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) Explain Embedded Systems.
b) Illustrate how program and data memory fetches can be overlapped in a Harvard Architecture.
c) Explain the difference between port-based I/O and bus-based I/O.
d) What is a CAN bus? Where is it used? Draw the data frame format of CAN?
e) What are the three methods by which an RTOS responds to a hardware source call on interrupt?
f) Define Task Control Block (TCB).
g) Classify the processors in embedded system?

(7x4)

2.

a) What are the Challenges in Embedded systems? List the hardware units that must be present in the embedded systems.
b) What is meant by UART? What does UART contain? Explain the types of UART.
c) Explain DMA Controller.

(6+6+6)

3.

a) Explain in what ways CISC and RISC processors differ?
b) Explain the architecture of PIC microcontroller.
c) What is a timer? How does a watch dog timer differ from other timers. Explain its need in embedded system.

(6+6+6)

4.

a) Explain the multiple function calls in the cyclic order in the main. Also write the advantages of building ISR queues. Explain
b) Explain the advantages of re-entrant function and infinite loop in embedded system software.
c) Discuss the important features in Java that makes it a highly useful high level language for an embedded system in many network related applications.

(6+6+6)

5.

a) Explain, how the Superscalar architecture, Parallelism and VLIW architecture improves the performance of a processor.
b) Explain interfacing protocol of USB and IrDA.

(9+9)

6.

a) What is RTOS? What are the goals of RTOS? What are the three methods by which an RTOS responds to a hardware source call on interrupt?
b) Explain the use of Semaphores for a Task or for the Critical Sections of a Task.
c) Explain the features of Vx Works.

(6+6+6)

7.

a) Explain the following:
   i) Emulators
   ii) Debugger
   iii) Logic Analyzer

b) Write assembly language program to accept the data from P1 and send it to P2 continuously while incoming data from serial port is send to P0. Assume XTAL = 11.0592 MHz and Baud rate = 9600.

(12+6)