Department of Computer Science & Engineering
University of Dhaka
Incourse - 1

CSE – 2103 Computer Architecture
Marks – 30 Time – 1 hr

Attempt all questions:

1. a) A floating number representation has 4 bit sign magnitude exponent and mantissa. What are the ranges of that floating number representation? 3

   b) Consider two different implementations, P1 and P2, of the same instruction set. There are five classes of instructions (A, B, C, D, and E) in the instruction set. P1 has a clock rate of 4 GHz. P2 has a clock rate of 6 GHz. The average number of cycles for each instruction class for P1 and P2 is as follows: 5

Class	CPI on P1	CPI on P2
A	1	2
B	2	2
C	3	2
D	4	4
E	5	4

   Assume that peak performance is defined as the fastest rate that a computer can execute any instruction sequence. What are the peak performances of P1 and P2 expressed in instructions per second?

   c) Write -3.25 in IEEE 754 64-bit floating point number representation. 3

   d) Write the corresponding machine language instruction of the following ARM instructions: 4

      i) ADD r2, r8, 5
      ii) LDR r5, [r3, #8]

2. a) What is the equivalent one-address machine code of **(A+B-C)/(A*B-C)** 3

   b) Show the steps of sequential multiplication where the multiplicand is 111_2 and the multiplier is 1001_2. 5

   c) Consider a stack (Motorola 680X0) where 5
   A2 = stack pointer register = 0AABCDEF
   D6 = stack data register = B(2,3)B(2,2)B(2,1)B(2,0)
   Assume that the stack contains some data inside it.

   Draw the stack before and after the execution of the following instructions:
   MOVE.L D6, -(A2)
   MOVE.L D6, -(A2)

   What will be the content of D6 and A2 at this stage?

   d) What do you understand by register indirect addressing with offset. 2

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Incou rse - 2

CSE- 2103 Computer Arc hitecture and Organization

Time - 1hr 15 minutes

Marks - 30

Answer all questions:

1. a) Construct a table to multiply 14 times -5 using 6-bit numbers using Booth's algorithm.

   b) Draw the block diagram of pipelined version of the Floating-point Adder.

   c) Write down the working principal of Carry-Sa e Adder.

2. a) Draw the block diagram of single cycle proces r datapath with necessary control signals. Highlight the datapath in the figure involved i operation for a R-type instruction.

   b) Outline the steps involved in operation for a Lo d instruction in multicycle processor datapath.

   c) Describe the role of ALU control in Simple Dat path Control Unit.

of CSE, UU
AT 2122, 2015
In-course Exam #1

minutes
Total Marks: 30

Answer the following questions.

1. [10 marks] State whether the following statements are true of false. If false correct the statements. Do not simply use negations such as NO/NOT to correct the false statements.

(a) If two events cannot happen at the same time, then they are independent.

(b) Mutually independence of a set of events implies pair-wise independence.

(c) If two events are independent then they are also conditionally independent.

(d) Posterior probability of a hypothesis is proportional to the likelihood of evidence times prior probability of the hypothesis.

(e) Events X and Y are conditionally independent given Z if $P(X|Z)P(Y|Z) = P(Z|XY)$.

$P(x \cap y \mid z) = \frac{P(x \cap y \cap z)}{P(x \cap y)} = \frac{P(x \mid y \cap z)}{P(x \mid y)}$

2. [5 marks] A geologist is quoted to say "there is 70% chance that this region contains oil". What will be frequency and subjective interpretations of this statement?

3. [5 marks] A point (x, y) is to be selected from the square S containing all points (x, y) such that $0 \le x \le 2$ and $0 \le y \le 2$. Suppose that the probability that the selected point will belong to a specified subset of S is equal to the area of that subset. Find the probability of the subset of points such that (i) $y \ge 3x^2$, (ii) $y = x$.

4. [5 marks] Prove that for two events A and B, $P(B|A) = \frac{P(A|B)P(B)}{P(A|B)P(B)+P(A|B^c)P(B^c)}$

5. [5 marks] Yummy Bakery has a selection of 5 different types of cakes, 3 different types of pizzas, 2 different types of wraps, and 3 different types of pies. You are a coupon holder who can buy any 4 items from the bakery. How many possible choices do you have? Explain your answer.

6. [5 marks] A class consisting of 4 graduate and 12 undergraduate students is randomly divided into four groups of 4. What is the probability that each group includes a graduate student? Explain your answer.

