Rangamati Science and Technology University

Department of Computer Science and Engineering

B.Sc. (Engg.) 1ˢᵗ Year 2ⁿᵈ Semester Midterm Examination - 02 (2020)

Session – 2019-2020, Course Code: CSE - 1202,

Course Title: Object Oriented Programming Language

Time: 01 hour

Marks: 15

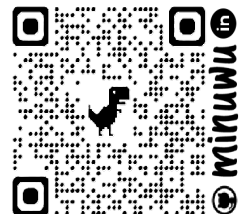[Note: You should answer all subsections of the same questions consecutively]

1. A shipping company uses the following function to calculate the cost (in dollars) of shipping based on the weight of the package (in pounds).   05

$$c(w) = \begin{cases} 3.5, & \text{if } 0 < w <= 1 \\ 5.5, & \text{if } 1 < w <= 3 \\ 8.5, & \text{if } 3 < w <= 10 \\ 10.5, & \text{if } 10 < w <= 20 \end{cases}$$

Write a program that prompts the user to enter the weight of the package and display the shipping cost. If the weight is greater than 50, display a message "the package cannot be shipped."

2. Define infinite conditions for the *loop*. Describe infinite states that may occur for various looping statements used in the Java OOP programming language with appropriate examples.   05

3. a) What are the benefits of using a method? How do you define a method? How do you invoke a method?   03

   b) Identify and correct the errors in the following program: 02

```java
public class Test {
  public static method1(int n, m) {
    n += m;
    method2(3.4);
  }

  public static int method2(int n) {
    if (n > 0) return 1;
    else if (n == 0) return 0;
    else if (n < 0) return -1;
  }
}
```
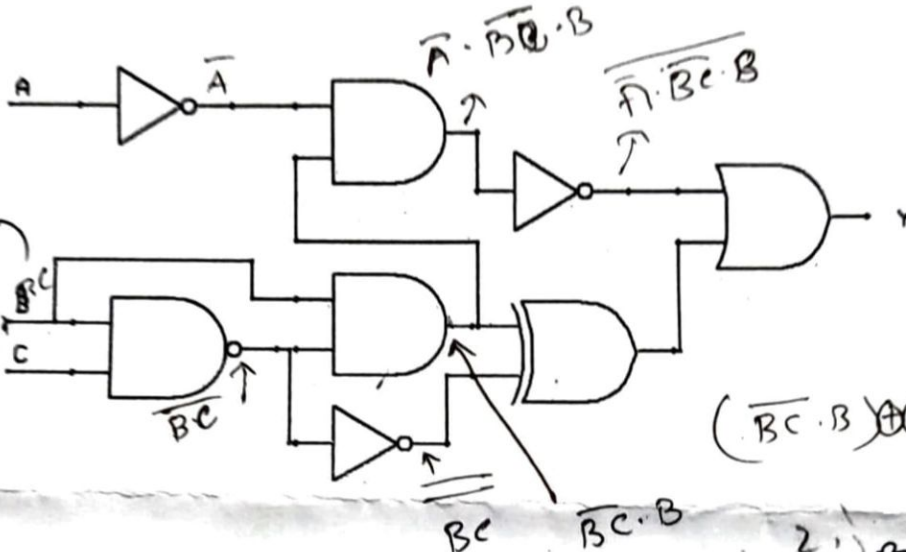
$A+BC$

1. (a). What do you mean by full adder? 1

   (b). From the following circuit diagram implement the expression and simply that logical expression 4
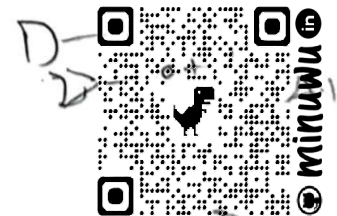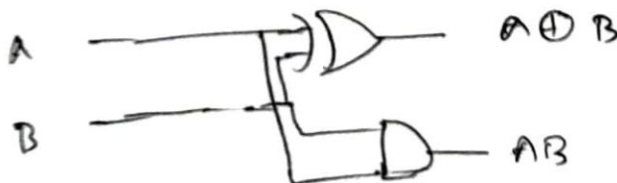   then redraws the circuit.

