"Heaven's Light is Our Guide"

Rajshahi University of Engineering & Technology

Department of Mechanical Engineering

B. Sc. Engineering 1st Year **Even** Semester Examination, **2019**

Course No.: **CSE 1281** Course Title: **Computer and Programming Language**

Full Marks: *72* Time: ***Three*** Hours

N.B.: i) Answers **Six** question taking **Three** from each section.
ii) Figures in the margin indicate full marks.
iii) Use separate answer script for each section.

SECTION-A

Q.1(a) Define the following terms (i) EAROM (ii) PROM (iii) DLT (iv) SRAM 04

(b) What is OS? Define the following terms, LINUX, WINDOWS, DOS 04

(c) Write a C++ program that converts a constant Fahrenheit temperature into the corresponding Celsius temperature. Prompt the user to enter a Fahrenheit temperature. Note: C = 5/9 (F - 32) 04

Q.2(a) What is meant by translator program? Explain the differences between complier and interpreter. 04

(b) Antu and dog are two best friends. They are good at matrix concepts. Antu created a matrix A of 3 × 3 order and dog created a matrix m of 3 × 3 order. They want to find the multiplication matrix of two matrices A and m. Write C++ program to solve the problem. 04

(c) What is software? What are the differences between system software and application software? 04

Q.3(a) Distinguish between break and continue keywords with their corresponding functions. 02

(b) Write a C++ program to print the following patterns:- 04

```
      2
    2 2
  2   2
2     2
2       2
2         2
2 2 2 2 2 2 2 2 2
```

(c) Write the output of the following code segments 06

(i)
```
#include < iostream>
using namespace std;
int main () {
int a;
for (a = 2; a < 88; a++)
{ if (a % 2 = = 0) || (a % 5 = = 0)
   { continue; }
cout << a << endl;
}
return 0; }
```

(ii)
```
#include < iostream>
using namespace std;
int main () {
int x;
for (x = 1; x < 33; x++)
{ if (x% 3 = = 1)
   {break;}
cout << x << endl;
}
return 0; }
```

Q.4 (a) What is recursion? What advantages are there in its use? 04

(b) What is wrong with this program? How can it be fixed? 04

```
#include < iostream>
using namespace std;
int main () {
   double number;
   int count;
  do{
     cout << " Enter a number: " ;
     cin >> number;
     } while (count < 6);
```

(c) Find the value of the following series with the help of C++ program 04

$$e = 1 + \frac{1}{1} + \frac{1}{2!} + \frac{1}{3!} \ldots \frac{1}{n!} \ldots$$

SECTION-B

Q.5(a) What are 3 base and 5 base number systems? 03

(b) Convert the following :- 04

(i) $(10101011111)_2 = (?)_{16} = (?)_8$ (ii) $(FA2A)_{16} = (?)_8$

(iii) $(1032243)_5 = (?)_2 = (?)_{16}$ (iv) $(7EFA)_{16} = (?)_8 = (?)_5$

(c) Find out the 2's complement of the following numbers 05

(i) $(11101110)_2$ (ii) $(10000010)_2$

(iii) $(11100001)_2$ (iv) $(10001011)_2$

Q.6 (a) Explain why you would need both 'public' and 'private' members in a class. 03

(b) What is a destructor and what is its purpose. 03

(c) Design and implement a class dayType that implements the day of the week in a program. The class dayType should store the day, such as 'Sun' for 'Sunday'. The program should be able to perform the following operations on an object of type dayType.

(i) Set the day
(ii) Print the day
(iii) Return the day
(iv) Return the next day
(v) Return the previous day
(vi) Add the appropriate constructors

Q.7 (a) Write short notes about two-dimensional array and one-dimensional array with examples.

(b) What is infinity loop? Is it harmful to programming? Justify your answer.

(c) Construct a class named Rectangle that has double precision data members named length and width. The class should have member functions named perimeter () and area () to calculate a rectangle's perimeter and area, a member function named setdata () to set a rectangle's length and width and a member function named showdata () that displays a rectangle's length, width, perimeter and area.

Q.8 (a) What is an algorithm? What are the basic data types used in C++ ? Explain them with their size.