7. [5 marks] An electrical system consists of four components as illustrated in Figure 1. The system works if components A and B work and either of the components C or D works. The reliability (probability of working) of each component is also shown in Figure 1. Find the probability that (a) the entire system works and (b) the component C does not work, given that the entire system works. Assume that the four components work independently.

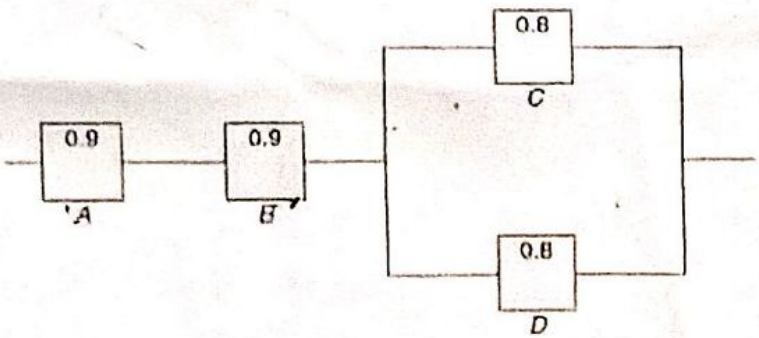

Figure 1

University of Dhaka

Department of Computer Science and Engineering

2nd year B.Sc. in Computer Science (1st Semester)

1st In-course Examination-2015

BUS 2123 Introduction to Business

Total Marks: 15 (6+9) Time: 1 Hour 10 Minutes

Short Questions (4×1.5=6)

[Answer all of the following questions]

a. What are the criteria to determine the right type of business for an individual? Discuss.

b. Differentiate between business profit and economic profit.

c. What are the common reasons of small business failure? Briefly explain.

d. Differentiate between balance of trade and balance of payment.

Broad Questions (3×3=9)

[Answer all of the following questions]

1. What is merger? What are the different types of merger? Discuss with example.

2. What is franchising? What are the advantages and disadvantages of franchising? Discuss.

3. What types of barriers are faced by the local companies in international business? Discuss.

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Department of Computer Science and Engineering

2nd year B.Sc. in Computer Science (1st Semester)

2nd In-course Examination-2015

BUS 2123: Introduction to Business

Total Marks: 15 (6+9)

Time: 1 Hour 10 Minutes

Short Questions (4×1.5=6)

[Answer all of the following questions]

a. What is control? What are the various steps of control? Explain.

b. Discuss the various forms of interpersonal that a manager may perform in an organization as suggested by Henry Mintzberg.

c. What do you mean by line authority? What are the advantages and disadvantages of line authority?

d. What is marketing mix? Define the major elements of marketing mix.

Broad Questions (3×3=9)

[Answer all of the following questions]

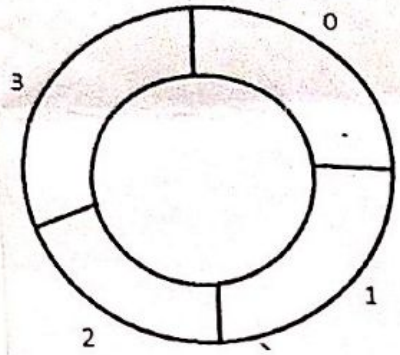
1. What is organizing? What are the basic principles of organizing? Discuss.
2. Briefly explain the **different steps of consumer buying process**
3. What types of skills are **necessary** for a **manager** to be successful in an organization? Explain

University of Dhaka
Department of Computer Science & Engineering
CSE 2101 – Data Structure
1st In-course Examination
Time: 60 Minutes Marks: 30

1. Show how to implement a queue using two stacks. Analyze the running time of the queue operations. [6]

2. Imagine you have a **circular queue** of size 4. Now draw the contents of the queue after each of the following operations. [the queue is implemented using array] [6]

   a. enqueue(5);
   b. enqueue(6);
   c. enqueue(7);
   d. dequeue();
   e. enqueue(8);
   f. dequeue();
   g. enqueue(9);
   h. dequeue();
   i. enqueue(10);
   j. enqueue(11);
   k. dequeue();
   l. enqueue(12);



