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Begum Rokeya University, Rangpur
 Department of Computer Science and Engineering
 2nd Year 1st Semester Final Examination -2013
 Course: CSE 2101(Digital Logic Design)

Time: 3 hours

Full Marks: 50

N.B.

- a) There are **SEVEN** questions in this course. Answer any **FIVE** questions.
- b) The figures in the margin indicate full marks.
- c) The questions are equal marks.
- d) All parts of each question must be answered consecutively.

- | | |
|--|---|
| 1. a) What is a logic gate? Why you used logic gates? | 2 |
| b) Proved that NAND and NOR gates are universal gates. | 4 |
| c) State and prove DeMorgan's theorem for three variables by trying all possible cases. | 4 |
| 2. a) How to convert binary code to gray code? What is the importance and application of gray code? | 3 |
| b) Show how a two-input NOR gate can be constructed from two-input NAND gates. | 2 |
| c) Design a full adder and explain its circuit operations. | 3 |
| d) What do you mean by SOP and POS? | 2 |
| 3. a) What is K-map? Why we need K-maps? Give the various types of K-map. | 3 |
| b) What are the limitations of K-map? | 1 |
| c) Simplify the function using K-map and implement using minimum number of logic gates. | 3 |
| $F = (2, 9, 10, 12, 13) + D(1, 5, 14)$ | |
| d) Describe potential timing problem in FF circuits. | 3 |
| 4. a) Minimize the following Boolean function using Quine-McCluskey method. | 5 |
| $F(A, B, C, D) = \sum m(4, 8, 10, 11, 12, 15) + d(9, 14)$ | |
| b) Define setup time and hold time requirements of a clocked FF. | 3 |
| c) When a microcontroller wants to access data in its external memory, it activates active -LOW output pin called \overline{RD} (read). The data book says that the read \overline{RD} pulse typically has a pulse width t_w of 50ns, a rise time t_r of 15 ns and a fall time t_f of 10 ns. Draw a scaled drawing of the \overline{RD} pulse. | 2 |
| 5. a) Give classification of counters and explain asynchronous 4-bit binary ripple counter. | 6 |
| b) Explain working of master -slave JK flip-flop with necessary logic diagram. | 4 |
| 6. a) What is the difference between decoder and multiplexer? | 2 |
| b) Draw the logic circuit of a 3 line to 8 line decoder and explain its circuit operations. | 5 |
| c) How 74LS138 decoder can function as a demultiplexer. | 3 |
| 7. a) State merits and demerits of CMOS logic family. | 3 |
| b) Explain with neat diagram two input CMOS and TTL NAND and NOR gates. | 7 |

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```
static PingPong2 pp2 = new PingPong2();
public static void main(String[] args) {
    new Thread(new Tester()).start();
    new Thread(new Tester()).start(); }
public void run() { pp2.hit(Thread.currentThread().getId()); } }
```

7. (a) What is the difference between a Window and a Frame? Which package has light weight components? 3
What is the difference between Swing and AWT components?
- (b) What is the relationship between clipping and repainting under AWT? What do you mean by container and component in java ? 3
- (c) The following program is supposed to display a button in a frame, but nothing is displayed. What is the problem? 2

