PYC

22 Series

SECTION : A

			Marks	CO
Q.1.	(a)	With example, show the running time and compile time complexity for a particular code in brief.	4	CO1
	(b)	Explain, how does C program run using computer resources?	3	CO2
	(c)	Suppose you have the following code and hence write the time and space complexity with explanation.	3	CO3

```
int a=0, b=0;
for(i=0; i<N; i++){
   a=a+rand();
}
for(j=0; j<M; j++){
   b=b+rand();
}
```

Q.2.	(a)	Create a flowchart to determine the absolute value of an integer.	2	CO2
	(b)	Analyze the following code segment:	4	CO2

```
int Lst, Fst, Tmp, Div;
scanf("%d %d %d", &Lst, &Fst, &Div);
if(Fst > Lst){
       Tmp= Fst; Fst= Lst; Lst= Tmp;}
if(Fst % Div)
       Fst+= Div-(Fst % Div);
printf("[%d] -> [%d]", Fst, Lst);
```

Now determine the output of the code segment for each of the following inputs:
(i) 47 1947 5; (ii) 1971 27 9; (iii) 2024 2441139 3;

	(c)	A perfect number is a positive integer that is equal to the sum of its positive divisors, excluding the number itself. For instance, 6 has three positive proper divisors: 1, 2, & 3, and 1+2+3=6, so 6 is a perfect number. Now develop a program that will accept a positive integer from the user and determine whether the number is a perfect number or not.	4	CO2
Q.3.	(a)	What is pointer in C programming language? How does it differ from an array?	3	CO1
	(b)	With example, explain (i) pointer to pointer and (ii) Array of pointers.	3	CO2
	(c)	Suppose you have the following data in memory. Write a C program to sort the data using pointer.	4	CO3

Address:	0	1	2	3	4	5	6
Data:	C	S	E	r	U	e	T
	1	3	2	7	5	6	4

Q.4.	(a)	Describe the significance of '\0' in a string.	1	CO4
	(b)	Demonstrate the significance/purpose of the following built-in-functions with proper example: (i) strcmp(); (ii) strcpy(); (iii) strlen(); (iv) strcat();	4	CO4
	(c)	Develop a program that will accept a sentence from the user as input and determine the length of each word in that sentence. [N.B.: Word-length refers the number of characters in a particular word. For instance, the word length of "Department" is 10.]	5	CO4

SECTION : B

Q.5.	(a)	What do you mean by recursive function? Write the benefit of using it in C programming.	3	CO1
	(b)	Justify whether C is a compiler or interpreter. Think an example and hence write the basic difference between If...Else and Switch statement.	4	CO2

(c) Write a program in C to count the digits of a given number using recursion. 3 CO3
Sample input: 60
Sample output: 2

Q.6. (a) Describe the significance of the following statements: 2 CO2
(i) break; (ii) continue;

(b) Analyze the following code segment: 5 CO5

```
#include<stdio.h>
void Convert(char *s){
     if(*s >= 'a' &&  *s <= 'z')
          *s-=32;
     s++;
     while(*s){
           if(*s==' '){
                s++;
                switch(*s){
                      case 'a'... 'z': *s-=32;}
           }
          else{
             switch(*s){
                   case 'A'... 'Z': *s+=32;}
           }
          s++;
     }
}

int main(){
          char str[100];
          scanf("%[^\n]S", str);
          convert(str);    puts(str);
}
```

Now determine the output of the program for each of the following inputs: (i) feludar goyendaGiri (ii) Prodosh c. mitter
(iii) 221B baker street, london.

(c) Compute the returned values if the following library functions are called in the following manners: 3 CO1
(i) sqrt(121); (ii) abs(-303); (iii) ceil(19.71); (iv) floor(-19.47);

(i) sqrt(121); (ii) abs(-303); (iii) ceil(19.71); (iv) floor(-19.47);

Q.7. (a) Write the differences between algorithm and flowchart. 2 CO1

(b) xyz company plans to give a 6% year-end bonus to each of its employees earning TK. 6000 or more per month and a fixed Tk. 300 bonus to the remaining employees. 5 CO2
(i) Draw a flowchart for calculating the bonus for an employee.
(ii) Write a C program for Q.7b(i).

(c) Write a C program to calculate power of a number. 3 CO3
Sample input:
Enter base: 5
Enter exponent: 2
Output:
$5^2 = 25$

Q.8. (a) Explain the following modes of opening a file: 2 CO1
(i) w (ii) a (iii) rt (iv) rb

(b) Develop a program that will read the four class test (CT) marks in CSE 1101 for all 60 students in the class from a file named 'CTmarks.doc' and display average of the best 3 CT marks for each student. 5 CO5

(c) Write a C program to display the last modification time of a file. 3 CO3
Sample: Last date of file modification:
Sat January 26 17:32:15 2024

