**Embedded System**

***2-Mark Questions:***

**1. Define Embedded System?**

An Embedded System is one that has computer hardware with software embedded in it as one of it’s most important Components.

**2.What are the Components of Embedded System?**

They have 3 Main Components:

Hardware

Main Application Software

RTOS

**3. What are the types of embedded system?**

Small scale Embedded system

Medium scale Embedded system

Sophisticated Embedded system

**4. Name some of the hardware parts of embedded system?**

Power source

Clock oscillator circuit

Timers

Memory units

DAC and ADC

LCD and LED displays

Keyboard/keypad

**5. What are the various types of memory in embedded systems?**

RAM (Internal, External)

ROM/PROM/EEPROM/Flash

Cache Memory

**6. What is Device Driver in Embedded System?**

A **device driver** is a [computer program](https://en.wikipedia.org/wiki/Computer_program) that operates or controls a particular type of device that is attached to a computer. A driver provides a [software interface](https://en.wikipedia.org/wiki/Software_interface) to hardware devices, enabling operating systems and other computer programs to access hardware functions without needing to know precise details about the hardware being used.

**7. What is interrupt service Mechanism?**

An **interrupt** is a signal to the processor emitted by hardware or software indicating an event that needs immediate attention. Whenever an **interrupt** occurs, the controller completes the execution of the current instruction and starts the execution of an **Interrupt Service** Routine (**ISR**) or **Interrupt** Handler.

**8. What is context switching in embedded system?**

**Context Switching** involves storing the **context** or state of a process so that it can be reloaded when required and execution can be resumed from the same point as earlier.

**9. What is meant by real time programming in embedded system?**

**Real**-**time systems** are computer **systems** that monitor, respond to, or control an external environment. This environment is connected to the computer **system** through sensors, actuators, and other input-output interfaces.

**10. What is multitasking in embedded systems?**

**Multitasking** is a method by which multiple tasks, also known as processes, share common processing resources, such as CPU.

**11. What is meant by inter process communication in embedded system?**

**Interprocess communication** (**IPC**) is a set of programming interfaces that allow a programmer to coordinate activities among different program **process**es that can run concurrently in an operating **system**. This allows a program to handle many user requests at the same time.

**12. Define Real time Operation System.**

A **real-time operating system** (**RTOS**) is an [operating system](https://en.wikipedia.org/wiki/Operating_system) (OS) intended to serve [real-time](https://en.wikipedia.org/wiki/Real-time_computing) applications that process data as it comes in, typically without buffer delays. Processing time requirements (including any OS delay) are measured in tenths of seconds or shorter increments of time. A real-time system is a time-bound system which has well-defined, fixed time constraints.

**13. Define Embedded Operating System.**

An **embedded operating system** is an [operating system](https://en.wikipedia.org/wiki/Operating_system) for [embedded computer systems](https://en.wikipedia.org/wiki/Embedded_system). This type of operating system is typically designed to be resource-efficient and reliable

**14. What is interrupt latency?**

Interrupt latency refers primarily to the software interrupt handling latencies. In other words, the amount of time that elapses from the time that an external **interrupt arrives** at the processor until the time that the **interrupt processing begins**.

**15. What is response time?**

The **response time** for a job is the **time** between when it becomes active (e.g. an external event or timer triggers an interrupt) and the **time** it completes

**16. Which software is used for Embedded System?**

The **software** and operating **system** requirements of an **embedded system** is also different from a traditional computer based **system**. Typically **embedded systems** use basic **embedded system software** such as C, C++, ADA, etc. Some specialized **embedded systems** may use OS such as Windows CE, LINUX, TreadX, Nucleus RTOS, OSE, etc.

**17. What are the disadvantages of embedded systems?**

* + - Difficult to upgrade.
    - If any problem occurs then you need to reset settings.
    - Nearly not scalable.
    - Hardware is limited.
    - Troubleshooting is difficult.
    - Difficult to transfer data from one system to other.

**18. Define Design Cycle in Embedded system.**

* + - Product specification
    - Partitioning of the design into its software and hardware components
    - Iteration and refinement of the partitioning
    - Independent hardware and software design tasks
    - Integration of the hardware and software components
    - Product testing and release
    - On-going maintenance and upgrading

**19. What is difference between C and Embedded C?**

### Differences between C and Embedded C

### C:\Users\WELCOME\Desktop\diff.jpg

### 20. Give the advantages of Embedded C Program.

* + its takes less time to develop application program.
  + It reduces complexity of the program.
  + It is easy to verify and understand.
  + It is portable in nature from one controller to another.

### 21. Enumerate the Characteristics of Embedded System:

### Requires Less power

### Low Cost

### Task Specific

### Time Specific

### Minimal user Interface

### High Efficiency

### High Reliability

### High Stable

### 22. Name the Two different modes of an Operating System.

### A processor in a computer running Windows has two different modes: user mode and kernel mode. The processor switches between the two modes depending on what type of code is running on the processor. Applications run in user mode, and core operating system components run in kernel mode.

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### 5 (or) 10 Marks Questions

### 1. Briefly Explain about I/O Ports, Buses and Interrupt handlers that are embedded in a system.

### 2. Briefly Explain about Various types and uses of RAM and ROM for designing embedded systems.

### 3. Explain about various Sources of Interrupt.

### 4. Explain how optimization of codes in embedded C++ can be done

### 5. Briefly explain how control data flow graph is used to model a program.

### 6. Explain how graphs can be used to model partitioning and scheduling of multiprocessors systems.

### 7. Briefly explain the typical components of an I/O Sub system.

### 8. Explain round robin time slicing scheduling in RTOS with an example.

### 9. Explain the role of target system in the design process of an Embedded system.

### 10. Describe various issues in hardware software design and co-design.

### 11. Explain various structural units of a processor in an Embedded system with a neat diagram.

### 12. Discuss in detail about Interrupt Servicing Mechanism.

### 13. Explain the state machine programming models for event controlled program flow.

### 14. Explain in detail the interrupt handling in RTOS environment.

### 15. Explain the basic system of an automatic chocolate vending systems.

### 16. Discuss in detail about Data structures in Embedded Systems.

### 17.Write short note on Embedded Programming in Java.

### 18. Explain about Embedded programming in C++.

### 19. List out the data types, statements, Loops in C.

### 20.Discuss about Performance metrics in schedule model.

### 21. Explain about the Memory allocations in Embedded System.

### 22. What is Macro? Explain it.

### 23.Explain about programming model in Embedded System.

### 24.Write short note on the following:

### Header files.

### Preprocessor directive

### Functions

### 25. Write short note an Operating System Services in Embedded system.

### 26.Explain about Task scheduling model in RTOS .

### 27.Explain use of scopes and logical analyzer for system hardware test.

### 28.Explain about Sharing data in multiple task and functions.

### 29.Discuss in detail about Context Switching in Embedded System.

### 30.Explain about Performance metrics in Task.