str1 as 3</p>	<p>4M</p> <p><i>Explanation of any two string functions 1M each, example 1M each</i></p>																				



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		<p>strcat() function: In C programming, strcat() concatenates (joins) two strings. It concatenates source string at the end of destination string. Syntax: strcat(destination source, source string); Example: Consider str1="abc" and str2="def" strcat(str1,str2); returns abcdef in str1 and str2 remains unchanged.</p> <p>strcpy() function strcpy() function copies portion of contents of one string into another string. Syntax: strcpy(destination string, source string, size); Example: Consider str1="abc" strcpy(str1,str2); returns abcstr2</p> <p>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); Example: Consider str1="abc" and str2="abc" Then strcmp(str1,str2) returns 0 as both the strings are same.</p>	
4.	(a) Ans.	Attempt any THREE of the following: Draw flowchart for finding largest number among three numbers.	12 4M



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	<pre> graph TD Start([Start]) --> Decl[Declare variables a, b and c] Decl --> Read[/Read a, b and c/] Read --> IsAB{is a > b?} IsAB -- True --> IsAC{is a > c?} IsAB -- False --> IsBC{is b > c?} IsAC -- True --> PrintA[/Print a/] IsAC -- False --> PrintC[/Print c/] IsBC -- True --> PrintB[/Print b/] IsBC -- False --> PrintC PrintA --> Stop([Stop]) PrintB --> Stop PrintC --> Stop </pre>	<p><i>Correct flowchart 4M</i></p>
<p>(b) Ans.</p>	<p>Describe generic structure of 'C' program.</p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: 80%;"> <pre> Documentation section Link section Definition section Global declaration section main () Function section { Declaration part Executable part } Subprogram section Function 1 Function 2 Function n </pre> <p style="text-align: right; margin-right: 50px;">(User defined functions)</p> </div>	<p>4M</p> <p style="text-align: center;"><i>List of sections from structure 1M</i></p>



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	<p>Documentation section: The documentation section consists of a set of comment lines giving the name of the program, the author and other details, which the programmer would like to use later.</p> <p>Link section: The link section provides instructions to the compiler to link functions from the system library such as using the #include directive.</p> <p>Definition section: The definition section defines all symbolic constants such using the #define directive.</p> <p>Global declaration section: There are some variables that are used in more than one function. Such variables are called global variables and are declared in the global declaration section that is outside of all the functions.</p> <p>Declaration part: The declaration part declares all the variables used in the executable part.</p> <p>Subprogram section: If the program is a multi-function program then the subprogram section contains all the user-defined functions that are called in the main () function. User-defined functions are generally placed immediately after the main () function, although they may appear in any order.</p> <p>Header files A header file is a file with extension .h which contains C function declarations and macro definitions to be shared between several source files.</p> <p>Include Syntax Both the user and the system header files are included using the preprocessing directive #include.</p> <p>‘main’ function main() function is the entry point of any C program. It is the point at which execution of program is started. Every C program have a main() function.</p>	<p><i>Correct description of structure 3M</i></p>
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	<p>(c)</p> <p>Ans.</p>	<p>Write a program to take input as a number and reverse it by while loop. <i>(Note: Any other correct logic shall be considered).</i></p> <pre>#include<stdio.h> #include<conio.h> void main() { int no; int sum=0,rem; printf("\n Enter number:"); scanf("%d",&no); while(no>0) { rem=no%10; no=no/10; sum=sum*10+rem; } printf("\nsum=%d",sum); getch(); }</pre>	<p>4M</p> <p><i>Accept input 1M</i></p> <p><i>Use of while loop 1M</i></p> <p><i>correct syntax 2M</i></p>
	<p>(d)</p> <p>Ans.</p>	<p>Write a program to accept 10 numbers in array and arrange them in ascending order. <i>(Note: Any other correct logic shall be considered).</i></p> <pre>#include<stdio.h> #include<conio.h> void main() { int arr[10],i,j,temp; clrscr(); printf("Enter array elements:"); for(i=0;i<10;i++) { scanf("%d",&arr[i]); } printf("\n\n Array elements are:"); for(i=0;i<10;i++) { printf("%d ",arr[i]); } }</pre>	<p>4M</p> <p><i>Correct logic 2M</i></p> <p><i>Correct syntax 2M</i></p>