(b) Fix the following code.

```
int main () {
int rawscores [5]…
char grade [5]…
double rawscore;
long idNum;
char grade;
while (cin >> idNum >> rawscore) {
  for (int j = 4, j > = 0; j++)
    if (rawscore > rawscores [j]) break;
  }
grade = grades [j];
cout << idNum << ' ' << grade << endl;
}
```

(c) What will cout display for the variable c? for b? for a?

```
#include < iostream>
#include < iomanip>
using namespace std;
int fun (int a, int &b);
int main () {
int a = 1;
int b = 2;
int c = 3;
c = fun (a,b);
cout << c << "  " << b << "  " << a << endl;
return 0;
}
int fun (int a, int &b) {
a = 42;
b = 42;
return 42;
}
```

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ii) Figures in the margin indicate full marks.
iii) Use separate answer scripts for each section.

SECTION – A (29)

Q.1(a) Define data and information. Distinguish between data and information. 04 04
(b) What is meant by operating system? Explain the functions of operating system. Name some operating systems that are being used presently. 04 04
(c) What is software? What are differences between system software and application software? 04 03
Q.2(a) Describe the different data types in C++. How could we extend the range of values they represent? 04 03
(b) What are the differences between break and continue keywords. Write the output of the following code segment: 05 02

```
int x = 5, y = 20, k = 2;
 if (x>y)
   if (y>k)
    k  = x;
    else k = y;
      k = x+ y;
      cout< k;
```

(c) Write a C++ program that will check a given number is odd or even. 03
Q.3(a) Compare Do-while and while loops in terms of their functions. 02 02
(b) What is infinity loop? Is it harmful to programming? Justify your answer. 04 02
(c) What is meant by compiler and interpreter? 02 02
(d) Write a C++ program to print the following patterns: 04 04

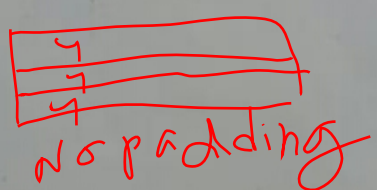
```
*
* *
* * *
* * * *
```

Q.4(a) What are the advantages of class over structures in terms of their functions? 03
(b) What are the basic class functions? Write their purposes. 03
(c) Construct a class diagram for a country class. Each country has a capital city. the attributes of interest for each country are its populations, size, main agricultural product and main manufacturing product. 06

SECTION – B (33)

Q.5(a) Why are binary digits used to code data to be stored in a computer? 03 02
(b) Convert the following 05 05
(i) $(1010111)_2 = (?)_{16}$ (ii) $(FA2A)_{16} = (?)_8$ (iii) $(7AEF)_{16} = (?)_8 = (?)_2$
(c) Find out the 2's complement of the following number (i) $(11001110)_2$ (ii) $(11000011)_2$ (iii) $(10100001)_2$ (iv) $(1111100)_2$ 04 04
Q.6(a) Define the following terms (i) RAM (ii) ROM (iii) EPROM (iv) EEPROM 04 04
(b) P and L are best friends. They are not good in matrix concepts. P created a matrix A and L created a matrix B. They want to find the multiplication matrix of two matrices A & B. Write C++ program to solve the problem. 06 06
(c) How many bites are allocated in the following program. 02 00

```
struct student {
        int roll;
        float marks;
        float gpa;
       }
void main () {
        int a;
        float b, cgpa;
        struct student s + 1;
       }
```



Q.7(a) Write a C++ program that calculates and display the velocity of water flowing out of the tube shown in Fig. Q 7(a). The velocity of water flowing into the tube is 1 ft/sec, the input tube radius is 0.75 in and the output tube radius is 0.5 in. the output velocity is given by this formula 03

$$V_{out} = V_{in}\left(\frac{r_{in}}{r_{out}}\right)^2$$

where, V_{out} is the output velocity, V_{in} is the input velocity, r_{out} is the radius of the output tube and r_{in} is the radius of the input tube.