3. a. Print the elements of a linked list in reverse order. You must use singly link list and you are not allowed to keep the elements of the linked list in any other data structure (e.g. array) temporarily. [3]

   b. What is stable sort? Prove that COUNTING-SORT is stable while using cumulative frequency. [3]

4. Write a program that takes P and n as input and prints output $\sqrt[n]{P}$. You are not supposed to use any function from <math.h> header file. [6]

5. Sort the following numbers using **insertion sort** or **quick sort** (show the steps). [6]
   23, 12, 33, 4, 55, 23, 78, 90

6. [bonus question] [5]
   Write output for the two function calls below:
   a) `permute(4)`
   b) `permute(3)`

```
int fl[] = {0,0,0,0,0}, N = 4, number = 0;
void permute(int n)
{
    if( n == 0 )
    {
      printf("%d\n",number);
      return;
    }
    for(int i = 1; i <= N; i ++)
        if(fl[i] == 0)
        {
            fl[i] = 1;
            number = number*10 + i;
            permute(n-1);
            number = number/10;
            fl[i] = 0;
        }
}
```

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Department of Computer Science and Engineering

CSE 2101: - Data Structure

2nd In course Examination

Time: 60 Minutes Marks: 30

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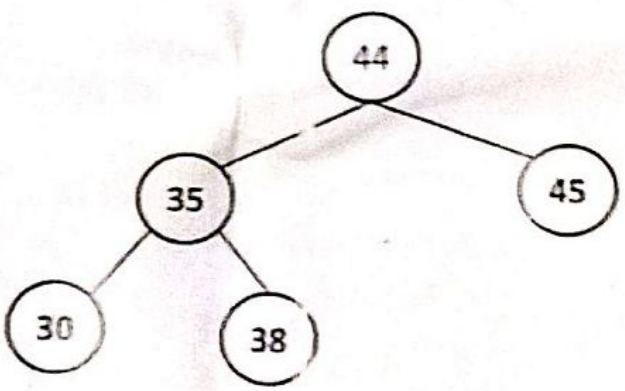
1. What is a BST? Find an input sequence of 15 numbers which results in best case build of a BST (Height = 3). Build the tree. [5]

2. Perform the following operations on a MIN Heap. Show heap after each operation. Also show which value will be returned when ROOT is extracted. [5]
   a. Insert 10
   b. Insert 5
   c. Insert 6
   d. Insert 30
   e. EXTRACT_ROOT
   f. Insert 12
   g. Insert 7
   h. EXTRACT_ROOT
   i. EXTRACT_ROOT
   j. EXTRACT_ROOT

3. Perform HUFFMAN Coding for the text below: [10]

   coloring clue dongle glue
   a. Show steps in building the HUFFMAN Tree.
   b. Encode each letter using Huffman . coding
   c. Encode the whole text.

4. What is tree edge, back edge, cross edge and forward edge? Show with examples. [4]
5. Consider the AVL tree below. Show how **36** will be inserted in this tree. [6]
   Perform necessary balancing actions (rotations)



Department of Computer Science and Engineering

2nd Year 1st Semester Incourse - 1, 2015

Course Code: CSE 2103, Course Title: Object Oriented Programming

Total Marks: 30 **Time: 1 Hour**

1. a) Why Java is platform independent, portable and secure language? 3

   b) Differentiate between method overloading and method overriding with example. 3

2. a) Are there any errors in the following codes? If so, find out and correct them: 3

   i)
   ```
   byte a =20, b= 100, c =30;
   int d = a * b /c;
   ```

   ii)
   ```
   short a = 10;
   a = a*50;
   ```

   b) Find the output of the following code: 5

```
class test {
    public static void main(String args[]) {
        byte b;
        int i = 513;
        double d = 320.639;
        b=(byte) i;
        System.out.println ("Conversion of int to byte: " + i +" "+ b);
        i = (int) d;
        System.out.println("Conversion of double to int: " +d+" "+i);
        b=(byte) d;
        System.out.println("Conversion of double to byte: " +d+" "+b);
    }
}
```