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		<pre>} for(j=0;j<10;j++) { for(i=0;i<10;i++) { if(arr[i+1]<arr[i]) { temp=arr[i]; arr[i]=arr[i+1]; arr[i+1]=temp; } } } printf("\n\nArray elements in ascending order are:"); for(i=0;i<10;i++) { printf("%d ",arr[i]); } getch(); }</pre>	
(e)	<p>Explain meaning of following statement with reference to pointers:</p> <pre>int *a, b; b=20; *a=b; A=&b;</pre> <p>Ans.</p> <pre>int *a,b;</pre> <p>It is declaration of integer pointer a and integer variable b</p> <pre>b=20;</pre> <p>value 20 is assigned to variable b.</p> <pre>*a=b;</pre> <p>Value of b is assigned to pointer a.</p> <pre>A=&b;</pre> <p>Address of b is assigned to variable A.</p>	4M	<p><i>Correct meaning of each statement 1M</i></p>



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5.	(a)	Attempt any TWO of the following: Write a program to perform addition, subtraction, multiplication and division of two integer number using function. (Note: Any other correct logic shall be considered).	12 6M
	Ans.	<pre>#include<stdio.h> #include<conio.h> void add(int x,int y) { printf("\nAddition=%d",x+y); } void sub(int x,int y) { printf("\nSubtraction=%d",x-y); } void mult(int x,int y) { printf("\nMultiplication=%d",x*y); } void div(int x,int y) { printf("\nDivision=%d",x/y); } void main() { intx,y; clrscr(); printf("Enter x:"); scanf("%d",&x); printf("Enter y:"); scanf("%d",&y); add(x,y); sub(x,y); mult(x,y); div(x,y); getch(); }</pre>	<i>Add function 1M</i> <i>sub function 1M</i> <i>Mult function 1M</i> <i>Div function 1M</i> <i>Main function 2M</i>
	(b)	Define Array. Write a program to accept ten numbers in array. Sort array element and display.	6M



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	Ans.	<p>Definition of Array: An array is a collection of data elements, all of the same type, accessed using a common name.</p> <p>Program: #include<stdio.h> #include<conio.h> void main() { int a[10],i,j,temp; clrscr(); printf("Enter numbers:"); for(i=0;i<10;i++) scanf("%d",&a[i]); for(i=0;i<10;i++) { for(j=i+1;j<10;j++) { if(a[i]>a[j]) { temp=a[i]; a[i]=a[j]; a[j]=temp; } } } printf("\n Sorted array elements:"); for(i=0;i<10;i++) printf("\n %d",a[i]); getch(); }</p>	<p><i>Array definition 1M</i></p> <p><i>Accepting array 1M</i></p> <p><i>Sorting logic 3M</i></p> <p><i>Display sorted array 1M</i></p>
	<p>(c)</p> <p>Ans.</p>	<p>Write a program to print reverse of a entered string using pointer. (Note: Any other correct logic shall be considered). #include<stdio.h> #include<conio.h> void main() {</p>	<p>4M</p>



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		<pre>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(); }</pre>	<p><i>Acceptin g string 1M</i></p> <p><i>pointer initializa tion1M</i></p> <p><i>logic of reverse using pointer 3M</i></p> <p><i>Displayi ng reverse string 1M</i></p>
6.	(a) Ans.	<p>Attempt any TWO of the following: Explain recursion with suitable example. List any two advantages.</p> <p>Recursion means a function calls itself repetitively. A recursive function contains a function call to itself inside its body.</p> <p>Example:</p> <pre>#include<stdio.h> #include<conio.h> int factorial(int N); void main() { int N,fact; clrscr(); printf("Enter number:"); scanf("%d",&N); fact=factorial(N);</pre>	<p>12 6M</p> <p><i>Explana tion of recursio n 1M</i></p> <p><i>Example 3M</i></p>



