BE1-R3: 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) Given a choice to select RISC or CISC microcontroller, which one is preferred for embedded application and why?

b) Explain in detail the Earlier Deadline First Scheduling Scheme.

c) List the functions of a Kernel. What can be the functions outside the kernel?

d) Explain one reason of using a DMA (Direct Memory Access) controller which might improve a system's performance.

e) What is Watchdog Timer? How is it useful in Embedded Systems?

f) Discuss the advantages and disadvantages of memory mapped I/O versus standard I/O.

g) What are the issues in testing a real time system software?

(7x4)

2.

a) What is the difference between Latency and Throughput? What are the three stages in ARM pipeline?

b) Explain where does the embedded system is preferred over microprocessor and microcontroller? Give the meanings of Digital Signal Processor and ASSP.

c) List two important capabilities, which Digital Signal Processor (DSP) should process. Draw a block diagram of the main structural units of the DSP, and explain the function of each unit in brief.

(5+5+8)

3.

a) Explain the Top Down design process. Define synthesis, verification and intellectual properties in the context of Embedded Systems.

b) What is the importance of design methodology in embedded system design?

c) How does DSP processor differ from the conventional processor?

(6+6+6)

4.

a) Interrupt mechanism in each processor differs from processor family to another so that the Device Drivers are processor sensitive programs. – Write a detailed comment on the above statement.

b) Compare the two scheduling strategies - Primitive mode and Round robin scheduling for the real time scheduling.

c) What are the cases in which time slice scheduling helps?

(6+6+6)

5.

a) List the features of P and V semaphores and explain how are these used as a
   i) Resource key
   ii) Counting semaphore
   iii) Mutex

b) Explain briefly wireless protocol namely IrDA, Bluetooth and IEEE802.11 as used in embedded communication systems.

c) Explain the need for security in Bluetooth System.

(9+5+4)

6.

a) Discuss following terms for I2C Bus:
   i) Structure
   ii) Electrical Interface
   iii) Format of address transmission
   iv) Application Interface

b) Draw a schematic for interfacing a processor's CAN module to a CAN bus and explain its working.

(9+9)

7.

a) What are the uses of Hardware assigned priorities in an interrupt service mechanism?

b) What are the most important features in C *or* C++, which makes it a popular high level language for an embedded system?

c) Write detailed notes on the following:
   i) Architecture of Jini and J2ME
   ii) Features and operations of SHARC processor

(6+6+6)