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21 Series

SECTION : A

			COs	Marks
Q.1.	(a)	Write short note on: i) Time Complexity, and ii) Space Complexity.	CO_1	3
	(b)	Is the time complexity of a code the same as the running/execution time of a code? If not so, explain with example.	CO_2	3
	(c)	Suppose you have a machine (PC) and you also have the following C code. Answer the following questions: i) What will be output? ii) Write the time complexity for this code.	CO_3	4

```
#include<stdio.h>
int main(){
   int n=3;
    int m=3;
    int arr[][3]={{3,2,7},{2,6,8},{5,1,9}};
    int sum=0;
    for(int i=0;i<n;i++){
       for(int j=0;j<m;j++){
            sum+=arr[i][j];
            }}
    printf("%d",sum);
    return 0;
   }
```

Q.2.	(a)	What is array and pointer in C programming language? How does a pointer differ from array?	CO_1	4
	(b)	How would you find the length of a string ("we are CSE students of RUET") without using inbuilt function strlen()? Justify your answer with C code example.	CO_2	3
	(c)	Carefully read the following C code and hence write the name of the problem on text. What will be the output:	CO_3	3

```
#include<stdio.h>
int main(void){
printf("%d", test(1,1));
printf("%d",test(2,2));
}
int test(int x, int y){
return x==y?(x+y)*3:x+y;
}
```

Q.3.	(a)	With example, write the importance of using function in C programming.	CO_1	3
	(b)	Explain with C code, how to calculate factorial of the number, 6 using recursive function.	CO_2	3
	(c)	Write a C program to convert the number of vowels and consonants in a string having at least 10 characters using pointer. *Sample Input: "we are CSE students of 2021 series"*	CO_3	4
Q.4.		A string is a sequence of characters. For example: "Amar Sonar Bangla".		
	(a)	Describe the significance of '\0' in a string.	CO_4	1
	(b)	Demonstrate the significance of the following built-in functions with proper example. *(i) strlen(); ii) strrev(); iii) strcat(); iv) strcmp();*	CO_4	4
	(c)	Develop a program that will accept an old password and a new password from the user and determine whether these passwords are identical or not. [N.B.: Please don't use the library function strcmp()].	CO_4	5

SECTION : B

Q.5.	(a)	Is there any difference between compile time and run time error? If so explain.	CO_2	3
	(b)	Suppose you have 2D matrix array. You are asked to write C program to read matrix and find sum, product of all elements of it. *Sample output:* *Enter number of Rows: 3*	CO_3	4

```
Enter number of Cols: 3
Enter matrix elements:
Enter element[1,1]: 1
Enter element[1,2]: 1
Enter element[1,3]: 1
Enter element[2,1]: 2
Enter element[2,2]: 2
Enter element[2,3]: 2
Enter element[3,1]: 3
Enter element[3,2]: 3
Enter element[3,3]: 3
SUM of all elements: 18
PRODUCT of all elements: 216
```

(c) Did you see any type of errors during C program execution? If so explain. CO_2 3

Q.6. (a) A function is a block of code that performs a specific task. Compute the returned values if the following built-in functions are called in following manners: CO_2 2

i)ceil(19.21); ii) floor (-19.71); iii) fabs(-19.71); iv) sqrt(121);

(b) Construct a function that will accept an integer and the addresses of two variables (Max and Min) as arguments, determine the largest and the smallest digit of the integer and assign the largest and the smallest digits respectively by using dereferencing operator(*). CO_2 4

(c) Analyze the following program: CO_2 4

```
#include<stdio.h>
    void Convert(char *s){
        while(*s){
            switch(*s){
            case 'a'... 'z' : *s-=32; break;
            case 'A'... 'Z': *s+=32;}
                s++;}}
int main(){
    char str[100];
    gets(str);
    convert(str);
    puts(str);
    return 0;}
```

Now determine the output of the program for each of the following inputs:
i) rRr, ii) belaSHURU, iii) 221b bAKER sTREET, lONDON.

Q.7. (a) Consider the following declarations: CO_4 4

i) `char Addr1[30]= "66 Harison Road".`

ii) `char Addr2[]= "RUET, Rajshahi-6204";`

iii)
```
struct Movie{
    char Movie_Name[30];
    double IMDb_Rating;
    int Release_Year;
    int No_of_Awards;
    } Hawa,OMG;
```

iv)
```
union Any{
    char Borno;
    int Purno;
    doube Doshomik;
    }X;
```

Now determine your understanding by determining the size (in bytes) of the array 'Addr1', array 'Addr2', 'Movie' type instance/variable 'Hawa' and 'Any' type instance/variable 'X'.