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	<pre>printf("\n Factorial is:%d",fact); getch(); } int factorial(int N) { if(N==1) return(1); else return(N*factorial(N-1)); }</pre> <p>Advantages:</p> <ul style="list-style-type: none">• Reduces length of the program• Reduces unnecessary calling of a function.• Useful when same solution is to be applied many times.	<p><i>Any two Advantages 2M</i></p>
<p>(b) Ans.</p>	<p>Write a program to accept ten numbers and print average of it. <i>(Note: Program without array shall be considered).</i></p> <pre>#include<stdio.h> #include<conio.h> void main() { int a[10],i,sum=0; float avg; clrscr(); printf("Enter numbers:"); for(i=0;i<10;i++) scanf("%d",&a[i]); for(i=0;i<10;i++) sum=sum+a[i]; avg=sum/10; printf("\n Average =%f", avg); getch(); }</pre>	<p>6M</p> <p><i>Accepting 10 numbers 2M</i></p> <p><i>Calculating average 2M</i></p> <p><i>Displaying average 2M</i></p>
<p>(c) Ans.</p>	<p>Enlist different format specifiers with its use.</p> <p>Format specifier tells the compiler what type of data a variable holds during taking input and printing output using scanf() and printf() functions respectively.</p> <p>Format specifiers used in C programming:</p>	<p>6M</p>



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Format specifier	Use	<i>Any six format specifiers with use 1M each</i>
%d	Specify data type as short signed	
%u	Specify data type as short unsigned	
%ld	Specify data type as long signed	
%lu	Specify data type as long unsigned	
%x	Specify data type as unsigned hexadecimal	
%o	Specify data type as unsigned octal	
%f	Specify data type as float	
%lf	Specify data type as double	
%Lf	Specify data type as long double	
%c	Specify data type as signed character	
%s	Specify data type as unsigned group of characters(Strings)	

22226

11920

3 Hours / 70 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. **Attempt any FIVE of the following :**

10

- (a) Define array. List its type.
- (b) Draw & label different symbols used in flowcharts.
- (c) Find the output of the following program :

```
# include < stdio.h>
void main( )
{
    int x = 10, y = 10, v1, v2 ;
    v1 = x++ ;
    v2 = ++y ;
    printf ("value of v1:%d", v1) ;
    printf ("value of v2:%d", v2) ;
}
```
- (d) State the syntax & use of `strlen ()` & `strcat ()` function.
- (e) State the Relational operators with example.
- (f) State the syntax to declare pointer variable with example.
- (g) Draw flow chart for addition of two numbers.

[1 of 2]

P.T.O.

- 2. Attempt any THREE of the following :** **12**
- (a) State the importance of flow chart.
 - (b) Write a program to declare structure student having rollno, name & marks. Accept & display data for 3 students.
 - (c) Explain pointer arithmetic with example.
 - (d) Explain nested if-else with example.
- 3. Attempt any THREE of the following :** **12**
- (a) Describe the following terms :
 - (i) Keyword
 - (ii) Identifier
 - (iii) Variable
 - (iv) Constant
 - (b) Differentiate between call by value and call by reference.
 - (c) Explain conditional operator with example.
 - (d) List the categories of functions and explain any one with example.
- 4. Attempt any THREE of the following :** **12**
- (a) Write an algorithm to determine the given number is odd or even.
 - (b) Illustrate the use of break and continue statement with example.
 - (c) Write a program to add, subtract, multiply and divide two numbers, accepted from user using switch case.
 - (d) Illustrate initialization of two dimensional array with example.
 - (e) Write a program to read two strings and find whether they are equal or not.
- 5. Attempt any TWO of the following :** **12**
- (a) Write a program to calculate sum of all the odd numbers between 1 to 20.
 - (b) Write a program for addition of two 3×3 matrices.
 - (c) Write a program to compute the sum of all elements stored in an array using pointers.
- 6. Attempt any TWO of the following :** **12**
- (a) Write a program to sort elements of an array in ascending order.
 - (b) Write a function to print Fibonacci series starting from 0, 1.
 - (c) Calculate factorial of a number using recursion.
-



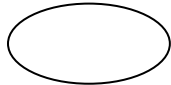
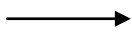
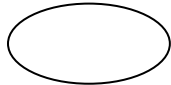
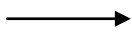
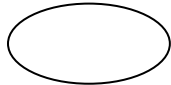
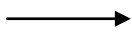
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Important Instructions to examiners:

- 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 any equivalent 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.

