

## BE1-R4: EMBEDDED SYSTEMS

### NOTE:

1. Answer question 1 and any FOUR from questions 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

Time: 3 Hours

Total Marks: 100

1.
  - a) Give short explanation about common terms related to the microprocessors and microcontrollers:
    - i) Von-Neuman Architecture
    - ii) Harvard Architecture
  - b) Define Task and Task status.
  - c) Define Threads and Semaphores and how they are useful in RTOS?
  - d) Explain DMA.
  - e) What are the merits and demerits of IrDA?
  - f) What are the important features required in a real-time operating system?
  - 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.
  - 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).
  - 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.
  - 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.
  - 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.

**(8+5+5)**

**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.

**(6+8+4)**

**7.**

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

**(6+6+6)**