[N.B.: Consider the following table to determine the sizes:]

Data Type	char	int	Double
Size (in Bytes)	1	4	8

	(b)	Define the term 'enumeration'.	CO_4	1
	(c)	Analyze the following code segment and determine the output: *enum Month{Jan=1, Feb, Mar, Apr, May, Jun, Jul, Aug=9, Sep, Oct, Nov, Dec}OddMonth;* *for(OddMonth=Jan; OddMonth<=Dec; OddMonth+=2)* *printf ("%d\t",OddMonth);*	CO_4	3
	(d)	Identify the differences between structure and union.	CO_4	2
Q.8.	(a)	Define the significance of the following modes for opening a file: i) w, ii) a, iii) rb, iv) rt,	CO_4	2
	(b)	Develop a program that will read the name, roll number, mobile number and CGPA of all 60 students of a particular section from a file named "Input.txt" and rearrange the students in descending order according to their CGPA, and store the rearranged data in another file named "ouput.txt".	CO_4	5
	(c)	Explain the significance of the following terms with suitable example: i) local variable, ii) parameters, iii) global variables, iv) arguments.	CO_1	3

***** END *****

20 Series

SECTION : A

Q.1. (a) Operators are the symbols which are used to perform logical and mathematical operations in a program. For example: +,%,==. Describe the significance of the following operators with proper example: CO1 2

i)++ ii) %= iii)!= iv)?: CO3 4

(b) Analyze the following program and determine the output:

```
#include<stdio.h>
int main(){
  int n1=3, n2=6;
  printf("%d\n",n1%n2);
  n1++; --n2;
  printf("%d; %d\n",n1,n2);
  printf("%d; %d\n",++n1,n2--);
  int R=(n1>=n2)?n1:n2;
  printf("%d;%d\n",n1<n2,R);
  return 0;}
```

(c) Mali is the hottest country in the world. On the other hand, Antarctica is the coldest place in the world. Rosayoka is a scientist who needs to move frequently between his labs in Mali and Antarctica. Mali uses Celsius scale whereas Antarctica uses Fahrenheit scale. Now, Rosayoka wants to know the differences in temperatures of two consecutive days in both scales but he needs your help. Write a C program to solve Rosayoka's problem. You know that the conversion formula between scales as mentioned: CO5 4

That is- $\frac{C}{5} = \frac{F-32}{9}$

Sample Input:
Enter 1st day temperature of Mali: 46
Enter 2nd day temperature of Mali: 44
Enter 1st day temperature of Antarctica: -113
Enter 2nd day temperature of Antarctica: -128

Sample Output:
Differences of temperatures of Mali in Celsius: 2
Differences of temperatures of Mali in Fahrenheit: 3.6
Differences of temperatures of Antarctica in Celsius: 8.3
Differences of temperatures of Antarctica in Fahrenheit: 15

Q.2. (a) Write the relational and logical operators used in C programming. What will be the output of the following program? CO2 4

```
#include <stdio.h>
int xor(int a, int b){
   return (a || b) && (a && b) && !(!a && !b);
}
int main (void){
   printf("%d", xor(1, 0));
   printf("%d", xor(1, 1));
   printf("%d", xor(0, 1));
   printf("%d", xor(0, 0));
   return 0;}
```

(b) With examples, write the differences between local and global variables. CO1 2

(c) Determine the output of the following code segment and mention how the bitwise operators are working. CO2 4

```
#include <stdio.h>
int main(void){
  unsigned int i;
  int j, k;
  i = 1;
  for(j=0; j<4; j++){
```

```
        i = i << 1;
        k = i >> 1;
        printf("%d %d\n", k, i);
    }
    return 0;
}
```

Q.3. (a) Analyze the following code segments; determine the number of iteration for each of the following loops and the output of each of the code segments: CO3 4

i)
```
for(y=10;y<=1;y-=2){
    printf("%d\t",y);}
printf("%d\n",y)
```

ii)
```
int y=5;
while(y--){
    printf("%d→",y);}
printf("%d\n",y)
```

iii)
```
int y=5;
do{
    printf("%d→",y--);
    }while(y);
printf("%d\n",y);
```

(b) A leap year is a calendar year that contains an additional day added to keep the calendar year synchronized with the astronomical or seasonal year. Every year that is exactly divisible by 4 is a leap year, except for years that are exactly divisible by 100, but these centurial years are leap year if they are exactly divisible by 400. For example, the year 1700, 1800, and 1900 are not leap years, but the year 1600 and 2000 are. By using conditional statements, write a C program to determine whether a given year is leap year or not. CO5 4

(c) Can you solve the problem Q. 3(b) using 'switch' statement? Justify your answer. CO3 2

Q.4. (a) Analyze the following code segments and determine the output: CO3 6

i)
```
int num;
for (num=1;num<=3;num++){
  switch((num*2)%3){
    case 0: printf("007……\n");
            break;
    case 1: printf("James ");
    case 2: printf("Bond\n");
            break;} }
```

ii)
```
int num;
for(num=0;num<100;num+=10){
if(num%7==0)
    break;
if(!(num%3))
    continue;
printf("%d→",num);}
```

(b) Create a perfect pyramid shape by writing a program that will accept the number of rows from the user and create the perfect pyramid shape by following the pattern given below: CO5 4

Sample input:
No. of Rows: 5
Sample output:

```
        0
      1  2
    3  4  5
  6  7  8  9
0  1  2  3  4
```

