1. **a)** Give short explanation about common terms related to the microprocessors and microcontrollers:
   i) Von-Neuman Architecture
   ii) Harvard Architecture

2. **b)** Define Task and Task status.
3. **c)** Define Threads and Semaphores and how they are useful in RTOS?
4. **d)** Explain DMA.
5. **e)** What are the merits and demerits of IrDA?
6. **f)** What are the important features required in a real-time operating system?
7. **g)** Define the following terms commonly used in interrupt driven applications:
   i) ROM emulator
   ii) Logic Analyzer

(7x4)

2. **a)** Classify the real-time task scheduling algorithms. Explain each of them in details.

2. **b)** Explain serial communication standard LIN (Local Interconnect Network) with a basic network overview diagram. How do they transmit & receive data? Enumerate LIN Versus CAN (Controller Area Network).

2. **c)** Give distinct comparison about Waterfall Model and Spiral Model used in programming of embedded system.

(6+8+4)

3. **a)** Give comparative study of VX WORKS and PSOS, which are commonly used in embedded operating system.

3. **b)** Write a ‘C’ program with respect to 8051 microcontrolling to read switch, if pressed as input on port P1.0 otherwise as output on port P3.

(8+10)

4. **a)** With respect to embedded system, how memory system architecture is specified? Give some brief overview about typical memory classification.

4. **b)** Explain the following terms of synchronization and inter-process communication of embedded system.
   i) Priority Inversion Problem
   ii) Deadlock Situations

(6+12)
5. 
   a) Explain architecture of PIC microcontroller.
   b) How optimization techniques used in embedded C or OOPS to eliminate the disadvantages of basic C language? State the optimization techniques commonly used in embedded system programming.
   c) Draw the block diagram of Bluetooth technology and explain the significance of each layer protocol in details.

6. 
   a) Explain embedded database used in development of embedded applications. What are the differences from the traditional database such as oracle, SQL?
   b) How the performance is enhanced by pipeline operation in processors? Explain the high performance processor architecture VLIW. Differentiate VLIW over Superscalar architecture.
   c) Explain the operation and applications of USB.

7. Write short notes on:
   a) UART (Universal Asynchronous Receiver Transmitter)
   b) Voice over IP
   c) Classifications of interrupts in embedded technology