Q. No	Sub Q.N.	Answer	Marking Scheme									
1.	(a) Ans.	<p>Attempt any FIVE of the following:</p> <p>Define array. List its type.</p> <p>Array is a fixed-size sequential collection of elements of the same type.</p> <p>Types:</p> <ol style="list-style-type: none"> 1. One dimensional 2. Multi dimensional 	<p>10 2M</p> <p><i>Definition 1M</i></p> <p><i>Types 1M</i></p>									
	(b) Ans.	<p>Draw & label different symbols used in flowcharts.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 30%;">Symbol</th> <th style="width: 30%;">Name</th> <th style="width: 40%;">Function</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"></td> <td style="text-align: center;">Start/end</td> <td>An oval represents a start or end point</td> </tr> <tr> <td style="text-align: center;"></td> <td style="text-align: center;">Arrows</td> <td>A line is a connector that shows relationships between the representative shapes</td> </tr> </tbody> </table>	Symbol	Name	Function		Start/end	An oval represents a start or end point		Arrows	A line is a connector that shows relationships between the representative shapes	<p>2M</p> <p><i>Any 4 symbols ½M each</i></p>
Symbol	Name	Function										
	Start/end	An oval represents a start or end point										
	Arrows	A line is a connector that shows relationships between the representative shapes										

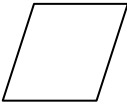

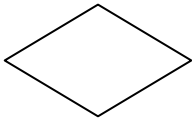


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			Input/Output	A parallelogram represents input or output	
			Process	A rectangle represents a process	
			Decision	A diamond indicates a decision	
	(c)	Find the output of the following program: <pre>#include<stdio.h> void main() { int x = 10, y = 10, v1, v2; v1 = x++; v2 = ++y; printf("value of v1: %d, v1); printf("value of v2: %d, v2); }</pre>			2M
	Ans.	Output: value of v1:10value of v2:11			<i>Correct output</i> 2M
	(d)	State the syntax & use of strlen () & strcat () function.			2M
	Ans.	strlen(): calculates the length of the string <i>Syntax:</i> strlen(s1); strcat(): concatenates two strings <i>Syntax:</i> strcat(s1,s2)			<i>1M for correct syntax</i> <i>1M for use</i>
	(e)	State the Relational operators with example.			2M
	Ans.	== - returns true if the values of two operands are equal else returns false. E.g: if (A= = B){ _ } != - returns true if values of two operands are not equal, else returns			



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		<p>false E.g: if (A! = B){ } <- returns true if the first operand is less than the second, else returns false. E.g: if (A< B){ } >- returns true if the first operand is greater than the second, else returns false. E.g: if (A> B){ } <= returns true if the first operand is less than or equal to the second, else returns false. E.g: if (A< = B){ } >= returns true if the first operand is greater than or equal to the second, else returns false. E.g: if (A> = B){ }</p>	<p><i>Any four operators 1/2M each</i></p>
	<p>(f) Ans.</p>	<p>State the syntax to declare pointer variable with example.</p> <p>General syntax to declare pointer. datatype *var_name;</p> <p><i>Eg:</i> int var = 20;</p>	<p>2M <i>Correct syntax 1M</i> <i>Correct example 1M</i></p>
	<p>(g) Ans.</p>	<p>Draw flow chart for addition of two numbers.</p> <pre> graph TD Start([start]) --> Input[/Input two numbers a,b. declare variable sum=0/] Input --> Process[sum = a+b] Process --> Output[/Display sum/] Output --> Stop([stop]) </pre>	<p>2M <i>Correct sequence 1M</i> <i>Correct symbol 1M</i></p>



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2.	(a) Ans.	Attempt any THREE of the following: State the importance of flow chart. A flowchart is a type of diagram that represents an algorithm. It is a visual representation of a sequence of steps to complete the process. A flow chart describes a process using symbols rather than words. Computer programmers use flow charts to show where data enters the program, what processes the data goes through, and how the data is converted to output. -can be used to quickly communicate the ideas or plans that one programmer envisions to other people who will be involved in the process. - aid in the analysis of the process to make sure nothing is left out and that all possible inputs, processes, and outputs have been accounted for. -help programmers develop the most efficient coding because they can clearly see where the data is going to end up. - help programmers figure out where a potential problem area is and helps them with debugging or cleaning up code that is not working. - are a useful tool in visualizing a module's flow of execution before writing any code. This allows developers to do three things: verify the algorithm's correctness before writing code, visualize how the code will ultimately be written, and communicate and document the algorithm with other developers and even non-developers. -may be used in conjunction with other tools, such as pseudo-code, or may be used by itself to communicate a module's ultimate design, depending on the level of detail of the flowchart.	12 4M <i>Any 4 points 1M each</i>
	(b) Ans.	Write a program to declare structure student having rollno, name & marks. <i>(Note: Any other correct logic shall be considered).</i> Accept and display data for three students. <pre>#include<stdio.h> #include<conio.h> void main() { int i; struct student{ int rollno; char name[20]; int marks; } s[3];</pre>	4M <i>Correct logic 3M</i> <i>Correct syntax 1M</i>