[Notice that the pyramid consists of only decimal digits (from 0 to 9)]

SECTION : B

Q.5. (a) With proper example, explain how does a pointer work? CO_1 3

(b) Determine the outcome of the following code if "hello" and "world" strings are scanned. CO_4 4

```
#include <stdio.h>
#include <string.h>
void check(char *a, char *b, int (*cmp) (const char *, const char *)){
  if((*cmp)(a, b)) printf("Equal");
  else printf("Not Equal");
}
int main(){
  char s1[80], s2[80];
  int (*p)(const char *, const char *);
  p = strcmp;
  printf("Enter two strings.\n");
  gets(s1);
  gets(s2);
  check(s1, s2, p);
  return 0;}
```

(c) Justify the following statement: CO_5 3

In C programming a function can't return multiple values at a time, but pointers can be used to return multiple values. CO_4 4

Q.6. (a) Consider the following declarations:

i)
```
char Address[50];
```

ii)
```
char Addr[]= "21, Rajani Sen Road";
```

iii)
```
struct Book{
  int Book_No,
  double price,
  char  Book_Title[20]
 }Book1,Book2;
```

iv)
```
union Any{
  char c,
  int  i,
  double d
 }X;
```

Now demonstrate your understanding by determining the size (in bytes) of the array 'Address', array 'Addr', 'Book', type instance/variable 'Book2' and 'Any' type instance/variable 'X'.

[N.B.: Consider the following table to determine the sizes:]

Data Type	char	int	double
Size(in bytes)	1	4	8

(b) Apply the basic concepts of array to develop a program that will store N integers into an array and determine- CO_2 6

i) the largest element of the array,

ii) the smallest element of the array,

iii) the summation of the integers stored in the odd indexes of the array.

iii) the summation of the integers stored in the odd indexes of the array.

Q.7. (a) Illustrate both call by value and call by reference with proper example and find out the core differences if any. CO5 4

(b) Determine what will happen if the following program is executed: CO5 3

```
#include <stdio.h>
int add(double a, double b){
   return a+b; }
int main(){
   double a=2.0, b=3.0;
   printf("%lf", add(a,b));
   return 0;}
```

(c) Write a function that takes two numbers as input and returns the GCD (Greatest Common Divisor) of those numbers. CO5 3

Q.8. (a) Define the significance of the following modes for opening a file: CO4 2
i) r ii) a iii) w

(b) Construct a program that will read the name, roll no, mobile no, and CGPA of all 60 students of a particular section from a file named "Input.doc" and rearrange the students in descending order according to their CGPA. CO5 5
(N.B.: you can either display all the information or save them in a different file).

(c) The break statement ends the loop immediately when it is encountered. On the other hand, the continue statement skips the current iteration of the loop and continues when the next iteration takes place. Now, determine the outcome of the following program: CO3 3

```
#include <stdio.h>
int main(void){
  int i, j;
  for(i=1,j=5; i<=5,j>=1; i=i+1,j=j+1){
    if(i==2 && j==2) break;
    if(i==3 || j==3) continue;
    if(i%2==0) printf("%d\n", j*i);
    else if(i%2==1) printf("%d\n", i-j);
    if(i/4==1) break;}
 return 0;}
```

*** END ***

19 Series

SECTION : A

Marks

Q.1. (a) Explain type conversion in C. Convert each of the following formulas into its C assignment equivalents: 4

(i) $x=(a-b)*(a-c)^2$ (ii) $d=\frac{(8-x^2)}{(x-9)}-\frac{(4*2-1)}{x^3}$

(b) According to operator precedence compare the followings 2

++ Vs +, / Vs +, % Vs /

(c) Describe the scope of variable. Elaborate the following keyword as variable identifier, (i) static (ii) extern (iii) const 3

(d) Rewrite the following code using a switch statement 3

```
if (num==1)
{printf("alpha");}
else if(num==2)
{printf("beta");}
else if(num==3)
{printf("gamma");}
else
{printf("other");}
```

Q.2. (a) A C program contain the following declaration and initial assignments: 5

```
int i=8, j=5;
double x=0.005, y=-0.01;
char C='c', d='d';
```

Determine the value of the following expressions:

(i) abs(i-2*j) (ii) isprint(C), (iii) isdigit(C), (iv) ceil(x+y), (v) tolower(65), (vi) isascii(10*j), (vii) isalnum(10*j) (viii) fmod(x,y), (ix) pow(x-y, 3.0) (x) sqrt(sin(x)+cos(y))

(b) Write a program to calculate the volume and area of a sphere using the formulas: $V=4\pi r^3/3$, $A=4\pi r^2$ $3\frac{1}{2}$

(c) Write a program to calculate the mass of air in an automobile tire, using the formula $PV=0.37m(T+460)$ $3\frac{1}{2}$

where P=pressure, pounds per square inch (psi); V=volume, cubic feet;
m=mass of air, pounds; T=temperature, degrees Fahrenheit.

