(2½ Hours) **[Total Marks : 60**

N.B. : (1) **All** questions are **compulsory**.
(2) **Figures** to the **right** indicate **full** marks.
(3) Draw **neat** diagrams wherever **necessary**.
(4) Symbols have usual meanings unless otherwise stated.
(5) Use of **non-programmable** calculator is allowed.

1. (a) Attempt any **one:**

(i) Explain various data types available in C++. What is meant by a qualifier in C++? List the qualifiers. **8**

(ii) A Fibonacci series is a series in which first two elements of the series are always 1. Each succeeding element of the series is sum of preceding two elements ($F_i = F_{i-1} + F_{i-2}$). Write a program in C++ that inputs an integer number n and displays and finds the sum of first n terms of the series. **8**

(b) Attempt any **one:**

(i) What is meant by an expression in C++? List the precedence and associativity of all binary arithmetic operators in C++ **4**

(ii) In what way does an array differ from ordinary variable? How are individual array elements identified? **4**

2. (a) Attempt any **one:**

(i) Construct a class called room containing length, width, and height as private data members. Include member functions to set the values of private data members, and to compute the area and the volume of the room. Include this class in a working C++ program. **8**

(ii) What is inheritance? Explain the different forms of inheritance supported by C++? **8**

(b) Attempt any **one:**

(i) Explain with an example constructor overloading in C++ **4**

(ii) Explain with an example how Polymorphism is achieved at compile time **4**

3. (a) Attempt any **one:**

(i) What is an embedded system? State and explain the important characteristics of an embedded system. **8**

(ii) With the help of suitable diagram show the hardware units and software component of a digital camera and hence explain the camera functions. **8**

(b) Attempt any **one:**

(i) Explain the purpose of the following task in embedded system with one each: **4**
   1. Data communication
   2. Monitoring
   3. Control
   4. Data collection

(ii) How the embedded system is classified based on generation. Give example of each class. **4**

4. (a) Attempt any **one:**

(i) What is non-preemptive scheduling? Explain its various types with one example each. **8**

(ii) What is virtual memory? What are advantages and disadvantages of virtual memory. **8**

(b) Attempt any **one:**

(i) Write a note on multitasking **4**

(ii) Write note on Message Queue **4**

5. Attempt any **four:**

(a) Explain any three escape sequences in C++ **3**

(b) What is a pointer? How do you declare and initialize pointers. **3**

(c) What is the function of scope resolution operator? **3**

(d) With respect to constructors explain parameterized constructor. **3**

(e) Mention the major application areas in embedded system. **3**

(f) Write note on commercial off-the -shelf components in embedded system **3**

(g) Explain in brief the structure of a process in RTOS **3**

(h) State the different types of kernels based on design and explain them **3**
