**UNIT WISE QUESTIONS - EMBEDDED SYSTEM DESIGN**

**UNIT – I**

**Short Answer Questions:**

1. Define an Embedded System. Give examples?
2. Write the advantages of embedded system.
3. Write the disadvantages of embedded system.
4. Give the applications of an embedded system.
5. Classify the embedded systems?
6. Distinguish between General purpose computing systems and embedded systems?
7. What are the various purposes of embedded systems?
8. Classify embedded system based on complexity & performance?
9. Explain any two operational quality attributes in embedded system design?
10. Explain any two non-operational quality attributes in embedded system design?

**Long Answer Questions:**

1. What is an embedded system? Distinguish between General purpose computing systems and embedded systems?
2. Explain the purpose of embedded systems in detail with illustrative examples?
3. Explain the classification of embedded systems. Give an example for each?
4. Explain the different characteristics of embedded systems in detail?
5. Explain quality attributes in the embedded system development context?
6. What is the operational quality attribute? Explain the important operational quality attributes to be considered in any embedded system design?
7. What is the non-operational quality attribute? Explain the important non-operational quality attributes to be considered in any embedded system?
8. What is an embedded system? Explain different application areas of embedded systems?

**UNIT – II**

**Short Answer Questions:**

1. Describe the components used as the core of an embedded system?

2. What are the languages used in embedded system?

3. Differentiate microprocessor & microcontroller?

4. Compare RISC & CISC processors?

5. What is Sensor? Give any two examples.

6. Write the difference between compiler and cross compiler?

7. In how many ways mixing of assembly and high level language can be done?

8. Give the limitations of the high-level language based development?

9. Differentiate little-endian & big-endian processors.

10. What is Actuator? Give any two examples.

**Long Answer Questions:**

1. Explain the components of typical embedded systems in detail with neat diagram?
2. Which are the components used as the core of an embedded systems? Explain the merits and drawbacks?
3. What is embedded firmware? What are the different approaches available for embedded firmware development?
4. What is embedded firmware? What are the different development languages available for embedded firmware?
5. Explain the role of RESET circuit and Real Time Clock in embedded system?
6. Explain the role of Watch dog Timer & Brown out protection circuit in embedded system?
7. Explain about ASIC, ASSP & COTS in detail?
8. Write short notes on DSP, ASIC, PLD & COTS?
9. Discuss about super loop based approach & embedded based OS approach?
10. Discuss in detail the mixing of assembly and high level language?

**UNIT – III**

**Short Questions:**

1. Explain the difference between SoC and SiP.

2. Write a short note on Embedded OS Trends.

3. Write a short note on Open Standards in Embedded industry

4. Discuss the bottlenecks in embedded industry.

5. What is Communication Interface and types of Communication Interface?

6. Discuss about RS232C interface?

7. Compare WiFi and Zigbee.

8. Write a short note on IEEE 1394

9. Write a short note on UART communication interface?

**Long answer questions:**

1. Discuss the processor trends in embedded system.

2. Discuss the development language trends in embedded system.

3. What is development platform? What are the trends in development platform trends?

4. Explain about Cloud Computing and Internet of Things.

5. Explain the different on-board communication interfaces in brief.

6. Explain the different external communication interfaces in brief.

7. Explain the sequence of operation for communicating with an I2C bus device with neat diagram.

8. Explain the sequence of operation for communicating with SPI bus device with neat diagram

9. Explain the sequence of operation for communication with a 1-wire slave device with neat diagram.

10. Explain in detail the working of USB with neat diagram?

**UNIT – IV**

**Short Answer Questions**:

1. Discuss about kernel space and user space.

2. Define monolithic and micro kernel?

3. Define task scheduling?

4. Define is an operating system? Give any two examples.

5. Discuss all activates are involved in the context switching?

6. What is process life cycle?

7. Define process control block?

8. What are the basic functions of Real time kernel?

9. Give the difference between threads and process in detail?

**Long Answer Questions:**

1. Define Operating System and what are the important functions of OS?
2. What is kernel? What are the different functions handled by a general purpose kernel?
3. Explain the Task, Process and Threads in the operating system context?
4. Explain the Process life cycle in detail with neat diagram?
5. Explain different types of preemptive scheduling algorithms. State merits and demerits of each.
6. Explain different types of non-preemptive scheduling algorithms. State merits and demerits of each.
7. What is process control block (PCB)? Explain the structure of the PCB.
8. Discuss in detail about multitasking, multiprogramming and multiprocessing?
9. Three process with process IDs P1,P2,P3 with estimated completion time 5,10,7 milliseconds respectively enters the ready queue together in the order of P1,P2,P3. Process P4 with estimated execution completion time 2 millisecond enters the ready queue after 5 milliseconds. Calculate waiting time and Turn Around Time (TAT) for each process and the average waiting time and TAT in the FIFO scheduling.
10. Three processes with process IDs P1,P2,P3 with estimated completion time 4,6,5 milliseconds and priorities 1,0,3 (0-highest priority , 3-lowest priority) respectively enters Ready queue after 5 milliseconds. Calculate the waiting time and Turn Around Time (TAT) (assuming there no IO waiting for the processes) in non-preemptive priority based scheduling algorithm.

**UNIT – V**

**Short answer questions:**

1. Define deadlock?
2. Explain the Race condition.
3. Discuss about the different methods of handling deadlocks?
4. Give the difference between buffer overrun and buffer under run?
5. Define task synchronization?
6. Give the difference between mutex and semaphores?
7. What is priority inversion?
8. Define device driver?
9. Discuss about the sleep and wakeup mechanism for mutual exclusion.
10. Write the concept of Shared memory in IPC?

**Long Answer Questions:**

1. Explain the various process interaction models in detail?
2. What is Inter Process Communication (IPC)? Give an overview of different IPC mechanisms adopted by various operating systems?
3. Explain the message passing technique for IPC. What are the merits and demerits of message based IPC?
4. Explain the synchronous and asynchronous messaging mechanisms for IPC under windows kernel?
5. What is priority inversion? What are the different techniques adopted for handling priority inversion?
6. What is mutual exclusion in the process synchronization context? Explain the different mechanisms for mutual exclusion?
7. What is semaphore? Explain the different types of semaphores. Where it is used?
8. Explain dining philosophers problem in the process synchronization context.
9. Explain Race Condition in detail, in relation to shared resource access.
10. Explain producer – consumer problem in the inter process communication context.