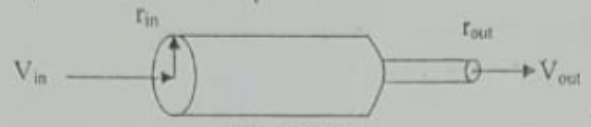


Fig. Q 7 (a)

(b) The combined resistance of three resistors connected is parallel, as shown in Fig. Q 7(b), is given by the formula 03

$$\text{Combined resistance} = \frac{1}{\left(\frac{1}{R_1}+\frac{1}{R_2}+\frac{1}{R_3}\right)}$$

Using this formula, write a C++ program to calculate and display the combined resistance when the three resistors $R_1 = 1000$, $R2 = 500$, $R_3 = 250$ are connected in parallel. the output should produce this display

The combined resistance is xxxx.xx ohms.

The xxxx.xx denotes placing the calculated value in a field width of seven column, with two positions to the right of decimal point.

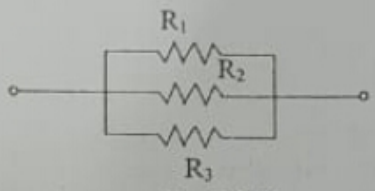


Fig. Q 7 (b)

(c) Write a program which receives two numbers from input (n, x) and calculate the following equation for entered numbers (n, x). 06

$$1 + x + x^2 + \ldots\ldots\ldots\ldots + x^n.$$

Q.8(a) What is recursion? Write down a program that can find out the factorial of any number using recursion. 04

(b) Write a C++ program to implement menu of addition, subtraction, multiplication and division of two integers using switch case. 04

(c) Write the output of the following code segments 04

(i)

```
# include <iostream>
using namespace std;
int main () {
int i;
for (i = 0; i < 10; i++)
{
if (i%2==0)||(i%3==0)
{ continue;}
cout << i <<endl;
}
return 0; }
```

(ii)

```
# include <iostream>
using namespace std;
int main () {
int i;
for (i = 0; i < 10; i++)
{
if (i%3==0)
{ break;}
cout << i<<endl;
}
return 0; }
```

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N.B.: i) Answer **Six** questions taking **Three** from each section.
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iii) Use separate answer script for each section.

SECTION-A

Q.1(a) Discuss the basic parts of a computer. Give some examples of system software. 04

(b) Explain the following terms: (i) data, (ii) information. Distinguish between data and information. 04

(c) What is an algorithm? Write an algorithm to compute the factorial of a positive number read from the keyboard. 04

Q.2(a) Write a C program that will check a given number is prime or not. 04

(b) What are the basic data types used in C? Explain them with their size. 04

(c) What will be the output of the following program statement? 04

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

Q.3(a) Compare the use of the *if-else* statement with the use of ?: operator. 03

(b) Distinguish between *while* loop and *do while* loop. What will be the output of the following program statement? 05

```
int main ( ) {
        int a=10;
Loop:
do {
    if (a==15){
        a=a+1;
        goto Loop;
    }
printf ("value of a: %d \n", a);
        a++;
    }
while(a<20);
return 0;}
```

Q.4(a) What is software? Mention the relations between hardware and software. Briefly explain the types of software. 04

(a) Write down the differences between EPROM and EEPROM. 03

(b) Write a program to print the following pattern. 05

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

(c) What is the difference between *break* and *continue*. Explain with example. 04

SECTION-B

Q.5(a) What is structure? How does a union differ from a structure? 03

(b) Find out the errors of the following code segment and rewrite the code segment with errors free. 05

```
#include < stdio.h>
 struct student{
                int id;
          char name[20];
          float percentage;
                } ;
int main ( ) {
      student std;
id=1
strcpy(std. name, "Raju");
percentage=86.5;
printf ("Id= %d \n", std.id);
printf ("Name= %d \n", std.name);
printf ("Percentage= %f", std.percentage);

return 0;}
```

(c) Write the output of the following code segments: 04

(i)

```
#include < stdio.h>
int main ( ) {
        int i;

for (i=0; i<10; i++){
   if (i%2==0)||i%3==0
   {
    continue;
   }
printf ("value i= %d \n", i);
   }
return 0;}
```

(ii)

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

Q.6 (a) Write a C program to implement menu of addition, subtraction, multiplication and division of two integer numbers using switch case. 06

(b) Find out the size of the variable ax for the following declaration: 04

```
union student{
int id;
char name[10];
float marks;
}ax;
```

