



**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
PUTTUR (AUTONOMOUS)**

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QUESTION BANK (DESCRIPTIVE)

Subject with Code: Real Time Operating Systems(16EC437)
Course & Semester:IV B. Tech & II- Sem

Branch: ECE
Regulation: R16

**UNIT –I
INTRODUCTION TO REAL TIME SYSTEM**

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|-----------|---|------------------------|--------------|
| 1 | Explain briefly about Real Time systems with examples. | [L2][CO1] | [12M] |
| 2 | a) What is the need for Real Times systems? Explain with examples. b) What are the specifications requirements in real time systems? | [L1][CO1] [L1][CO1] | [6M] [6M] |
| 3 | Explain Architecture of real Time Systems with the help of neat block diagram. | [L2][CO1] | [12M] |
| 4 | Discuss about following systems i) Reactive Systems ii) Time Driven iii) Deadline Driven Real Time Systems. | [L6][CO1] | [12M] |
| 5 | Mention various application areas of real time systems with examples. | [L2][CO1] | [12M] |
| 6 | a) Distinguish between embedded systems and real time systems. b) Explain the features of Real Time Systems. | [L4][CO1] [L2][CO1] | [7M] [5M] |
| 7 | What is meant by Deadline driven? Explain various kinds of Real time systems. | [L1][CO1] | [12M] |
| 8 | Explain the overview of design process of embedded system. | [L1][CO1] | [12M] |
| 9 | a) Mention typical Issues in Real time computing. b) Discuss about the following aspects i) Timeliness ii) Responsiveness iii) Fault tolerance & safety iv) Predictability. | [L2][CO1] [L6][CO1] | [6M] [6M] |
| 10 | a) Explain various Modeling /verifying tools used for the development of Real time systems. b) Discuss working of ATM with help of UML Tool. | [L2][CO1] [L6][CO1] | [6M] [6M] |

UNIT –II
EMBEDDED HARDWARE FOR REAL TIME SYSTEM

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| 1 | Explain about Selection Criteria for Real Time systems in detail. | [L2][CO2] | [12M] |
| 2 | Briefly explain about Hardware and software selection criteria in real time systems. | [L2][CO2] | [12M] |
| 3 | What is partitioning? Explain need for partitioning in real time systems. | [L1][CO2] | [12M] |
| 4 | Explain different criteria for partitioning hardware and software perspective of real time systems. | [L2][CO2] | [12M] |
| 5 | a) Discuss about following criteria for partitioning i) Fault tolerance & safety ii) criticality iii) Resource limitations b) Explain in briefly about the following i) I/O Ports ii) Memory | [L6][CO2] [L2][CO2] | [7M] [5M] |
| 6 | a) Explain in briefly about the following i) Bus architecture ii) system considerations iii) CPU features b) Discuss about following i) I2C ii) SPI | [L2][CO2] [L6][CO2] | [6M] [6M] |
| 7 | Explain in brief about the following On-chip Peripherals i) USB ii) RS-232 & RS-485 iii) SPI | [L2][CO2] | [12M] |
| 8 | a) Define interrupts? Explain about different types of Interrupts with an example. b) Explain in brief about the interrupt vector table (IVT) in embedded systems. | [L1][CO2] [L2][CO2] | [6M] [6M] |
| 9 | Explain in brief about the following concepts with examples i) Pipeline processing ii) Parallelism technique | [L2][CO2] | [12M] |
| 10 | a) Explain about basic development environment-host vs target concept of embedded systems. b) Explain about Interrupt programming in embedded systems. | [L2][CO2] [L2][CO2] | [6M] [6M] |

UNIT –III
EMBEDDED HARDWARE

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| 1 | a) What is the need of communication protocols? | [L1][CO3] | [6M] |
| | b) Explain in brief about Role of peripherals for Real time systems. | [L2][CO3] | [6M] |
| 2 | a) Explain about On-chip peripherals used in embedded systems. | [L2][CO3] | [6M] |
| | b) Define Hardware accelerators? Explain it. | [L1][CO3] | [6M] |
| 3 | Explain in brief about the following Peripherals i) Direct Memory Access ii) ADC & DAC iii) Comparator | [L2][CO3] | [12M] |
| 4 | Explain the architecture of Real Time systems with neat sketch. | [L2][CO3] | [12M] |
| 5 | a) What is Real time communication? Explain about Need of Real Time communication. | [L1][CO3] | [6M] |
| | b) Explain about design issues in real time systems. | [L2][CO3] | [6M] |
| 6 | a) Mention the requirements of communication in real time systems. | [L2][CO3] | [6M] |
| | b) Discuss about Timeliness, Dependability in real time systems with examples. | [L6][CO3] | [6M] |
| 7 | Explain about communication peripherals of real time systems? Explain how these are used in Real time systems. | [L2][CO3] | [12M] |
| 8 | a) Explain brief about Overview of real time communication. | [L2][CO3] | [6M] |
| | b) Explain need of communications in real time systems. | [L2][CO3] | [6M] |
| 9 | Explain the following real time communication peripherals i) I2C ii) SPI iii) UART | [L2][CO3] | [12M] |
| 10 | Explain the following real time communication peripherals i) Pulse width modulation (PWM) ii) Timers iii) Multimedia cards | [L2][CO3] | [12M] |

