# SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)
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Puttur -517583, Tirupati District, A.P. (India)

**QUESTION BANK (DESCRIPTIVE)**

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|---|---|---|---|
| **Subject with Code** | EMBEDDED SYSTEMS DESIGN (23EC0451) | **Course & Branch** | B.Tech – CSE, CCC & CSIT |
| **Year & Sem** | III & II | **Regulation** | R23 |

## UNIT - I

## Introduction to Embedded Systems

| | | | | |
|---|---|---|---|---|
| **1** | **a)** | Define an embedded system. | **[L1][CO1]** | **[2 M]** |
| | **b)** | List any two purposes of embedded systems. | **[L3][CO1]** | **[2 M]** |
| | **c)** | Mention any two characteristics of embedded systems. | **[L1][CO1]** | **[2 M]** |
| | **d)** | What is meant by requirements analysis in the embedded system design process? | **[L2][CO6]** | **[2 M]** |
| | **e)** | List any two applications of embedded systems. | **[L1][CO1]** | **[2 M]** |
| **2** | **a)** | Define embedded system and List the various processors types of embedded processors. | **[L1][CO1]** | **[05 M]** |
| | **b)** | List any Five differences between Embedded Systems Vs General Computing. | **[L1][CO1]** | **[05 M]** |
| **3** | **a)** | Brief the History of Embedded Systems. | **[L1][CO1]** | **[05 M]** |
| | **b)** | Sketch the various classifications of Embedded systems. | **[L3][CO1]** | **[05 M]** |
| **4** | **a)** | Explain the classification of Embedded systems based on generation | **[L2][CO1]** | **[05 M]** |
| | **b)** | Explain the classification of Embedded systems based on Complexity. | **[L1][CO1]** | **[05 M]** |
| **5** | | Explain briefly about the purpose of an Embedded systems | **[L4][CO1]** | **[10 M]** |
| **6** | | With a neat diagram, explain the design process of an embedded system | **[L2][CO6]** | **[10 M]** |
| **7** | **a)** | Describe requirement analysis in embedded system design. . | **[L2][CO6]** | **[05 M]** |
| | **b)** | Explain system specification and its importance. | **[L2][CO6]** | **[05 M]** |
| **8** | | With the neat sketch, Explain architecture of embedded system. | **[L3][CO2]** | **[10 M]** |
| **9** | | Explain system integration and testing techniques in embedded systems. | **[L2][CO6]** | **[10 M]** |
| **10** | | Briefly discuss the major application of Embedded systems. | **[L2][CO1]** | **[10 M]** |
| **11** | | Explain the characteristics of embedded systems with suitable examples. | **[L2][CO1]** | **[10 M]** |

## UNIT - II
## Typical Embedded System

| | | | | |
|---|---|---|---|---|
| **1** | **a)** | Define a domain-specific processor | **[L1][CO2]** | **[2M]** |
| | **b)** | Define PLD and give one example. | **[L1][CO2]** | **[2M]** |
| | **c)** | List any two types of ROM used in embedded systems. | **[L1][CO2]** | **[2M]** |
| | **d)** | What is a sensor? Give some example. | **[L2][CO2]** | **[2M]** |
| | **e)** | What is the use of a push button switch in embedded systems? | **[L3][CO2]** | **[2M]** |
| **2** | | Explain the core of an embedded system with a neat block diagram. | **[L2][CO2]** | **[10 M]** |
| **3** | | Explain general-purpose processors and domain-specific processors used in embedded systems. | **[L2][CO2]** | **[10M]** |
| **4** | **a)** | Explain the role of ASICs in embedded systems. | **[L3][CO2]** | **[05 M]** |
| | **b)** | Describe PLDs and COTs with suitable examples. | **[L3][CO2]** | **[05 M]** |
| **5** | | Explain The Memory Organization of an Embedded System. | **[L2][CO2]** | **[10 M]** |
| **6** | **a)** | Explain Memory Shadowing in Embedded Systems. | **[L3][CO2]** | **[05 M]** |
| | **b)** | Discuss Criteria for Memory Selection in Embedded System Design. | **[L3][CO2]** | **[05 M]** |
| **7** | **a)** | Differentiate static RAM and Dynamic RAM. | **[L4][CO2]** | **[05 M]** |
| | **b)** | Explain Sensors and Actuators used in Embedded Systems. | **[L2][CO3]** | **[05 M]** |
| **8** | **a)** | Discuss in detail about 7-segment LED display | **[L2][CO2]** | **[05 M]** |
| | **b)** | Describe the operation of Relay and Piezo buzzer. | **[L3][CO2]** | **[05 M]** |
| **9** | **a)** | Explain Push Button Switch used in Embedded Systems. | **[L2][CO2]** | **[05 M]** |
| | **b)** | Explain the need for a Reset Circuit in embedded systems | **[L2][CO2]** | **[05 M]** |
| **10** | | Explain the role of following in embedded system.<br>i) Brownout Protection ii) Oscillator Circuit | **[L2][CO2]** | **[10 M]** |
| **11** | | Explain the role of following circuitry in embedded system.<br>i) Real-Time Clock ii) Watchdog Timer | **[L2][CO2]** | **[10 M]** |