```
public class Test extends javax.swing.JFrame {
    public Test() {
        add(new javax.swing.JButton("OK"));
    }
    public static void main(String[] args) {
        frame.setSize(100,200);
        frame.setVisible(true); } }
```

- (d) What happens if you add a button to a container several times, as shown below? Does it cause syntax errors? Does it cause runtime errors? 2
- ```
JButton jbt = new JButton();
JPanel panel = new JPanel();
panel.add(jbt);
panel.add(jbt);
panel.add(jbt);
```

Department of Computer Science and Engineering

Begum Rokeya University, Rangpur.

2<sup>nd</sup> Year 1<sup>st</sup> Semester Final Examination, 2014 (Session: 2012-13)

Course Title: Object Oriented Programming

Course Code: CSE 2103

Full Marks: 50

Answer Any Five from the Given Questions

(Note: Numbers in the right margin indicate marks for each question.)

1. (a) What do you mean by compile time and run time polymorphism. 2
- (b) What is an accessor method and mutator method? What are the naming conventions of accessor method and mutator method? 3
- (c) What are the benefits of data field encapsulation? Describe the difference between passing parameter of primitive type and reference type with java code. 2
- (d) *Class Atom {  
Atom() { System.out.print("atom "); } }  
Class Rock extends Atom {  
Rock(String type) { System.out.print(type); } }  
public class Mountain extends Rock {  
Mountain() {  
super("granite ");  
new Rock("granite "); }  
public static void main(String[] a) { new Mountain(); } }* 2

What is the result? Give reason to your answer.

- (e) What is the default value of an object reference declared as an instance variable? Can a top level class be private or protected? 1
2. (a) What is immutable class and object? How can we be beneficiary of using these class and objects? Show appropriate java code. 2
- (b) Describe "has-a" and "is-a" relationship in OOP. What changes are required to successfully compile following code snippet? 2+2=4

```
Class Super {
private int a;
protected Super(int a) { this.a = a; } }
class Sub extends Super {
public Sub(int a) { super(a); }
public Sub() { this.a = 5; } }
```

- (c) Write a java program to maintain the books details like BookId, AccessionNumber, BookName, Author, Publication in books package and keep the journal details such as Journalid; JournalName in journal package. In main class use these two packages details for Staff and Student classes and display the books and journals information as requested by the user. 4
3. (a) What is function overloading and overriding? Explain with examples. If a method in a subclass has the same signature as a method in its superclass with a different return type, will this be a problem? Why? 3
- (b) How do you prevent a class from being extended? How do you prevent a method from being overridden? 2
- (c) In the code below, classes **A** and **B** are in the different package. If the question marks are replaced by blanks can class **B** be compiled? If the question marks are replaced by **private**, can class **B** be compiled? If the question marks are replaced by **protected**, can class **B** be compiled? 3

```
package p1;
public class A{
 ? int i;
 ? void m(){
```

```
 package p2;
 public class B extends A{
 public void m1(String[] args){
 System.out.println(i);
 m(); } }
```

- ✓ ✓ ✗ ✓
- (d) Which number is denoted by leading 0x or 0X in java? What is the difference between inner class and nested class? 2
4. (a) What does it mean that a method or class is abstract? Can we make an instance of an abstract class? Explain it with example. 2
- (b) What is the difference between Comparable and Comparator ? 3
- (c) Write a program to create interface named customer. In this keep the methods called information(), show() and also maintain in the Tax rate. Implement this interface in employee class and calculate the tax of the employee based on their Income. 3
- (d) What is the output of the following program? Give a logical explanation to your answer. 3
- ```
public class Barn {
    public static void main(String[] args) {
        new Barn().go("hi", 1);
        new Barn().go("hi", "world", 2);
        public void go(String... y, int x) {
            System.out.print(y[y.length - 1] + " ");
        }
    }
}
```
5. (a) What is Exception handling in java? Why it is used? Write a java code to simulate the way a stack mechanisms works with exception handling, throwing and dealing with exceptions such as stack is full (if you want to add more elements into the stack) or Stack is empty (you want to pop elements from the stack). 5
- (b) What is the difference between throw and throws clauses? Explain with a code. 2
- (c) What will be the result after executing the following program? 3
- ```
public static void parse(String str) {
 try{
 float f = Float.parseFloat(str);
 } catch(NumberFormatException nfe) {
 f = 0;
 } finally{
 System.out.println(f);
 }
}
public static void main(String[] args) {
 parse("invalid");
}
```
6. (a) When a thread is created and started, what is its initial state? Why do we need run() & start() method both. Can we achieve it with only run method? 2
- (b) Describe synchronization in respect to multithreading. What are the different level lockings using in the synchronization keyword? 2
- (c) 

```
public class TestFive {
 private int x;
 public void foo() {
 int current = x;
 x = current + 1;
 }
 public void go() {
 for(int i = 0; i < 5; i++) {
 new Thread() {
 public void run() {
 foo();
 System.out.print(x + ", ");
 }
 }.start();
 }
 }
}
```

3

Which two changes would guarantee the output: 1, 2, 3, 4, 5, ?

- (d) Estimate the output of following Program with proper reason. 3