Q.3. (a) For each of the following arrays determine the size of the array (in bytes) and the values assigned to the individual array elements: 6

(i) int year[10]= [1947, 1952, 1971]; (ii) char letter[10]= "R.U.E.T.";
(iii) char digit[4][4]= "0123456789"; (iv) double constant[]={3.14159, 2.71828};

[N.B. Consider the following table to determine the size of the arrays:

Data type	char	int	double
Size in bytes	1	4	8

(b) (i) Write a program that will count the number of even integers stored in an array of integer numbers. 6

(ii) Write another program that will determine the summation of odd integers stored in an array.

Q.4. (a) Define the following terms with proper example: 3

(i) local variable (ii) global variable

(b) Describe the significance of the following built-in functions: 4

(i) pow(x,n); (ii) sqrt(x); (iii) strlen(string); (iv) abs(z);

(c) Consider the following function definition: 5

```
int squarEnd(int num){
int divisor=1, lastDigits, Number=num;
while (Number>0){
        divisor=divisor*10;
        Number/=10;
        }
lastDigits=(num*num)%divisor;
return lastDigits;}
```

Now determine the returned values if the function is called in following manners:

(i) squarEnd(5); (ii) squarEnd(15); (iii) squarEnd(25); (iv) squarEnd(101);

SECTION : B

Q.5. (a) Discriminate between NULL pointer and Dangling pointer with examples. 3

(b) Explain recursive function. Express each of the following algebraic formulas in a recursive form. 3

(i) $y = (x_1 + x_2 + \ldots\ldots\ldots\ldots + x_n)$ (ii) $y = 1 - x + \frac{x^2}{2} - \frac{x^3}{6} + \frac{x^4}{24} - \ldots\ldots\ldots + (-1)^n \frac{x^n}{n!}$

(iii) $p = (f_1 * f_2 * \ldots\ldots\ldots\ldots * f_t)$

(c) A C program contains the following statements. 3

```
int i, j=25;
int*pi, *pj=&j;
- - - - - - - -
*pj=j+5;
i=*pj+5;
pi=pj;
*pi=i+j;
```

Assume integer occupies 2 bytes of memory and value assigned to i begins at address (hexadecimal) F9C and value assigned to j begins at address F9E, then find (i) value of &i; (ii) value of pj? (iii) final value of *pi? (iv) value of (pi+2)? (v) value of the expression (*pi+2)? (vii) value of expression *(pi+2)?

(d) Define a 2-dimensional 3×4 array (integer) called n and assign the following values to the array element. 3

10	12	14	16
20	22	0	0
0	0	0	0

Q.6. (a) Find out the output of the following programs: 4

(i)
```
#include<stdio.h>
void main(){
    int a,b=0;
    int c[10]={1,2,3,4,5,6,7,8,9,0};
    for (a=0; a<10; ++a)
        b+=c[a];
    printf("%d",b);
}
```

(ii)
```
#include<stdio.h>
void main(){
    int a;
    static char c[]="programming
    with C can be great fun!"
    for(a=0;c[a] !='\0';++a)
        if ((a%2)==0)
        printf("%c%c", c[a], c[a]);
}
```

(b) Write and test the following

printf("%c%c", c[a], c[a]);
}

(b) Write and test the following power() function that returns raised to the power, *double power(double, int)* 2

(c) Write short note on: (i) Dynamic memory allocation (ii) Opening and closing file. 3

(d) Write a program to find the sum of squares of element on a diagonal of a square matrix. 3

Q.7. (a) Define a structure named 'Book' that will contain an integer type field named 'Book_No', a float type field named 'price' and a character type array named 'Author' (which can hold at most 30 characters) 4

(b) Define a union named 'Unknown' that will contain an integer type field 'i', a float type field 'f' and a character type field 'c'. 4

(c) Create a 'Book' type variable/instance named 'HoJoBoRoLo' and an 'Unknown' type variable named 'data'. 2

(d) Determine the size of the variable/instance 'HoJoBoRoLo' and 'data' (in bytes). 2

Q.8. (a) What is pointer? 1

(b) Consider the following code segment: 4

```
char str[100];
int x, count=0;
gets(str);
for(x=0; str[x]!='\0';x++){
count++;}
printf("%d",count);
```

Now determine the output of the code segment for each of the following inputs:
(i) Just count (ii) Why so serious! (iii) Best of luck...
(iv) Believe me, it's an easy question.