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	<pre>clrscr(); for(i=0;i<3;i++) { printf("Enter rollno, name and marks\n"); scanf("%d%s%d",&s[i].rollno,&s[i].name,&s[i].marks); } for(i = 0; i<3;i++){ printf("\nThe details of student %d\n",i+1); printf("Roll no %d\n",s[i].rollno); printf("Name is %s\n",s[i].name); printf("Marks %d\n",s[i].marks); } getch(); }</pre>	
(c) Ans.	<p>Explain pointer arithmetic with example. (Note: Code snippet shall be considered).</p> <p>The pointer arithmetic is done as per the data type of the pointer. The basic operations on pointers are:</p> <p>Increment It is used to increment the pointer. Each time a pointer is incremented, it points to the next location. Eg, for an int pointer variable, if the current position of pointer is 1000, when incremented it points to 1002 because for storing an int value it takes 2 bytes of memory.</p> <p>Decrement It is used to decrement the pointer. Each time a pointer is decremented, it points to the previous location. Eg, if the current position of pointer is 1002, then decrement operation results in the pointer pointing to the location 1000.</p> <p>Addition and subtraction: When addition or subtraction operation is performed on the pointer variable, it shows that particular location in the memory. Eg: int *ptr; -say address is 1000. If -> ptr+n- then ptr+n*2 . If -> ptr-n thenptr-n*2.</p> <pre>#include<stdio.h> #include<conio.h> void main() {</pre>	4M <i>Any two operator s</i> <i>Each operator with explanation 1M</i> <i>1M for each example</i>



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	<pre>int i = 10; int *ptr=&i; clrscr(); printf("%x%d",ptr,i); ptr++; printf("\n%x%d",ptr,i); printf("\n%x",ptr+2); printf("\n%x",ptr-2); getch(); }</pre>	
<p>(d) Ans.</p>	<p>Explain nested if-else with example. <i>(Note: Any example shall be considered)</i></p> <p>When a series of decision is required, nested if-else is used. Nesting means using one if-else construct within another one. If the condition in the outer if, is true, then only the inner if-else will get executed. Further the statements in the inner if will get execute only if the condition of inner if, evaluates to true. If it is false, the statements in inner else will get executed.</p> <p>If the outer if evaluates to false, then the statements in outer else get executed.</p> <p>General syntax:</p> <pre>if(condition) { if(condition) { statements } else { statements } } else { statements } statements</pre> <p>Example:</p> <pre>#include<stdio.h> #include<conio.h> void main() { int val; clrscr();</pre>	<p>4M</p> <p><i>Explanation 2M</i></p> <p><i>Example 2M</i></p>



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		<pre>printf("Enter a number"); scanf("%d",&val); if(val>=5) { if(val>5) { printf("Number is greater than 5"); } else { printf("Number is equal to 5"); } } else { printf("Number is less than 5"); } getch(); }</pre>	
3.	(a)	<p>Attempt any THREE of the following: Describe the following terms: (i) Keyword (ii) Identifier (iii) Variable (iv) Constant</p> <p>Ans. (i) Keyword: Keywords are special words in C programming which have their own predefined meaning. The functions and meanings of these words cannot be altered. Some keywords in C Programming are if, while, for, do, etc..</p> <p>(ii) Identifier: Identifiers are user-defined names of variables, functions and arrays. It comprises of combination of letters and digits. <i>Example</i> int age1; float height_in_feet; Here, <i>age1</i> is an identifier of integer data type. Similarly <i>height_feet</i> is also an identifier but of floating integer data type,</p> <p>(iii) Variable: A variable is nothing but a name given to a storage area that our programs can manipulate. Each variable in C has a specific type, which determines the size and layout of the variable's memory; the range of values that can be stored within that memory; and the set of operations that can be applied to the variable. <i>Example:</i> add, a, name</p> <p>(iv) Constant:</p>	<p>12 4M</p> <p style="text-align: center;"><i>Each term 1M</i></p>