```
class PingPong2 {
 synchronized void hit(long n) {
 for(int i = 1; i < 3; i++)
 System.out.print(n + "-" + i + " ");
 }
}
public class Tester implements Runnable {
```

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Begum Rokeya University, Rangpur  
 Department of Computer Science and Engineering  
 2<sup>nd</sup> Year 1<sup>st</sup> Semester Final Examination -2014  
 Course: PHY 1125 (Physics)

Time: 3 hours

Full Marks: 50

**N.B.**

- a) Answer any **FIVE** of the following questions.
- b) The figures at right side indicate full marks of the question.
- c) All parts of each question must be answered consecutively.

- |       |                                                                                                                                                                                                                                   |   |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 1. a) | Define photo-electric effect and work function. Establish Einstein's photo-electric equation.                                                                                                                                     | 4 |
| b)    | What is Compton effect? Obtain the expression for kinetic energy and direction of the recoil electron in Compton Scattering.                                                                                                      | 4 |
| c)    | Find the change in wavelength of an X-ray photon when it is scattered through an angle of 90° by a free electron.                                                                                                                 | 2 |
| 2. a) | What is radioactivity? Mention the properties of $\alpha$ and $\beta$ decay.                                                                                                                                                      | 4 |
| b)    | Define half-life and mean-life of a radioactive substance. Establish the relation $N = N_0 e^{-\lambda t}$ , where the symbols are of usual meaning.                                                                              | 4 |
| c)    | 1 gram of radium is reduced by 2.1 mg in 5 years by $\alpha$ - decay. Calculate the half-life of radium.                                                                                                                          | 2 |
| 3. a) | Define mean free path.                                                                                                                                                                                                            | 2 |
| b)    | Explain the basic principles of the kinetic theory of gases and show that pressure of an ideal gas is proportional to its density.                                                                                                | 5 |
| c)    | Calculate the average kinetic energy of molecule of a gas at a temperature of 300K.                                                                                                                                               | 3 |
| 4. a) | Define Miller indices. Draw the planes (111), (002), (112) and (201).                                                                                                                                                             | 3 |
| b)    | Show that the distance between two adjacent parallel planes with index number $(hkl)$ is<br>$d = \frac{a}{(h^2+k^2+l^2)^{1/2}}.$                                                                                                  | 4 |
| c)    | What are crystal defects? Name different types of crystal defects.                                                                                                                                                                | 3 |
| 5. a) | Define self-induction and mutual induction.                                                                                                                                                                                       | 2 |
| b)    | In a simple LR circuit, derive the expressions of growth and decay of the current.                                                                                                                                                | 6 |
| c)    | What is the physical significance of time constant $\lambda$ ?                                                                                                                                                                    | 2 |
| 6. a) | What are electric field and electric field strength?                                                                                                                                                                              | 2 |
| b)    | Derive an expression for the electric field due to a point charge.                                                                                                                                                                | 5 |
| c)    | Four point charges $q_1 = 1 \times 10^{-8} C$ , $q_2 = -2 \times 10^{-8} C$ , $q_3 = 3 \times 10^{-8} C$ and $q_4 = 2 \times 10^{-8} C$ are placed at four corners of a square of side 1m. Calculate the potential at its centre. | 3 |