UNIT –IV**EMBEDDED SOFTWARE AND RTOS SOFTWARE ARCHITECTURE OF REAL TIME SYSTEM**

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| 1 | a) What is RTOS? Give one practical example where RTOS is used? b) What are the Characteristics of Real time operating Systems. Explain it. | [L1][CO4] [L1][CO4] | [5M] [7M] |
| 2 | a) Explain the Architecture of RTOS. What is need of RTOS? b) What are the pros & cons of RTOS? | [L2][CO4] [L2][CO4] | [6M] [6M] |
| 3 | a) Explain about Role of RTOS. b) Explain about Foreground & Background systems in RTOS. | [L2][CO4] [L2][CO4] | [6M] [6M] |
| 4 | a) Explain the following Functionalities i)Task ii)Task states iii) Task control Block b) Explain about Architecture of RT kernel. | [L2][CO4] [L2][CO4] | [5M] [7M] |
| 5 | Explain the following functionalities i) Task Management ii) I/O Management iii) Memory Management. | [L2][CO4] | [12M] |
| 6 | Define Task Control Block? Explain about attributes of TCB. | [L1][CO4] | [12M] |
| 7 | Explain following elements of RTOS i) Context Switching ii)Interrupts Handling iii) Multiprocessing | [L2][CO4] | [12M] |
| 8 | Explain following elements of RTOS i)Task ii)Process iii)Thread iv) Task State v) Inter Process Communication | [L2][CO4] | [12M] |
| 9 | a) Explain how interrupt routines handled in embedded system. b)Explain process management and memory management in embedded system | [L2][CO4] [L2][CO4] | [6M] [6M] |
| 10 | a)What the need for memory management. b) Explain in brief about Multiprocessing & Multitasking in Real time operating systems. | [L1][CO4] [L2][CO4] | [5M] [7M] |

UNIT –V**SCHEDULING, SYNCHRONIZATION AND INTER TASK COMMUNICATION IN REAL TIME SYSTEMS**

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|-----------|--|------------------------|--------------|
| 1 | a) What are the various scheduling criteria for CPU scheduling? b) Explain the following i) Deadlock ii) Race Condition | [L1][CO5] [L2][CO5] | [6M] [6M] |
| 2 | a) How effective release times and deadlines are useful in real time scheduling? b) Explain in brief about Clock driven, weighted round robin and priority driven approaches. | [L1][CO5] [L2][CO5] | [6M] [6M] |
| 3 | Define Scheduling. Explain about overview of scheduling policies. | [L1][CO5] | [12M] |
| 4 | a) What is Task synchronization? Explain it. b) What is the need of Synchronization? | [L1][CO5] [L1][CO5] | [6M] [6M] |
| 5 | Explain in brief about Shared data problems. Mention the ways it can be handled in RTOS. | [L2][CO5] | [12M] |
| 6 | a) What is semaphore? Explain about types of semaphores. b) What is the role of Semaphores? Explain about Functions of semaphores. | [L1][CO5] [L1][CO5] | [6M] [6M] |
| 7 | a) Explain in brief about Inter Task Communication. b) Explain in brief about the Need of Inter task communication. | [L2][CO5] [L2][CO5] | [6M] [6M] |
| 8 | Explain following elements of RTOS i) Message Mailboxes ii) Message Queues iii) Pipes | [L2][CO5] | [12M] |
| 9 | Explain about steps to handle for RTOS Problems of Following i) Priority Inversion Phenomenon ii) Deadlock Phenomenon | [L2][CO5] | [12M] |
| 10 | a) Explain in brief about Priority Inversion Phenomenon. b) Explain in brief about Deadlock Phenomenon. | [L2][CO5] [L2][CO5] | [6M] [6M] |

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