## UNIT - III

## Communication Interface

| | | | | |
|---|---|---|---|---|
| **1** | **a)** | List any two signal lines used in SPI communication. | **[L1][CO3]** | **[2M]** |
| | **b)** | Mention any one application of SPI in embedded systems. | **[L3][CO3]** | **[2M]** |
| | **c)** | Give application of I2C | **[L3][CO3]** | **[2M]** |
| | **d)** | What type of communication is CAN (serial/parallel)? | **[L1][CO3]** | **[2M]** |
| | **e)** | Why is ZigBee preferred in sensor networks? | **[L2][CO3]** | **[2M]** |
| **2** | **a)** | Define on-board communication interface & List it. | **[L1][CO3]** | **[05 M]** |
| | **b)** | Differentiate between I2C and SPI communication protocols | **[L4][CO2]** | **[05 M]** |
| **3** | | Explain the working of I2C communication protocols with suitable diagrams | **[L1][CO4]** | **[10 M]** |
| **4** | | What is serial peripheral interface explain in detail. | **[L2][CO3]** | **[10 M]** |
| **5** | | Explain the architecture and features of CAN protocol used in embedded systems. | **[L3][CO3]** | **[10 M]** |
| **6** | **a)** | Explain briefly about the serial communication Interface. | **[L2][CO3]** | **[05 M]** |
| | **b)** | Explain the Parallel interface with suitable diagram | **[L2][CO3]** | **[05 M]** |
| **7** | **a)** | Explain the concept of RS232 communication Interface | **[L2][CO3]** | **[05 M]** |
| | **b)** | Explain the concept of RS485 communication Interface | **[L2][CO3]** | **[05 M]** |
| **8** | **a)** | Explain in detail about the USB and its types of data transfer | **[L2][CO3]** | **[05 M]** |
| | **b)** | Explain briefly about the Infrared (IR) communication. | **[L2][CO3]** | **[05 M]** |
| **9** | **a)** | Explain the features of Bluetooth. | **[L2][CO3]** | **[05 M]** |
| | **b)** | Explain the features of Wi-Fi network | **[L2][CO3]** | **[05 M]** |
| **10** | **a)** | Explain the concept of Zigbee module. | **[L2][CO3]** | **[05 M]** |
| | **b)** | Explain briefly about the GSM communication. | **[L2][CO3]** | **[05 M]** |
| **11** | | Draw & Explain the architecture of GPRS. | **[L1][CO3]** | **[10 M]** |