(c) Determine the output of the following code segments: 4

(i)
```
int num;
for(num=1; num<=10; num++){
  if(num%2==0)
    break;
  printf("%d-> ", num);}
```

(ii)
```
for(int num=1; num<=10; num++){
  if(num%2==0)
    continue;
  printf("%d-> ", num);}
```

(d) Determine the returned values if the following built-in functions are called in the following manners: 3
(i) ceil(-20.21); (ii) floor(20.21) (iii) strcmp("Bangladesh", "Bangladesh");
(iv) strcmp("Bangla-Vasha", "bangla-vasha");

****

18 Series

SECTION : A

Marks

Q.1. (a) What are the key features of C programming language? 3

(b) Find the value of the following expression: 3

```
50%4+2>16/5+1
```

(c) Explain the difference between = and == symbols in C programming. 3

(d) Find out the output if following code is executed. 3

```
a=10;  b=20;
a=++b;
b=a++;
printf("%d %d", a, b);
```

Q.2. (a) What is the syntax of switch statement? Can it be avoided in programming? 3

(b) What are the differences between 'break' and 'continue' keywords? Write the output of the following code segments: 5

(ii)
```
#include <stdio.h>
int main( ) {
int i;
for (i=0; i<6; i++) {
if (i%2==0||i%3==0) {
continue;
}
printf("value i=%d",i);
printf("\n");
}
return 0;
}
```

(i)
```
#include <stdio.h>
int main( ) {
int i;
for (i=1; i<10; i++) {
if (i%3==0||i%5==0) {
break;
}
printf("value i=%d \n",i);
}
return 0;
}
```

(c) Write a C program to compute and display remainder and quotient using only two variables. 2

(d) Compare the use of if-else statement with the use of ?: operator. 2

(d) Compare the use of if-else statement with the use of ?: operator. 2

Q.3. (a) "In any case do while loop must be executed at least once"- Explain this statement with example. 3

(b) Evaluate the value of n if a=10 and b=5. 3

(i) n= (a>b)?a:b (ii) n=(a++)+(--b)

(ii) n=--a*b++ (iv) n=a>>2

(v) n=(b<<2)+(a>b)

(c) What will be the output of the following program? 2

```
void main() {
    int i;
    for (i=0; i<10; i++) {
    printf("%d",i++);
    }}
```

(d) Write a C program that find prime numbers of a given range. 4

Q.4. (a) What are header files and what are its uses in C programming. 3

(b) Write a C program to produce the following output using nested loop. 5

```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

(c) Find out the value of k if the following code is executed. 4

```
K=0;
for(i=0; i<6; i++) {
k+=i;
if(i<3) continue;
if(i>4) break;
k++;
}
printf("k=%d,k);
```

SECTION : B

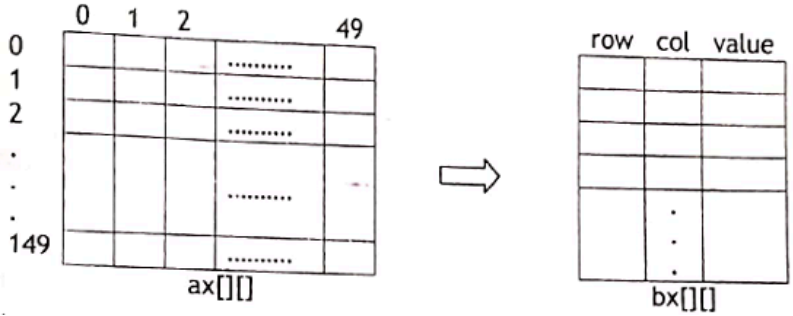
Q.5. (a) What is wrong in the following statement and why? 2

```
scanf("%d", wrong);
```

(b) Find out the output of the following code: 4

```
float ax[5]={1.5, 2.8, 1.8, 1.0, 2.5};
float *p1=&ax[0];
float *p2=p1+3;
printf("%f", *p2+1);
printf("%d", *p2-p1);
```

(c) Suppose a 150x150 matrix is saved in array ax. Then write a program to copy only the non-zero elements of ax to another 2D array bx[][] along with its row and column. 6



ax[][]

bx[][]

Q.6. (a) What is pointer to array in C? 2

(b) Find the output of the following program if the address of the first element of array ax is 3001_H. 4

```
float ax[5]={1.2, 2.3, 3.4, 4.5, 5.6};
float *p=&ax[3];
printf("%f %f %x  %x", *p, *p+1, p-1, p+3);
```

(c) Write a C program that will show the following output: 4

Sample input=5

Sample output=

```
0 1 0 0
0 1 2 0
0 1 2 3 0
1 2 3 4 0
1 2 3 4 5
```

(d) Between 'for' loop and 'while' loop, which is better in what situation? 2

Q.7. (a) Differentiate between string and stream. 2

(b) Suppose there are 100 strings are stored in a character array ax[][]. Write a program that takes a string from keyboard and searches in ax. If it is found then print "login ok". 5

(c) Write a program in C that reads 500^{th} and 750^{th} positioned integers stored in a file named "input.dat" and prints their average. 5

Q.8. (a) Write a program to store roll, name and GPA of 120 students using structures. Then write functions to find the following: 5

(i) List of student(s) who got the highest GPA.

(ii) Search a particular student's GPA with roll number.

(b) Explain the following function with an example. 4

(i) isalpha() (ii) isupper()

(ii) getchar() (iv) puts()

(c) Find the size of variable student1 of the following declaration: 3