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		<p>Constants refer to fixed values that the program may not change during its execution. These fixed values are also called literals. Constants can be of any of the basic data types like an integer constant, a floating constant, a character constant, or a string literal. There are enumeration constants as well.</p> <p><i>Example:</i> 121 234 3.14</p>																			
	<p>(b) Ans.</p>	<p>Differentiate between call by value and call by reference.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Sr. No.</th> <th style="width: 40%;">Call by value</th> <th style="width: 50%;">Call by reference</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>When function is called by passing values then it is call by value</td> <td>When function is called by passing address of variable then it is called as call by reference.</td> </tr> <tr> <td style="text-align: center;">2</td> <td>Copy of actual variable is created when function is called.</td> <td>No copy is generated for actual variable rather address of actual variable is passed.</td> </tr> <tr> <td style="text-align: center;">3</td> <td>In call by value, memory required is more as copy of variable is created.</td> <td>In call by reference, memory required is less as there is no copy of actual variables.</td> </tr> <tr> <td style="text-align: center;">4</td> <td>Example:- Function call - Swap (x,y); Calling swap function by passing values.</td> <td>Example:- Function call – Swap (&x, &y); Calling swap function by passing address.</td> </tr> <tr> <td style="text-align: center;">5</td> <td>Original (actual) parameters do not change. Changes take place on the copy of variable.</td> <td>Actual parameters change as function operates on value stored at the address.</td> </tr> </tbody> </table>	Sr. No.	Call by value	Call by reference	1	When function is called by passing values then it is call by value	When function is called by passing address of variable then it is called as call by reference.	2	Copy of actual variable is created when function is called.	No copy is generated for actual variable rather address of actual variable is passed.	3	In call by value, memory required is more as copy of variable is created.	In call by reference, memory required is less as there is no copy of actual variables.	4	Example:- Function call - Swap (x,y); Calling swap function by passing values.	Example:- Function call – Swap (&x, &y); Calling swap function by passing address.	5	Original (actual) parameters do not change. Changes take place on the copy of variable.	Actual parameters change as function operates on value stored at the address.	<p>4M</p> <p><i>Any four differences 1M each</i></p>
Sr. No.	Call by value	Call by reference																			
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	<p>(c) Ans.</p>	<p>Explain conditional operator with example. Conditional Operator (Ternary Operator): It takes the form „? :“ to construct conditional expressions The operator „? :“ works as follows: exp1 ? exp2 : exp 3 Where exp1, exp2 and exp3 are expressions.exp1 is evaluated first, If it is true, then the expression exp2 is evaluated and becomes the value</p>	<p>4M</p> <p><i>Explanation 2M</i></p> <p><i>Example</i></p>																		



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		of the expression. If exp1 is false, exp3 is evaluated and its value becomes the value of the expression. <i>E.g.</i> int a=10,b=5,x; x=(a>b) ? a : b;	2M
(d) Ans.	List the categories of functions and explain any one with example. Different categories of function: 1) Function with no arguments and no return value. 2) Function with arguments and no return value. 3) Function with no arguments and return value. 4) Function with arguments and return value. 1) Function with no arguments and no return value: This category of function cannot return any value back to the calling program and it does not accept any arguments also. It has to be declared as void. For example: void add() { inta,b,c; a=5; b=6; c=a+b; printf(“%d”,c); } It should be called as add(); 2) Function with arguments and no return value: This category of function cannot return any value back to the calling program but it takes arguments from calling program. It has to be declared as void. The number of arguments should match in sequence, number and data type. For example: void add(intx,int y) { int z; z=x+y; printf(“%d”,z); } It should be called as add(4,5); where x will take 4 and y will take 5 as their values.	4M <i>List 2M</i> <i>Explanation of any one category 2M</i>	



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		<p>3) Function with no arguments and return value: This category of function can return a value back to the calling program but it does not take arguments from calling program. It has to be declared with same data type as the data type of return variable. For example: int add() { inta,b,c; a=5; b=6; c=a+b; return(c); } It should be called as int x = add(); where x will store value returned by the function.</p> <p>4) Function with arguments and return value: This category of function can return a value back to the calling program but it also takes arguments from calling program. It has to be declared with same data type as the data type of return variable. For example: int add(intx,int y) { int z; z=x+y; return(z); } It should be called as int s = add(4,5); where x will have 4 and y will have 5 as their values and s will store value returned by the function.</p>	
4.	(a) Ans.	<p>Attempt any THREE of the following: Write an algorithm to determine the given number is odd or even.</p> <p>Step 1- Start Step 2- Read / input the number. Step 3- if $n\%2==0$ then number is even. Step 4- else number is odd. Step 5- display the output. Step 6- Stop</p>	12 4M <i>Correct algorithm m 4M</i>
	(b)	Illustrate the use of break and continue statement with example.	4M



