Course Code: 23ECS1302 **R23**

SIDDARTH INSTITUTE OF ENGINEERING AND TECHNOLOGY::
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QUESTION BANK (DESCRIPTIVE)

Subject with Code: Embedded Systems (23CS1302) **Course & Branch**: B.Tech. – CIA

Year &Sem: III-B.Tech & I-Sem **Regulation:** R23

UNIT –I
INTRODUCTION TO EMBEDDED SYSTEM

1	**a**	Define an embedded system.	[L1] [CO1]	**[2M]**
	b	Differentiate embedded systems from general-purpose computing systems.	[L2] [CO1]	**[2M]**
	c	List any four characteristics of embedded systems.	L1] [CO1]	**[2M]**
	d	Mention two quality attributes of embedded systems.	L1] [CO1]	**[2M]**
	e	Write any four applications of Embedded system	L1] [CO1]	**[2M]**
2	**a)**	Explain the definition of an embedded system with suitable examples.	[L2][CO1]	**[5M]**
	b)	List the characteristics of Embedded systems	[L1][CO1]	**[5M]**
3		Compare embedded systems and general-purpose computing systems	[L2][CO1]	**[10M]**
4		Discuss the evolution and history of Embedded systems	[L2][CO1]	**[10M]**
5		Classify embedded systems based on Generation, and explain each category with examples.	[L2][CO1]	**[10M]**
6		Describe the major application areas of embedded systems.	[L2][CO1]	**[10M]**
7		Explain the purposes of embedded systems in different industrial and consumer domains.	[L2][CO1]	**[10M]**
8		Discuss the characteristics of embedded systems with examples	[L3][CO1]	**[10M]**
9		Describe quality attributes of embedded systems with suitable examples	[L2][CO1]	**[10M]**
10		Explain about the applications of Embedded system with examples	[L2][CO1]	**[10M]**
11		Explain the classification of embedded systems based on complexity and performance requirements.	[L3][CO1]	**[10M]**

UNIT –II
TYPICAL EMBEDDED SYSTEM

1	**a)**	Give two differences between General Purpose Processor and Domain Specific Processor.	**[L1][CO2]**	**[2M]**
	b)	Expand COTS and give one example	**[L1][CO2]**	**[2M]**
	c)	Define a sensor with one example.	**[L1][CO2]**	**[2M]**
	d)	Mention one advantage of serial memory interface over parallel memory interface	**[L1][CO2]**	**[2M]**
	e)	Differentiate between SPI and I^2C	**[L1][CO2]**	**[2M]**
2		Explain about General Purpose Processors (GPPs) and Domain Specific Processors with examples.	**[L2][CO1]**	**[10M]**
3	**a)**	Write the comparison between RISC and CISC	**[L1][CO2]**	**[4M]**
	b)	Discuss about ASICs and COTS components in embedded system design.	**[L2][CO2]**	**[6M]**
4		Explain about the PLDs in embedded system design.	**[L2][CO2]**	**[10M]**
5		Describe the different types of RAM (SRAM, DRAM, NV-RAM) and justify their usage in embedded systems.	**[L2][CO3]**	**[10M]**
6	**a)**	Explain Mask ROM, PROM, and EPROM used in embedded systems with their advantages and limitations.	**[L2][CO2]**	**[6M]**
	b)	Write the comparison between CPLD and FPGA	**[L1][CO2]**	**[4M]**
7	**a)**	Discuss about memory shadowing in embedded systems.	**[L2][CO2]**	**[5M]**
	b)	What are factors influencing the selection of RAM and ROM in embedded systems	**[L2][CO2]**	**[5M]**

		with examples.		
8	**a)**	What is a sensor? Give the examples of sensor.	**[L2][CO2]**	**[5M]**
	b)	Explain the role of actuators in embedded systems with examples.	**[L2][CO2]**	**[5M]**
9	**a)**	Discuss about CAN Protocol in on board interface	**[L2][CO2]**	**[4M]**
	b)	Explain about RS-232C and RS-485 in external interfaces	**[L2][CO2]**	**[6M]**
10		Write a short notes on the following (i) PLDs (ii) RAM	**[L2][CO2]**	**[10M]**
11	**a)**	Write the comparison between SRAM and DRAM	**[L1][CO2]**	**[4M]**
	b)	Describe EEPROM and Flash memory, highlighting their applications in modern embedded systems.	**[L3][CO2]**	**[6M]**