## UNIT - IV

## Embedded Firmware Design and Development

| | | | | |
|---|---|---|---|---|
| **1** | **a)** | What is embedded firmware? | **[L1][CO4]** | **[2M]** |
| | **b)** | What is OS-based firmware design approach? | **[L2][CO4]** | **[2M]** |
| | **c)** | What is a high-level language in embedded firmware development? | **[L1][CO4]** | **[2M]** |
| | **d)** | List two firmware design approaches used in embedded systems. | **[L1][CO4]** | **[2M]** |
| | **e)** | Give advantages of high-level language-based firmware development. | **[L3][CO4]** | **[2M]** |
| **2** | | Explain embedded firmware and its role in embedded systems. | **[L2][CO4]** | **[10M]** |
| **3** | | Explain the embedded firmware design approaches used in embedded systems. | **[L2][CO4]** | **[10M]** |
| **4** | **a)** | Explain the super loop-based firmware design approach**.** | **[L3][CO4]** | **[05M]** |
| | **b)** | List the advantages and limitations of the super loop approach. | **[L3][CO4]** | **[05M]** |
| **5** | **a)** | Explain the operating system-based firmware design approach**.** | **[L3][CO4]** | **[05M]** |
| | **b)** | Compare super loop-based approach and OS-based approach. | **[L3][CO4]** | **[05M]** |
| **6** | | Explain the steps involved in embedded firmware development. | **[L2][CO4]** | **[10M]** |
| **7** | | Explain assembly language-based firmware development in embedded systems. | **[L2][CO4]** | **[10M]** |
| **8** | **a)** | Explain high-level language-based firmware development. | **[L2][CO4]** | **[05M]** |
| | **b)** | List the advantages of using high-level languages in embedded systems. | **[L2][CO4]** | **[05M]** |
| **9** | | Explain the differences between assembly language and high-level language-based firmware development. | **[L3][CO4]** | **[10M]** |
| **10** | **a)** | Explain the role of compilers, assemblers, and linkers in firmware development. | **[L2][CO4]** | **[05M]** |
| | **b)** | Explain briefly about the firmware build process. | **[L2][CO4]** | **[05M]** |
| **11** | | Explain debugging and testing techniques used in embedded firmware development. | **[L3][CO4]** | **[10M]** |

## UNIT –V

## RTOS based Embedded System Design

| | | | | |
|---|---|---|---|---|
| **1** | **a)** | What is an operating system in embedded systems? | **[L1][CO5]** | **[2M]** |
| | **b)** | Name any two types of operating systems used in embedded systems. | **[L1][CO5]** | **[2M]** |
| | **c)** | What is a task in an RTOS? | **[L2][CO5]** | **[2M]** |
| | **d)** | What is the difference between preemptive and non-preemptive scheduling? | **[L2][CO5]** | **[2M]** |
| | **e)** | Give one method of task synchronization in RTOS. | **[L3][CO5]** | **[2M]** |
| **2** | | Explain the basics of an operating system and its role in embedded systems. | **[L2][CO5]** | **[10 M]** |
| **3** | | Explain the types of operating systems used in embedded systems | **[L2][CO5]** | **[10 M]** |
| **4** | **a)** | Define tasks, processes, and threads. | **[L2][CO5]** | **[05 M]** |
| | **b)** | Explain the difference between multiprocessing and multitasking. | **[L2][CO5]** | **[05 M]** |
| **5** | | Explain briefly about the task scheduling in RTOS. | **[L3][CO5]** | **[10 M]** |
| **6** | **a)** | Explain shared memory and message passing techniques for task communication. | **[L3][CO5]** | **[05 M]** |
| | **b)** | Explain Remote Procedure Call (RPC) and socket-based communication in embedded systems. | **[L3][CO5]** | **[05 M]** |
| **7** | | Explain task synchronization and the issues faced during task communication. | **[L2][CO5]** | **[10 M]** |
| **8** | **a)** | Explain other synchronization techniques used in embedded systems. | **[L3][CO5]** | **[05 M]** |
| | **b)** | Explain the Shared Memory communication with Suitable diagram | **[L2][CO3]** | **[05 M]** |
| **9** | | Explain the differences between cooperative and preemptive multitasking in RTOS. | **[L2][CO5]** | **[10 M]** |
| **10** | **a)** | Explain the concept of priority-based task scheduling. | **[L3][CO5]** | **[05 M]** |
| | **b)** | Explain the concept of round-robin scheduling. | **[L3][CO5]** | **[05 M]** |
| **11** | | Explain how task communication and synchronization improve reliability and performance in an RTOS-based embedded system. | **[L3][CO5]** | **[10M]** |