```
struct student {
        int roll;
        char name [6];
        float gpa;
        } student1;
```

****

17 Series

SECTION : A

Q.1. (a) Define the followings: 3
(i) Source file (ii) Object file (iii) Executable file

(b) Which of the following C identifiers are valid/invalid and why? 3
(i) $My_number (ii) FOR (iii) Twenty-20 (iii) _Raj (iv) Not Out (vi) 2_two

(c) What is the output of the following C code: 3

```
int main(){
printf("Hello world %d\n", x);
return 0;
}
```

(d) To increment the value of a which statement a++ or a=a+1 is preferable and why? 3

Q.2. (a) Calculate the mass of air in an automobile tire using the formula, PV=0.37m(T+460) 4
Where,
P= pressure, pounds per square inch (psi)
V= volume, cubic feet
m=mass of air, pounds
T=temperature, degrees Fahrenheit.
The tire contains 2 cubic feet of air. Assume that the pressure is 32 psi at room temperature.

(b) Compare in terms of their function, the following pair of statements: (use flow-chart also) 3
(i) while and for (ii) break and continue (iii) while and do --- while (iv) break and go to (v) continue and go to (vi) if and if --- else.

(c) Explain what happens when the following statement is executed. 2
If (abs(x)<xmin)x=(x>0)?xmin:-xmin;
Is this a compound statement? Is a compound statement embedded within this statement?

(d) Write a loop that will calculate the sum of every third integer if it is divisible by 2, beginning with i=2. (i.e., calculate the sum 2+8+14+20+....) for all values of i that are less than 100. Write the loop three different ways. 3
(i) Using a while statement
(ii) Using a do --- while statement
(iii) Using a for statement

Q.3. (a) Describe the output that will be generated by each of the following program segment: 3

(i)
```
int i=0, x=0;
for(i=1;i<0;i*=20){
x++;
printf("%d",x);
}
printf("\nx=%d",x);
```

(ii)
```
int i,j,x=0;
for(i=0;i<5;++i)
for(j=0;j>i;++j){
x+=(i+j-1);
printf("%d",x);
break;
}
printf("\nx=%d",x);
```

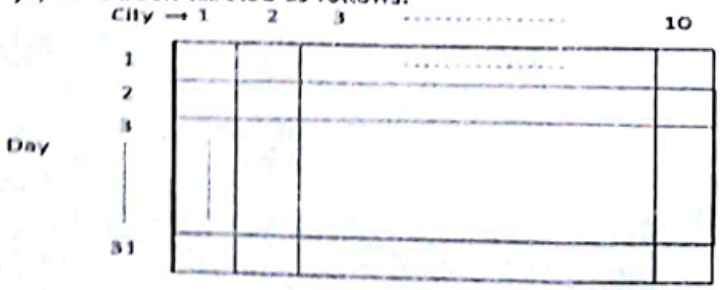
(b) The weighted average of a list of numbers is given by the following formula. 4

$$x_{avg} = f_1x_1 + f_2x_2 + \ldots\ldots + f_nx_n$$

Where the f's are fractional weighting factors, i.e., $0 \le f_i < 1$ and $f_1 + f_2 + f_3 + \ldots + f_n = 1$

Write a program to calculate x_{avg} with a given values of x's and their corresponding f's.

(c) The daily maximum temperatures recorded in 10 cities during the month of January (for all 31 days) have been labeled as follows: 5



Write a program to read the table elements into a two-dimensional array temperature and to find the city and day corresponding to (i) the highest temperature (ii) the lowest temperature.

Q.4. (a) Explain the following with example: (i) auto variable (ii) global variable (iii) static variable. 3

(b) Find the output of the following codes: 4

```
int ax[2][2]={0,1,2,3};
int i, x, y, sum=0;
for(i=0;i<4;++i){
x=i%2;
if(x) y=0;
else y=1;
sum+=ax[x][y];
}
printf("%d" sum);
```

(c) A series of integers stored in an array called ax[100]. Then write a program that counts the number of prime numbers stored in ax[]. 5

SECTION : B

Q.5. (a) Differentiate between "break" and "continue" with an example. 2

(b) Find the value of Z if a=10 and b=20 for the following statement: 3

```
Z=(1-b+10)?++a:b--;
```

(c) Find the output of the following program segment: 3

```
int i, sum=0;
for(i=0;i<4;i++){
sum+=2;
printf("%d", sum);}
```

(d) Write a function that accepts an alphabet and then it returns its uppercase equivalent character. 4

Q.6 (a) What is ...

equivalent character. 4

Q.6. (a) What is meant by nested structure and array of structures? Explain with examples. 2

(b) Define a structure called BD-cricket with following fields:- [explanation given in bracket] 8

player_name [Name of the player]
batting_avg [His batting average]
no_50 [Total number of 50's]
no_100 [Total number of 100's]
wicket [Total wickets taken]

Initialize the structure with 50 players and read the information. Find the following information with necessary statements:

(i) Find the player with highest batting_avg
(ii) Total number of 50's and 100's made by 50 players
(iii) Find out the player with highest number fo 100 in his career
(iv) Find out the best bowler.

(c) What is the difference between structure and union? 2

Q.7. (a) Differentiate between traditional variable and structure variable. 2

(b) Calculate the size of the following union variable, ul. 3