| 7. a) | Define electric dipole and dipole moment.                                                                                                                                                                                         | 2 |
| b)    | Derive the expression of potential energy when an electric dipole is placed in a uniform electric field.                                                                                                                          | 4 |
| c)    | Define electric capacitor. Describe the construction of a parallel plate capacitor.                                                                                                                                               | 4 |

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Begum Rokeya University, Rangpur  
 Department of Computer Science and Engineering  
 2<sup>nd</sup> Year 1<sup>st</sup> Semester Final Examination -2014 ✓  
 Course: MAT 2121 (Ordinary Differential Equations)

Time: 3 hours

Full Marks: 50

**N.B.**

- a) Answer any **FIVE** of the following questions.
- b) The figures at right side indicate full marks of the question.
- c) All parts of each question must be answered consecutively.

1. a) Define order and degree of a differential equation. Form a differential equation from  $c(y + c)^2 = x^3$ . 5
- b) State existence and uniqueness Theorem. Examine this theorem on 5
  - i)  $y' = yx^2, y(1) = 2$
  - ii)  $\frac{dy}{dx} = \frac{y}{\sqrt{x}}, y(0) = 2$ .
2. a) Solve  $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 4y = \cos 2x$  by the method of separation of variables. 5
   
b) Solve  $(x^3 + y^2\sqrt{x^2 + y^2})dx - xy\sqrt{x^2 + y^2}dy = 0$ . 5
3. a) State and prove the necessary and sufficient condition for the exactness of a differential equation. 5
   
b) i) Solve  $(xy^2 - 1)dx + (x^2y - 1)dy = 0$  5
   
ii) Solve  $\left(\frac{2s-1}{t}\right)ds + \left(\frac{s-s^2}{t^2}\right)dt = 0$ .
4. a) Solve the initial value problem that consists of the differential equation  $(x^2 + 1)\frac{dy}{dx} + 4xy = x$  5
 and the initial condition  $y(2)=1$ .
   
b) Define Bernoulli equation. Identify and solve  $\frac{dy}{dx} + \frac{y}{2x} = \frac{x}{y^3}, y(1) = 2$ . 5
5. a) Define orthogonal trajectory. Solve  $cx^2 + y^2 = 1$ . 5
   
b) Define oblique trajectory. Find an oblique trajectory of the family of curve  $x^2 + y^2 = c^2$  which cuts the family at angle  $45^\circ$ . 5
6. a) State Cauchy-Euler equation. Show that the transform  $x = e^t$  reduces the equation  $a_0x^2\frac{d^2y}{dx^2} + a_1x\frac{dy}{dx} + a_2y = F(x)$  to a linear differential equation with constants coefficients. 5
   
b) Solve i)  $\frac{d^4y}{dx^4} + 8\frac{d^2y}{dx^2} + 16y = 0$  ii)  $3\frac{d^2y}{dx^2} - 14\frac{dy}{dx} - 5y = 0$  5
7. a) Define complementary function and particular integral. Find the general solution of the equation 5
  $\frac{d^2y}{dx^2} - 8x\frac{dy}{dx} + 15y = 9xe^{2x}$  by the method of undetermined coefficients.
   
b) Solve  $x^2\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + 2y = x^3$  5

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Begum Rokeya University, Rangpur

Department of Computer Science and Engineering ✓

2<sup>nd</sup> Year 1<sup>st</sup> Semester Final Examination -2013

Course: BUS 2123 (Introduction to Business)

Time: 3 hours

Full Marks: 50

**N.B.**

- a) Answer any **FIVE** of the following questions.
- b) The figures in the margin indicate full marks.
- c) All parts of each question must be answered consecutively.

- |                                                                                                                                                        |   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 1. a) 'Managing is necessary whenever one needs to get things done' Explain.                                                                           | 2 |
| b) Discuss the importance of management in national as well as enterprise level.                                                                       | 4 |
| c) Do you agree with view that a manager cannot be successful without having necessary skills? If yes discuss the relative importance of those skills. | 4 |
| 2. a) Why is time management important?                                                                                                                | 3 |
| b) How can you improve your time management skills?                                                                                                    | 3 |
| c) Discuss the time management grid.                                                                                                                   | 4 |
| 3. a) "Motivation is the act of stimulating someone" Explain.                                                                                          | 2 |
| b) Discuss the Need Hierarchy theory of motivation.                                                                                                    | 5 |
| c) What are the non-financial sources of motivation?                                                                                                   | 3 |
| 4. a) What are the sources of leadership power?                                                                                                        | 3 |