$A+BC$

$(A+B)(A+C)$

$AA+AC+AB+BC$

$\overline{A}\cdot\overline{BC}\cdot B$

$\overline{\overline{A}\cdot\overline{BC}\cdot B}$

$\overline{BC}$

BC

$\overline{BC}\cdot B$

$(\overline{BC}\cdot B)\oplus(BC) + \overline{\overline{A}\cdot\overline{BC}B}$

B

$A+BC$

2. (a). Draw a Block diagram of 3-bit Encoder. 1

   (b). Simplifying the following Boolean expression using Karnaugh map. 4

$$\overline{A}B\overline{C}\overline{D} + AB\overline{C}\overline{D} + \overline{A}\overline{B}CD + A\overline{B}CD + \overline{A}\overline{B}C\overline{D} + \overline{A}B\overline{C}D + AB\overline{C}D + A\overline{B}\overline{C}D + \overline{B}C\overline{D}.$$

$AA\cdot + BC$

$A+B$

3. (a). Why K-map is important; show your opinion. 1

   (b). How do you implement a half adder using a 2:4 line decoder? 4

2^n 2 4

Rangamati Science and Technology University
Department of Computer Science and Engineering
1st Year 2nd Semester BSc.(Engg.) 1st Mid Term Examination-2020
Session: 2019-2020

Course Title: Discrete Mathematics;   Course Code: CSE1201

Time-1Hour

Total Marks-15

Figures in the right-hand margin indicate full marks.]

1. What do you mean by mathematical induction? Show that $1^2+2^2 \ldots \ldots +n^2 = \frac{n(n+1)(2n+1)}{6}$ (Use Mathematical induction)   4

2. Write down the Handshaking Theorem. Determine the sum of the in-degrees of the vertices and the sum of the out-degrees of the vertices directly for the following graph. Show that they are both equal to the number of edges in the graph.   4
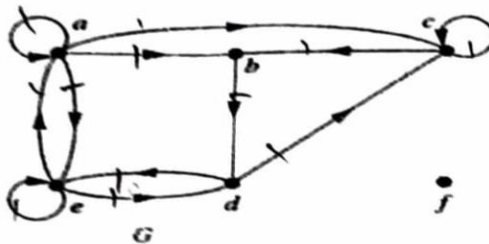
3. Draw a graph with the following adjacency matrix, A.   2

$$A = \begin{array}{c} a \\ b \\ c \\ d \end{array} \begin{bmatrix} 0 & 1 & 1 & 0 \\ 1 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 \end{bmatrix}.$$

4. Use Dijkstra's algorithm to find the length of the shortest path between the vertices a and z in the weighted graph displayed in Figure (a).   5
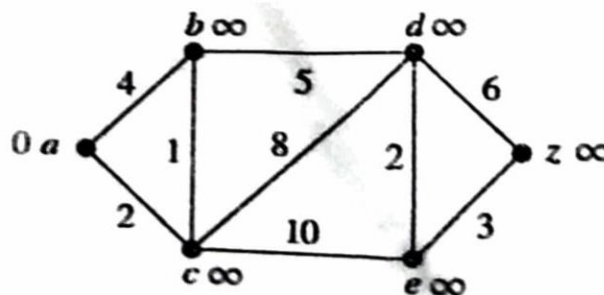
(a)

Rangamati Science and Technology University
Department of Computer Science and Engineering
1st Year 2nd Semester B.Sc. (Engg.) Midterm-2:- 2021
Session: 2019-2020

Course Title: Matrices, Differential Equation and Geometry
Course Code: MATH 1206

Time: 1 hr   Full Marks: 15

[Answer all the questions. Figures in the right-hand margin indicate full marks.]

1.	Write short note on (a) Gradient (b) Divergence	1.5x2=3
2.	Find the unit outward drawn normal to the surface $(x-1)^2 + y^2 + (z+2)^2 = 9$ at the point $(3, 1, -4)$.	2+2=4
3.	Prove that the vector $\vec{A} = 3y^4z^2\hat{i} + 4x^3z^2\hat{j} - 3x^2y^2\hat{k}$ is solenoidal.	1x4=4
4.	Prove that $\nabla \cdot \frac{1}{r} = -\frac{\vec{r}}{r^3}$	1x4=4

1. Define chemical bond. How many types of chemical bonds are recognized? 1+1=2

2. What do you understand by covalent bond? Give an example. 2+1=3

3. What are the characteristics of covalent compounds? 2

4. What is ionic bond? Describe the conditions for formation of ionic bond. 1+4=5

5. Explain Lewis concept of acids and bases with example. 3