Full Marks: 60　　　　　　　　　　　　　　　　　　　　**Time: 3 Hours**

[N.B.- (i) Answer any Five questions; (ii) Figures in the right margin indicate full marks.]

1. a)	What is *object-oriented programming*? How does *object-oriented approach* differ from *object based approach*?	3
b)	Describe *inheritance* as applied to *object-oriented programming*.	3
c)	Why do we need "use namespace std" at the beginning of the C++ program?	3
d)	Write a program for Student management system where student is a class with its own properties like name, roll, dob. Create an object of Student class and show his/her name can be printed from a function.	3
2. a)	What are the differences between call by reference and return by reference?	3
b)	When will you make a function inline? Why?	3
c)	Define a class to represent a bank account. Include the following members: 1. Name of the depositor 2. Account Name 3. Type of account 4. Balance amount Member functions 1. To assign initial values 2. To deposit an amount. 3. To withdraw an amount after checking the balance. 4. Display name and balance Write a main program to test the program.	6
3. a)	Define *constructor* and *destructor*. Can we have more than one *constructor* in a *class*? If yes, explain your answer with example.	4
b)	What do you mean by *dynamic initialization* of objects? Why it is used?	3
c)	What are the different forms of inheritance? Give an example of each.	5
4. a)	What is operator overloading? Why is it necessary to overload an operator? Give an example.	3
b)	What is type conversion? Write an example of type conversion.	3
c)	When a friend function compulsory? Give an example.	3
d)	Write a program for different colors using enum keyword.	3
5. a)	What is an abstract class? Why do we use the abstract class in the program?	3
b)	What is a virtual function? Why do we need virtual function?	3
c)	What does this pointer point to? What are the applications of this pointer?	3
d)	Define a class String. Use overload == operator to compare two strings.	3
6. a)	What do you mean by dynamic binding? How is it useful in OOP?	3
b)	Write a function using reference variables as arguments to swap the values of a pair of integers.	3
c)	What is the application of *scope resolution operator* :: in C++?	3

d)	Define *friend function*. What would be the output of the following statements:
	
	``cpp
	#include<iostream>
	using namespace std;
	class sample
	{
	int a,b;
	public:
	void setvalue()
	{
	a=25;
	b=40;
	}
	friend float mean(sample s);
	};
	float mean(sample s)
	{
	return float (s.a+s.b)/2.0;
	}
	int main()
	{
	Sample X;
	X.setvalue();
	cout<<"Mean value="<<mean(X)<<"\n";
	return 0;
	}
	``
		3	3

7. a)	How can you access the *private* data of a class?	3	
b)	What is pure virtual function? Distinguish between abstract class and polymorphic class.	3	
c)	Can we pass objects as function arguments? Explain with the help of an example.	3	
d)	Write a program for a book shop maintains the inventory of books that are being sold at shop. The list includes details such as author, price, publisher and stock position. Whenever a customer wants a book, the sales person inputs the title and author and the system searches the list and displays whether it is available or not.	3	

8. a)	Why should we return an object in a function? Write an example	3	
b)	What are the visibilities of base members in derived class?	3	
c)	What is dynamic initialization of a variable? Give an example.	3	
d)	Write a program for your university transportation management where Bus is a class. Every Bus has bus number, driver_name, destination_address.	3	

b) Draw a circuit diagram of a 3-bit serial in parallel out shift register with timing diagram using input data 101. 5

c) Draw the diagram for a 5-bit ring counter and explain its operation.

7. a) How asynchronous counters work? Draw a circuit diagram of a MOD-13 asynchronous counter with   5
truth table and timing diagram.   3

b) Explain how propagation delays affect the operation of an asynchronous counter.   4

c) Design and explain the operations of a 3-bit synchronous down counter.   1
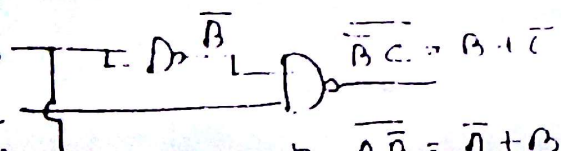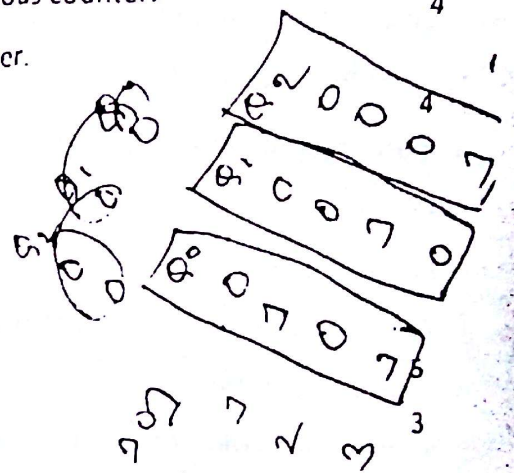
8. a) Define the terms:

i) Noise Margin

ii) Power Dissipation

Iii) Speed of operation

iv) Fan-out

b) Describe the operations of a diode-transistor logic NOR gates.

c) How does memory work? Draw the internal structure of a memory with volume 32x8

COMILLA UNIVERSITY

Department of Computer Science & Engineering:

Second Year First Semester B Sc (Hons.) Final Examination, 2013

Course Code: CSE-213

Full Marks: 60

Course Title: Digital Logic Design

Time: 3 Hrs.

Answer any five questions

1. a) Draw a pulse train and define the rise time, fall time and pulse width. 3

   b) Convert $(63756.365)_8$ into its equivalent binary number and convert the binary number into its equivalent decimal number. 4

   c) Explain why gray code is not suitable for arithmetic operation? Convert the following gray code number into its equivalent binary code number with necessary steps. 101101011 3

   d) What are the advantages and disadvantages of encoding the decimal numbers in BCD as compared with straight binary? 2

2. a) Simplify the following expression and draw the logic diagram using "NOR" gates only. 5

   (i) $(B + BC)(B + \bar{B}C)(B + D)$

   (ii) $ABCD + AB(\bar{C}\bar{D}) + (\overline{C}\overline{B})CD$

   b) What is "don't care" condition? Minimize the following expression and realize using NAND gates only. 5

   $f(A, B, C, D) = \Sigma(1 - 3, 9 - 11, 14), d \cdot 7, 15$

   c) What is minterm and maxterm? Convert the following expression into standard SOP form. 2

   $AB + AB + ACD$

3. a) Name the universal gates. Why they are called so? Explain with example using one of the universal gates. 3

   b) Write the truth table, minimum Boolean expression of a full adder and draw the circuit diagram. Draw the block diagram of a full adder using half adder. 5

   c) Show how the following expressions can be implemented using NAND gates only: $X=(A+B)(C+D)$; $X=AB + CD$. 4

4. a) What is a combinational logic circuit? List the steps involved in designing combinational logic circuits. 2

   b) What is a decoder? Design and describe the operation of a 3-to-8 line decoder. 4

   c) Design a 32:1 multiplexer using 1:8 and 1:4 multiplexers and describe its operations. 6

   8:1   4:1

5. a) What is a flip-flop? Distinguish between latch and flip flop. Define S-R flip-flop using block, circuit and timing diagrams 5

   b) Discuss the logic operation of a T type flip flop with timing diagram. 4

   c) "J-K flip-flops are used as frequency divider" —Justify with an example of divide by four with timing diagram. 3

6. a) What is shift register? Why are shift register considered basic memory devices? 2

$\overline{A}(\overline{B}\overline{C} + B\overline{C})$

$1:00 :$