| b) Discuss the various patterns of leadership.                                                                                                         | 4 |
| c) Critically discuss the Trait Theory of leadership.                                                                                                  | 3 |
| 5. a) What is Communication?                                                                                                                           | 2 |
| b) Discuss the role of Communication in fulfilling enterprise objectives.                                                                              | 5 |
| c) State the importance of communication in management.                                                                                                | 3 |
| 6. a) What do you understand by decision making?                                                                                                       | 2 |
| b) What are the decision making conditions? Discuss them with the help of a diagram.                                                                   | 5 |
| c) Show the relationship between management hierarchy, nature of problem and nature of decision.                                                       | 5 |
| 7. a) What is meant by Human Resource Management?                                                                                                      | 2 |
| b) What are the objectives of Human Resource Management?                                                                                               | 3 |
| c) Discuss the factors influencing Human Resource Management.                                                                                          | 5 |

*(Handwritten marks: A, F, 8)*

Begum Rokeya University, Rangpur

Department of Computer Science and Engineering

2<sup>nd</sup> Year 1<sup>st</sup> Semester Final Examination -2014 ✓

Course: STA 2122 (Basic Statistics & Probability)

Time: 3 hours

Full Marks: 50

**N.B.**

- a) Answer any **FIVE** of the following questions.
- b) The figures at right side indicate full marks of the question.
- c) All parts of each question must be answered consecutively.

1. a) Define Statistics. Distinguish between descriptive statistics and inferential statistics. Explain and illustrate the function and importance of different modern Statistical techniques in Computer Science & Engineering. 4
- b) The following data are relate to study hour per week of 20 students of CSE dept., BRUR: 6  
12 8 10 9 5 14 12 10 14 20 18 19 10 7 6 9 10 12 13 15
  - i) Organize the data into frequency distribution table using a class interval of 3.
  - ii) Convert the data into relative frequency distribution.
  - iii) Draw a histogram from the table. Find the mode from the histogram.
2. a) What do you mean by measures of central tendency and measures of location? Write down the different measures of central tendency. Following are 5 days closing price of two stocks (in takas)  
**Stock A:** 180, 179, 182, 178, 181  
**Stock B:** 27, 30, 24, 33, 21  
Which stock should be purchased and why? 5
- b) Six samples of sizes 150, 155, 140, 148, 135 and 160 were taken from the students of Begum Rokeya University, Rangpur, giving the mean heights 131.06, 143.26, 152.40, 155.45, 134.11 and 146.30 cm respectively. Estimate the mean height of the students.
3. What do you mean by coefficient of correlation? What does the correlation coefficient measure? Show that coefficient of correlation is lies between -1 to +1. Distinguish between coefficient of correlation and coefficient of regression. 10  
Find the regression line of y on x from the following data

|    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|
| x: | 5  | 10 | 15 | 25 | 30 | 35 | 40 | 45 |
| y: | 25 | 32 | 44 | 32 | 39 | 49 | 55 | 60 |

What will be the value of y for x= 48?

4. Define Probability. Write down the types of Probability. Distinguish between Probability and Possibility. State and prove the Bayes Theorem. 10

5. Define random variable. 10

- i) A continuous random variable X has the following density function:

$$f(x) = \begin{cases} \frac{2}{27}(1+x), & 2 < x < 5 \\ 0, & \text{elsewhere} \end{cases}$$

Verify that it satisfies the condition  $\int_{-\infty}^{\infty} f(x)dx = 1$  and Find P(X<4) and P(3<X<4)

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ii) Suppose that the random variable X and Y have the joint density function is

$$f(x, y) = 12xy(1 - y); \quad 0 < x < 1, \quad 0 < y < 1 \\ = 0, \quad \text{elsewhere}$$

Are X and Y independent?

6. Define binomial distribution and find its mean and variance. Give some example of binomial 10 variable. In a course, 20 percent got A grade. Five students are selected randomly from the group of students. Find the probability that out of 5 students (i) 2 students got A (ii) at least 1 student got A (iii) at best 1 student got A.
7. Define normal distribution. Write some characteristics of normal distribution. Write down the uses of Poisson distribution. The rainfall during rainy season is assumed to follow normal distribution with mean rainfall of 5 mm/day and with a standard deviation of 2mm/day. Find the probability that in a day (i) the rainfall will exceed 10 mm (ii) the rainfall will be within the limit 6 to 12 mm.