(c) What is the use of increment and decrement operator in C? 02

Q.7 (a) What is the difference between RAM and ROM? 04

(b) Given a number, write a program to reverse the digits of the number. 04

(c) Write a C program to print the following pattern: 04

```
*  *  *  *
*  *  *
*  *
*
```

Q.8 (a) What is recursion? Write down a program that can find out the factorial of any number using recursion. 04

(b) Character strings in C are automatically terminated by the null character. Explain how this feature helps in string manipulation? 04

(c) How many bits are allocated by the following program? 04

```
struct student{
        int roll;
    float marks;
     float gpa;
      }
void main ( ) {
      int a;
float b, cgpa;
struct student s1,;}
```

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ii) Figures in the margin indicate full marks.
iii) Use separate answer script for each section.
iv) Charts and tables may be used if required.

SECTION-A

Q.1 (a) Draw a block diagram to illustrate the basic organization of a computer system. 04

(b) Determine the value of each of the following logical expressions if a=5, b=10 and c=-6, (i) a<b && a>c (ii) b>15 && c<0 II a>0. 04

(c) Write a program that gets a character and display while vowel or not. 04

Q.2 (a) Describe the different data types in C. How could we extend the range of values they represent? 04

(b) What are the differences between ' break' and 'continue' keywords. Write the output of the following code segment: 05

(i)
```
#include<stdio.h>
int main () {
int i;
for (i=0, i<6,.i++){
if{ i%2==0II i%3==0)
{
continue;
}
printf("value i:%d \n",i);
}
return0;
}
```

(ii)
```
#include<stdio.h>
int main () {
int i;
for (i=1, i<10, i++)
{
if { i%3==0II i%5==0)
{
break;
}
printf("value i:%d \n",i);
}
return0; }
```

(c) Write a C program that will check a given number is prime or not.

Q.3 (a) Define : Assembler, Compiler and Interpreter. 04

(b) What will be the value of x when the value of x when the following segment is extended? 03

(c) Write a C program to print the following patterns: 05

```
*
* *
* * *
* * * *
```

Q.4 (a) What is pointer? How is a pointer variable declared? 02

(b) Write a C program that will show the summation of any two integer number by using function. 04

(c) Convert each of the following: (i) $(1010111)_2 = (?)_8$ (ii) $(FA2A)_{16} = (?)_4$. 03

(d) What is the difference between variable declaration and initialization in C. 03

SECTION-B

Q.5 (a) What is a Union? How does a Union differ from a structure? 03

(b) Write a C program to design a Structure for 10 cricketers. Take input for each cricketer's name, team and strike-rate like name: Shakib Al Hasan; team: Bangladesh and strike rate: 40.25. Give output for all 10 cricketers name, team & strike rate. 07

(c) In what ways does a switch statement differ from and if statement. 02

Q6 (a) What is an operating system? Give some examples.

(b) Find the output of the following program:

```
#include<stdio>
Main() {
int a,b,c;
Int z[3] [4]={1,2,3,4,5,6,7,8,9,10,11,12};
for (a=0; a<3; a++) {
c=999;
for (b=0; b<4 ;b++)
if (z[a] [b] <c)
c= z[a] [b];
printf("%d\n", c); }}
```

	0	1	2	3
0	1	2	3	4
1	5	6	7	8
2	9	10	11	12

(c) Write a program that read and sort an array using bubble sort in ascending order.

Q7 (a) What are the syntax and purpose of the following library function:
(i) Sort (ii) Strcmp (iii) Strcpy (iv) pow().

(b) Write a C program to find the frequency of a character within a line of text.

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

Q8 (a) Write down the output of the following code statement:

```
Int a=1; a=(a++)+(++a)
printf("%d", a);
printf("%d", ++a);
printf("%d", a++);
```

4, 5, 5

(b) Why is the use of 'goto' statement generally discouraged? In which condition 'goto' statement is useful and when it should be avoided, discuss briefly.

(c) What is recursion? What advantages are there in its use?

(d) Describe ternary operator with example.

1 + 3

(a>b)? a : b

a=3

line1; a=1

line2: a=4

line3: print a=4

line4: " a=5

RAM	ROM
1. Random acen memory	1. Read only memory
2. volatile	2. permanent
3. Fast acen	3. slow acen
4. send and recive data directly from proceno.	4. indirect from procenor
5. Can read and write	5. Can't write