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	<p>Ans.</p>	<p><i>(Note:- Any other example shall be considered)</i> Break: It breaks the execution of the loop which allows exiting from any loop or switch, such that break statement skips the remaining part of current iterations of the loop. <i>Syntax:</i> break;</p> <pre>while (testExpression) { // codes if (condition to break) { break; } // codes }</pre> <p>Continue: It is used when it is required to skip the remaining portion of the loop without breaking loop it will transfer control directly to next iteration <i>Syntax:</i> continue;</p> <pre>while (testExpression) { // codes if (testExpression) { continue; } // codes }</pre> <p>In given program sequence if “break” executes then execution control will jump out of loop & next statement after loop will be executed. In given program sequence if “continue” executes then execution control will skip remaining statements of loop & will start next iteration of loop</p>	<p><i>Use of each 1M</i></p> <p><i>Example of each 1M</i></p>
	<p>(c)</p> <p>Ans.</p>	<p>Write a program to add, subtract, multiply and divide two numbers, accepted from user switch case. <i>(Note: Any other correct logic shall be considered).</i></p> <pre>#include<stdio.h> #include<conio.h> void main() { int a,b,ch,add,sub,mul,div; clrscr(); printf("\n1 for addition \n2 for subtraction"); printf("\n3 for multiplication \n4 for division"); printf("\nEnter two numbers:");</pre>	<p>4M</p> <p><i>Correct logic 2M</i></p> <p><i>Correct syntax 2M</i></p>



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	<pre>scanf("%d%d",&a,&b); printf("\nEnter your choice:"); scanf("%d",&ch); switch(ch) { case 1: add=a+b; printf("Addition of a & b=%d",add); break; case 2: sub=a-b; printf("Substraction of a & b=%d",sub); break; case 3: mul=a*b; printf("Multiplication of two numbers=%d",mul); break; case 4: div=a/b; printf("Division of two numbers=%d",div); break; default: printf("Invalid choice...."); } getch(); }</pre>	
<p>(d) Ans.</p>	<p>Illustrate initialization of two dimensional array with example.</p> <p>Two dimensional array: The array which is used to represent and store data in a tabular form is called as two dimensional array. Such type of array is specially used to represent data in a matrix form. Initialization can be done as design time or runtime.</p> <p>1. Design time: This can be done by providing „row X column“ number of elements to the array. Eg for a 3 rows and 4 columns array , 3X4=12 elements can be provided as :</p> <pre>arr[3][4]={ {2,3,4,6}, {1,4,6,3}, {6,6,4,3}, {6,7,8,9} };</pre>	<p>4M</p> <p><i>Two dim array 1M</i></p> <p><i>Declarat ion 1M</i></p>



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	<p>2. Runtime: For this loop structures like „for“ can be used in a nested form, where outer loop will increment row and inner loop will increment column.</p> <p><i>Eg :</i></p> <pre>for(i=0;i<3;i++) { for(j=0;j<4;j++) { scanf(“%d”, &arr[i][j]); } } </pre> <p>Example:</p> <pre>main() { int arr[2][2]={{1,2},{4,5}}; int i,j; for(i=0;i<2;i++) { for(j=0;j<2;j++) { printf(“%d”, arr[i][j]); } printf(“\n”); } } </pre>	<p><i>Initializ ation by any one type 1M</i></p> <p><i>Example 1M</i></p>
<p>(e)</p> <p>Ans.</p>	<p>Write a program to read two strings and find whether they are equal or not. <i>(Note: Any other correct logic shall be considered).</i></p> <pre>#include<stdio.h> #include<conio.h> #include<string.h> void main() { char st1[20],st2[20]; printf(“enter string 1”); scanf(“%s”,st1); printf(“enter second string”); scanf(“%s”,st2); if(strcmp(st1,st2)==0) </pre>	<p>4M</p> <p><i>Correct logic 2M</i></p> <p><i>Correct syntax 2M</i></p>