```
Union Test{
int roll;
char name[6];
double gpa;
} ul;
```

(c) Write a program that stores the information of 100 account holders of a break using the following structure. 7

Account id;
Name;
Balance;

Also explain the program that's prints the id and name of top balances.

Q.8. (a) Explain the purpose of fopen(), fseek() and feof(). 3

(b) Define the following structure and write necessary function for the queries. 4

Structure name: Student
Field's: name, Roll, CGPA
Queries:

(i) Find out the Roll of a Student with a give name
(ii) Find out the CGPA of a Student with a given Roll
(iii) Sort the students with the stored CGPA.

(c) Write down a program that will take the length of the radius of 10 circles stored in a file. Find out the area of those 10 circles and print the areas in an another file. 5

***

16 Series

SECTION : A

Q.1. (a) Explain briefly (i) compiler (ii) interpreter and (iii) object file. 6

(b) Find the value of the expression, $-13\%4 > 4/8-1$. 2

(c) Find the output when the following statement is executed if $a = 10$ and $b = 20$. 2
printf("%d", (b-a) ? a+b : a-b);

(d) Write down the meaning of the following escape sequence (i) /? (ii) /a (iii) /n and (iv) /v 2

Q.2. (a) Write a program to find out the interest charged in installments for following case. 6
A desktop computer costs 30000 BDT. A salesman sells it for 10000 BDT for next 6 months. What is the monthly interest charged?

(b) The wind chill index (WCI) is calculated from the wind speed v and the temperature t. Three formulas are used, depending on the wind speed 6
if $(0 \le v \le 4)$ then $WCI = t$,
if $(v \ge 45)$ then $WCI = 1.6t - 55$
otherwise $WCI = 91.4 + (91.4 - t)(0.0203U - 0.304\sqrt{v} - 0.474)$
Write a program that can calculate WCI using v and t.

Q.3. (a) What will be the output of the following programs: 6

(i)
```
void main(){
int a=b=c=10;
a=b=c=50;
printf("\n %d %d %d", a, b, c);
}
```

(ii)
```
#define SQUARE(X) X*X
void main(){
printf("\n square = %d", SQUARE(10+2));
}
```

(iii)
```
void main(){
int x;
x=printf(" I see, Sea in C");
printf("\n x=%d", x);
}
```

(iv)
```
void main(){
printf("\n %d %d %d", 10 & 20, 10/20);
}
```

(b) Find the output of the following program segment: 4
```
int i=1;
while(1){
printf("%d", i++);
if(i>3) break;
printf("*");
}
```

(c) What are the differences between continue and break statement? 2

Q.4. (a) Differentiate between local and global variable with an example. 2

(b) Let ax[] is defined as 6
int ax[5] = {10, 20, 30, 40, 50};
and if int *p = &ax[2];
then find (i) *(p+2) (ii) (p-3) (iii) *p++ if &ax[0] = 2262H.

(c) Write a program to find the common elements between arrays ax[50] and bx[50]. 4

SECTION : B

Q.5. (a) Write a program to find out the amount of load-shading on a given day of a region. The conditions are: 5

(i) A city is divided into regions with different priorities.

(ii) Region with highest priority will have lowest amount of load-shading (hour) and vice-versa.

(iii) The amount of load-shading is pre-allocated for a given region on a specific day of a week.

(b) Given three variable x, y and z, write a function to circularly shift their values. In other words if x=5, y=6 and z=7, after circular shift y=5, z=6 and x=7. Call the function with variables a, b and c to circularly shift their values. 4

(c) Write and test the following power() function that returns raised to the power 3
double power(double, int);

Q.6. (a) Explain with example of the followings: 3
(i) call by value (ii) call by reference

(b) Write the heading of the following functions: $4\frac{1}{2}$

(i) Function "abc" accepts one integer and one char and return a double.

(ii) Function "def" accepts a pointer to char and returns nothing.

(iii) Function "ghi" accepts nothing and returns a pointer to float.

(c) Write a program that generates 10 unique numbers between 10 and 100 randomly. $4\frac{1}{2}$

Q.7. (a) What value is stored in the memory if we press "B" from keyboard. 2

(b) Explain the function of the following function with example. 4
(i) strcmp() and (ii) strcpy()

(c) Write a program that reads a string from keyboard and checks the number of occurrence of character 's' and 't'. 6

Q.8. (a) Given a text file, create another file deleting all the vowels (a, e, i, o, u). 4

(b) Write a program which will read a line and delete from it all occurrences of the word "the". 4

(c) Explain the array of structures and write a program to accept record of 15 persons which has name, age and address and also display them. 4

***