UNIT –III
EMBEDDED FIRMWARE

1	**a)**	Define brown-out protection in microcontrollers	**[L1][CO3]**	**[2M]**
	b)	List the advantages of a Real Time Clock	**[L1][CO3]**	**[2M]**
	c)	What is the difference between Super Loop and RTOS-based firmware design?	**[L1][CO3]**	**[2M]**
	d)	What is the purpose of a reset circuit in embedded systems?	**[L1][CO3]**	**[2M]**
	e)	What are the programming languages used for firmware development?.	**[L1][CO3]**	**[2M]**
2		Explain about reset circuit and its types.	**[L2][CO3]**	**[10M]**
3	**a)**	Discuss about brown-out protection circuit in microcontroller-based systems?	**[L3][CO3]**	**[5M]**
	b)	Differentiate between reset circuits and brown-out protection circuits in embedded systems.	**[L2][CO3]**	**[5M]**
4	**a)**	Explain the working principle of oscillators and discuss how different types are applied in embedded systems."	**[L2][CO3]**	**[6M]**
	b)	List the important parameters that characterize an oscillator.	**[L1][CO3]**	**[4M]**
5	a)	Discuss the main features of a Real-Time Clock (RTC) and its importance in embedded systems.	**[L2][CO3]**	**[7M]**
	b)	Define a Real-Time Clock (RTC) and write one example**.**	**[L1][CO3]**	**[3M]**
6		Explain the working principle of a Watchdog Timer (WDT). Illustrate with both up-counting and down-counting modes.	**[L3][CO3]**	**[10M]**
7	**a)**	List the steps involved in the firmware execution flow of a super loop based approach	**[L1][CO3]**	**[4M]**
	b)	Discuss the advantages, applications, and drawbacks of super loop–based approach.	**[L2][CO3]**	**[6M]**
8	**a)**	Explain about Operating system based approach in Embedded system	**[L2][CO3]**	**[6M]**
	b)	Differentiate between GPOS-based and RTOS-based approaches with examples.	**[L2][CO3]**	**[4M]**
9	**a)**	List the steps involved in converting Assembly Language code to Machine Language.	**[L1][CO3]**	**[4M]**
	b)	List the advantages and drawbacks of Assembly Language–based firmware development.	**[L1][CO3]**	**[6M]**
10	**a)**	Explain the role of IDE HLL-based firmware development.	**[L2][CO3]**	**[4M]**
	b)	List the advantages and dis advantages of HLL	**[L1][CO3]**	**[6M]**
11		Explain about methods of mixing Assembly Language and High-Level Languages in detail.	**[L2][CO3]**	**[10M]**

UNIT –IV
RTOS BASED EMBEDDED SYSTEM DESIGN

1	**a)**	What is an operating system?	**[L1][CO4]**	**[2M]**
	b)	List the types of real-time operating system	**[L1][CO4]**	**[2M]**
	c)	Define process	**[L1][CO4]**	**[2M]**
	d)	What is multiprocessing?	**[L1][CO4]**	**[2M]**
	e)	List the examples of preemptive scheduling.	**[L1][CO4]**	**[2M]**

2	**a)**	Explain the concept of an Operating System in embedded systems.	**[L2][CO4]**	**[5M]**
	b)	Explain about Real time operating system with examples	**[L2][CO4]**	**[5M]**
3		Explain about the kernel services of OS	**[L2][CO4]**	**[10M]**
4	**a)**	Explain about different types of RTOS with examples.	**[L2][CO4]**	**[6M]**
	b)	Define the following terms i)Task (ii) Process	**[L1][CO4]**	**[4M]**
5		Explain about process states and Process Control Block (PCB) and its components.	**[L2][CO4]**	**[10M]**
6	**a)**	Define Thread.	**[L1][CO4]**	**[2M]**
	b)	Compare Process and thread in an operating system.	**[L2][CO4]**	**[8M]**
7		Explain multiprocessing and multitasking with examples	**[L2][CO4]**	**[10M]**
8	**a)**	What is Scheduling and write factors of scheduling algorithm	**[L2][CO4]**	**[6M]**
	b)	Explain about the classification of CPU scheduling algorithms	**[L2][CO4]**	**[4M]**
9		Explain about FCFS, SJF, SRT, and priority based non preemptive scheduling	**[L2][CO4]**	**[10M]**
10		Explain Shortest Remaining Time (SRT) and Round Robin scheduling algorithms in detail	**[L2][CO4]**	**[10M]**
11	**a)**	Compare preemptive scheduling and Non preemptive scheduling	**[L2][CO4]**	**[6M]**
	b)	Discuss about kernel and OS scheduler	**[L2][CO4]**	**[4M]**

UNIT –V
TASK COMMUNICATION

1	**a)**	What is shared memory communication in embedded systems?	**[L1][CO5]**	**[2M]**
	b)	List the applications of device driver.	**[L1][CO5]**	**[2M]**
	c)	What is a device driver in an embedded system?	**[L1][CO5]**	**[2M]**
	d)	List any two factors to consider while choosing an RTOS.	**[L1][CO6]**	**[2M]**
	e)	Define Racing	**[L1][CO6]**	**[2M]**
2	**a)**	Define Task Communication. Explain the need for Task Communication in Embedded Systems.	**[L2][CO5]**	**[6M]**
	b)	List the methods of task communication	**[L1][CO5]**	**[4M]**
3		Describe about shared memory in a task communication	**[L2][CO5]**	**[10M]**
4		Classify message passing methods and explain each with examples.	**[L2][CO5]**	**[10M]**
5	**a)**	Discuss about RPC in task communication	**[L2][CO5]**	**[5M]**
	b)	Write the advantages and dis advantages of Sockets	**[L2][CO5]**	**[5M]**
6	**a)**	Define task synchronization	**[L1][CO5]**	**[2M]**
	b)	Explain about any four task synchronization issues	**[L2][CO5]**	**[8M]**
7		Explain about Task synchronization techniques with examples	**[L2][CO5]**	**[10M]**
8	**a)**	Explain about the role of device drivers in embedded systems.	**[L2][CO6]**	**[6M]**
	b)	Define device driver and its types	**[L2][CO6]**	**[4M]**
9		Explain in detail the methods to choose a suitable RTOS for an embedded system.	**[L2][CO6]**	**[10M]**
10	**a)**	List methods to choose a suitable RTOS.	**[L1][CO6]**	**[5M]**
	b)	Write a short notes on deadlock.	**[L2][CO6]**	**[5M]**
11		Explain about the following i) Sockets ii) Mail box	**[L2][CO6]**	**[10M]**