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		<pre>printf("\nboth strings are equal"); else printf("\nstrings are not equal"); }</pre>	
5.	(a)	<p>Attempt any TWO of the following: Write a program to calculate sum of all the odd numbers between 1 to 20. <i>(Note: Any other correct logic shall be considered).</i></p> <p>Ans.</p> <pre>#include<stdio.h> #include<conio.h> void main() { inti,sum=0; clrscr(); for(i=1;i<=20;i++) { if(i%2!=0) { sum=sum+i; } } printf("Sum=%d",sum); getch(); }</pre>	<p>12 6M</p> <p><i>Finding odd numbers 2M</i></p> <p><i>Calculat ing sum 1M</i></p> <p><i>Display sum 1M</i></p> <p><i>Correct syntax 2M</i></p>
	(b)	<p>Write a program for addition of two 3 x 3 matrices. <i>(Note: Any other correct logic shall be considered).</i></p> <p>Ans.</p> <pre>#include<stdio.h> #include<conio.h> void main() { int a[3][3],b[3][3],c[3][3],i,j; clrscr(); printf("\n Enter first matrix"); for(i=0;i<3;i++) { for(j=0;j<3;j++) { scanf("%d",&a[i][j]); } }</pre>	<p>6M</p> <p><i>Decelera tion of variable s 1M</i></p> <p><i>Input matrices 2M</i></p>



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	<pre>} printf("\n Enter second matrix"); 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]; } } printf("\n Addition:\n"); for(i=0;i<3;i++) { for(j=0;j<3;j++) { printf("%d\t",c[i][j]); } printf("\n"); } getch(); }</pre>	<p><i>Calculating addition</i> 2M</p> <p><i>Display addition</i> 1M</p>
<p>(c)</p> <p>Ans.</p>	<p>Write a program to compute the sum of all elements stored in an array using pointers. <i>(Note: Any other correct logic shall be considered).</i></p> <pre>#include<stdio.h> #include<conio.h> void main() { int a[5],sum=0,i,*ptr; clrscr(); printf("\n Enter array elements:"); for(i=0;i<5;i++) scanf("%d",&a[i]);</pre>	<p>6M</p> <p><i>Variable declaration</i> 1M</p> <p><i>Input array</i> 1M</p>



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		<pre>ptr=&a[0]; for(i=0;i<5;i++) { sum=sum+(*ptr); ptr=ptr+1; } printf("\n Sum= %d",sum); getch(); }</pre>	<p><i>Pointer Initializ ation 1M</i></p> <p><i>Sum calculati on 2M</i></p> <p><i>Display 1M</i></p>
6.	(a)	<p>Attempt any TWO of the following: Write a program to sort elements of an array in ascending order. <i>(Note: Any other correct logic shall be considered).</i></p>	12
	Ans.	<pre>#include<stdio.h> #include<conio.h> void main() { int a[5],i,j,temp; clrscr(); printf("\n Enter array elements:"); for(i=0;i<5;i++) scanf("%d",&a[i]); for(i=0;i<5;i++) { for(j=0;j<4-i;j++) { if(a[j]>a[j+1]) { temp=a[j]; a[j]=a[j+1]; a[j+1]=temp; } } } for(i=0;i<5;i++) printf("\n %d",a[i]); getch(); }</pre>	<p><i>Input array 1M</i></p> <p><i>Sorting logic 4M</i></p> <p><i>Display sorted list 1M</i></p>
	(b)	<p>Write a function to print Fibonacci series starting from 0, 1. <i>(Note: Any other correct logic shall be considered).</i></p>	6M



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	Ans.	<pre>void Fibbo() { inta,b,c,limit,i; printf("\n Enter number:"); scanf("%d",&limit); a=0; b=1; printf("%d\t%d",a,b); for(i=0;i<limit-2;i++) { c=a+b; printf("\t%d",c); a=b; b=c; } }</pre>	<i>Correct function with syntax 6M</i>
	(c) Ans.	<p>Calculate factorial of a number using recursion. <i>(Note: Explanation/algorithm/program shall be considered)</i></p> <pre>#include<stdio.h> #include<conio.h> int factorial(int no) { if(no==1) return(1); else return(no*factorial(no-1)); } void main() { intfact,no; clrscr(); printf("\n Enter number"); scanf("%d",&no); fact=factorial(no); printf("\n Factorial number=%d",fact); getch(); }</pre>	6M <i>Recur siv e function 4M</i> <i>Main function 2M</i>