3. a) Find output of the following code: 5

```
class test{
    static int a = 20;
    int b = 10;
}
public class test1 {
    public static void main(String args[]) {
        System.out.println(test.a);
        test ob1 = new test();
        test ob2 = new test();
        System.out.println(ob1.a + " " + ob1.b);
        System.out.println(ob2.a + " " + ob2.b);
        ob1.a =25;
```

```
            ob1.b = 35;
            System.out.println(ob1.a+ " " + ob1.b);
            System.out.println(ob2.a + " " + ob2.b);
        }
    }
```

b) Find the error of the following code (if there is any): 4

```
class A {
    int x;
    final int myMethod(int a){
        return a*a + x;
    }
}
class B extends A {
    int myMethod(int b){
        return b+x;
    }
}
public class C {
    public static void main(String args[]){
        B ob = new B();
        System.out.println(B.myMethod(10));
    }
}
```

a) We want to model two classes named "Teacher" and "Student". Both of them are subclass of a superclass called "Person", which contains common properties of a Teacher and a Student i.e. Name, address etc. Both of the classes (Teacher and Student) should have their own properties. Write a Java program to model these classes. Use appropriate properties, inheritance and variable of super class to refer subclass object and return a formatted string to describe the object of a class in each class's toString() method. 5

b) What is the output of the following code: 2

```
class test {
    public static void main(String args[]){
        String s1 = "Hello World";
        String s2 = "Hello World";
        String s3 = s1;
        System.out.println(s1 == s2);
        System.out.println(s1 == s3);
        System.out.println(s1.equals(s2));
    }
}
```

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Department of Computer Science and Engineering

2nd Year 1st Semester In-course - 2, 2015

Course Code: CSE 2102. Course Title: Object Oriented Programming

Total Marks: 30 **Time: 1 Hour**

1. a) Differentiate abstract class and interface with example.How Java supports multiple inheritance? 4

   b) What is wrapper class and anonymous inner class? Describe life cycle of an applet. 4

2. a) Are there any errors in the following codes? If so, find out and correct them: 3

i)
```
interface A{
int a = 10;
}
interface B implements A{
int b = 20;
}
class C extends B{
System.out.println("Hello World");
}
```

ii)
```
interface A
{
intval = 10;
void display();
}
interface B
{
intval = 20;
void display();
}
class Main implements A, B{
   void display(){
         System.out.println(val);
         A.val ++;
         System.out.println(A.val+" " +B.val);
   }
}
```
4

   b) Find the error of the following code and propose two ways to correct the error. 5

```
class MyClass{

public static void main(String args[]){

     System.out.println("Inside main method");

     throw new IllegalAccessException("Test");

}

}
```

3. a) Write a Java program to take two integer number x and y as input and calculate square root of (x - y). Also write your own exception class InvalidSquareRootException and throw in case, if the calculation of square root is not valid.

b) Describe two ways to create a thread in Java with example. According to you which one of the two ways is good to use? Support your answer with some logical explanation.

Dept. of computer science and Engineering
University f Dhaka
2nd Year 1st Semester 1st Incourse Examination-2015

MTM-2121: Ordinary Differential Equation

Time: 01- hour **Full marks-15**

All questions carry equal Weight (Marks are indicated in the figre)

1. 2+3=5

(a) Define Order and degree of the differential Equation with example.

(b) Find the differential equations of all circles passing through the origin and having their centre on the x-axis

2. 2+3=5

(a) Form the differential equations of all the straight lines passing through the origin

(b) Find the differential equation of $y= Ae^{3x} + Be^{-2x} + \sin 5x$

3. 2+3=5

(a) If the equation $Mdx + Ndy = 0$ is exact then prove that $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$

(b) Solve $(2x + 3y + 4)dx + (3x - 6y - 5)dy = 0$

Or

Solve the following equations (a) $(x-y)^2 \frac{dy}{dx} = a^2$ (b) $(x^2+y^2)dx - 2xydy = 0$

Dept. of Computer Science and Engineering
University of Dhaka
2nd Year 1st Semester 2nd Incourse Examination-2015

MTM-2121: Ordinary Differential Equation

Time: 01- hour **Full marks-30**

Each question carry equal Weight

1. (a) Determine the method of particular integral $y = \frac{1}{f(D)} e^{ax}$

(b) *Solve* $(D2 - 1)y = 4xe^x$

or

A fossilized bone is found to contain $\frac{1}{1000}$ of the original amount of carbon. Determine the age of the fossil. Assume that the half life of carbon is 5600 years.

2. *Solve* $\frac{d2y}{dx2} + y = cosecx$ by the method of variation of parameter

3. Solve $\frac{d2y}{dx2} - 2\frac{dy}{dx} = e^x sinx$ by the method of undetermined coefficient