

Reg. No



# Manipal Institute of Technology

(Constituent Institute of Manipal University)

Manipal – 576 104



FIRST SEMESTER MCA END SEMESTER EXAMINATIONS – NOV, 2014

SUBJECT: –OBJECT ORIENTED PROGRAMMING & DESIGN (MCA-4101)

29/11/2014

TIME: 3 HOURS]

[MAX.MARKS: 50

## Instructions to Candidates:

- Answer any 5 FULL questions.
- All questions carry equal marks.
- Missing data if any may be suitably assumed and mention your assumptions.

- 1A. Explain the concept of constructors and destructors in a C++ class. Differentiate between the assignment operator and the copy constructor with a suitable example. Can a destructor be declared virtual?
- 1B. Draw the **Activity diagram** for the following ‘selecting a floor’ scenario of an **elevator control System**: A passenger pushes the destination floor button. The internal button sends the system the signal to select the direction (up/down). The system changes the elevator status (from idle to busy). The system switches the floor button (internal button) light on. The system closes the elevator door. The system moves the elevator according to the destination floor direction (up/down). The elevator sends the system the signal to check if the floor that the elevator is going to is the correct destination floor. The system stops the elevator at the destination floor. The system opens the door at the destination floor. The passenger moves outside the elevator. The system switches the internal button off.
- 1C. Illustrate an exception handler that catches all exceptions with an example. (5+3+2)
- 2A. A phone number (820 – 256- 4917) can be thought of as having three parts: area code (820), exchange (256) and the number (4917). Write a program that defines a class “Phone Number” to store these three parts of a number separately. Create two objects, one using parameterised constructor and accept the other as a user input. Then display both numbers. Overload the insertion operator when displaying the objects.
- 2B. Explain friend class with the help of an example.
- 2C. Write a function called **fn\_check\_case()** that allows the user to enter a letter, and then displays

either zero or nonzero, depending on whether a lowercase or uppercase letter was entered.

(5+3+2)

3A. Explain the conceptual model of UML with the necessary notations.

3B. Write a program that emulates the file copy command. That is, it should copy the contents of a text file to another file. Accept source file and destination file names as user inputs.

3C. Differentiate between '**const**' qualifier and '**#define**' directive. (5+3+2)

4A. Explain how run time polymorphism is implemented in C++ using virtual functions and base class pointer with the help of a suitable example.

4B. Explain enumeration in C++ with an example.

4C. Differentiate between static data member and a constant data member of a class? (5+3+2)

5A. Write a program that overloads the += operator for a class called STRPLUS with **str** (max size 80) as its data member. This operator should allow statements like `s1 += s2;` where `s2` is concatenated with `s1` and the result is stored in `s1`. The operator should also perform the following calculation `s3 = s1 += s2;`

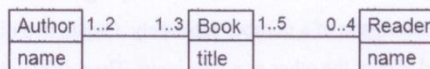
5B. Write a template function that returns the average of all the elements of an array. The arguments to the function should be the array name and the size of the array (type int). In `main()`, implement the function with arrays of type int, long, double, and char.

5C. "There exists a close association between an array and pointer." Justify. (5+3+2)

6A. Explain how virtual base class resolves the ambiguity in multiple inheritance. Is there another approach to sort this problem? If yes, explain.

6B. Explain the 'new' memory management operator in C++. Differentiate between passing arguments by address and by reference.

6C. Consider the following UML diagram:



a. If there are 2 authors, what is the minimum and maximum number of books? What is the minimum and maximum number of readers?

b. If there are 4 readers, what is the minimum and maximum number of books? What is the minimum and maximum number of authors? (5+3+2)

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