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) Write clear significance of the “threads” and “semaphores” in embedded system OS.

b) What do you mean by IrDA-standard? Write atleast two advantages and disadvantages of this technology?

c) Compare: Von Neumann and Harvard Architecture

d) Compare: Waterfall Model and Spiral Model in Embedded OS

e) With respect to ARM processor architecture and operation, give the operational differences between CISC and RISC technologies.

f) Explain the following terms which are commonly used in interrupt driven applications,

   i) Logic Analyzer

   ii) Remote Debugger

g) What are the general challenges found during the designing of the embedded system?

(7x4)

2.

a) What is Bluetooth technology? Explain each layer and core protocol of this technology with respect to it importance and application in embedded system.

b) Explain the following terms of synchronization and inter-process communication, mostly related in RTOS and the embedded system.

   i) Priority Inversion Problem

   ii) Deadlock Situations

(9+9)

3.

a) Why interrupt base applications are useful in embedded systems? Classify types of interrupts with respect to characteristics and operation by giving a suitable example.

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) What are the features of a real-time OS in compare to traditional OS?

(6+6+6)

4.

a) Discuss the unique features of the advance processors like ARM? Draw a basic architecture of ARM processors.

b) What are the main functions of the device driver? Draw the basic architecture of device drivers with respect to embedded processors. Shortly explain the function of each layer.

(9+9)

5.

a) Explain architecture of PIC microcontroller.

b) Explain Design of Washing Machine.

(9+9)

6.

a) Discuss the main differences between hard real-time, soft real-time and firm real-time systems.

b) Following terms are always considered during the design of any real-time embedded systems. Give short understanding about these terms.

i) NRE cost (nonrecurring engineering cost)

ii) Time-to-prototype

iii) Latency or response time

iv) Throughput

c) What are the technical differences and advantages of USB bus technology with respect to other traditional communication buses?

(7+8+3)

7. Write detailed notes on following (**any three**):

i) IEEE 802.11 protocol

ii) Bluetooth

iii) I2C (Inter-Integrated Circuit) Bus Standard

iv) Watchdog timer

(6+6+6)