

Department of Electronics and Instrumentation Engineering

EE6602/ EMBEDDED SYSTEMS

QUESTION BANK

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UNIT I - INTRODUCTION TO EMBEDDED SYSTEMS

PART A

1. How embedded systems are different from conventional PC?**BLT.2**
2. What are the different types of memory used in embedded system design?**BLT.3**
3. Demonstrate about pre-processor macros.**BLT.3**
4. What are the steps involved in the build process?**BLT.1**
5. Differentiate between editor and compiler. **BLT.2**
6. Decide how suitable memory will be selected for the design of the embedded system? **BLT.6**
7. Assess the additional structural units in advanced embedded processor? **BLT.6**
8. What are the different modes of DMA transfer? Which one is suitable for embedded system?
BLT.1
9. Analyze the need for memory management in Embedded Systems?**BLT.4**
10. List out the states of timer? **BLT.1**
11. How does a program reside in ROM in embedded systems?**BLT.5**
12. Illustrate the need for watchdog timer? **BLT.3**
13. Define Real Time Clock (RTC)?**BLT.1**
14. Why do we need at least one timer in an ES? **BLT.1**
15. Explain some control bit of timer? **BLT.4**
16. Classify embedded Real time systems? Give an example for each.**BLT.3**
17. Discuss about In circuit emulator(ICE) and describe its importance. **BLT.2**
18. Generalize the development process used in ICE? **BLT.5**
19. Differentiate between host machine and target machine.**BLT.2**

20. Mention the uses of system monitor codes for debugging.**BLT.3**

PART B

1. (i) Describe the memory management concepts in embedded system design. **(8)BLT.1**
(ii) Examine how real time systems differ from conventional system? What is the necessity of real time system in embedded applications? **(8)BLT.1**
2. List and explain the various hardware units that must be present in the embedded systems. **(16) BLT.1**
3. (i) Summarize the various form of memories present in an embedded system. **(8) BLT.2**
(ii) Discuss the software tools in designing of an embedded system. **(8) BLT.2**
4. (i) Quote in brief about the various steps involved in the Embedded System build process. **(10) . BLT.1**
(ii) Describe the basic block diagram of embedded real time system. **(6) BLT.1**
5. (i) Explain the need for memory management. Discuss in detail the function of major structural units in embedded systems? **(10) BLT.2**
(ii) Discuss in detail about embedded computory applications. **(6) BLT.2**
6. Illustrate in detail about the different 'Embedded Processors' in a system. **(16) BLT.3**
7. (i) Explain the different types of single purpose processors. **(8) BLT.4**
8. (ii) Explain the different modules of modern embedded system. **(8) BLT.4**
9. (i) Generalize about the types and applications of embedded systems. **(8) BLT.5**
(ii) Compose the different memory management methods. **(8) BLT.5**
10. (i) Explain how suitable processor and memory devices are selected for an embedded system design. **(8) BLT.6**
(ii) Explain the function of timing and counting devices in embedded systems **(8). BLT.6**

UNIT II - EMBEDDED NETWORKING

PART A

1. List out the types of I/O ports. **BLT.1**
2. Differentiate between serial port and parallel port. **BLT.2**
3. Define half-duplex communication. **BLT.1**
4. Define full duplex communication. **BLT.1**

5. Compare parallel port interfaces for keypad, printer, LCD-controller and touch screen. **BLT.6**
6. Generalize the major features of USB bus. **BLT.2**
7. What is I2C? **BLT.1**
8. What is USB? Where is it used? **BLT.1**
9. Comprehend the main features of PCI/X bus. **BLT.2**
10. Analyze about RS232c. **BLT.4**
11. Assess the transmission rate of RS 485. **BLT.6**
12. Classify between device register and device address? **BLT.3**
13. Mention the main features of CAN bus. **BLT.3**
14. Mention the advantages of USB bus? **BLT.3**
15. What is CAN Bus? **BLT.1**
16. Generalize the concept of advanced serial high speed buses. **BLT.5**
17. Discuss SPI and point out the operating speed of SPI. **BLT.2**
18. Mention the concept of plug and play. **BLT.3**
19. Analyze the different serial buses. **BLT.4**
20. Explain why device drivers are necessary for interfacing a device with a processor? **BLT.6**

PART B

1. (i) Draw the CAN data frame format and explain the bus arbitration process in CAN protocol. **(8). BLT.5**
(ii) Explain why PCI/X buses are used for high speed data transfer? List the major features of PCI/X bus. **(8) BLT.5**
2. Explain how serial data transfer is performed in I²C bus. How to transfer a byte using I²C? **(16) BLT.4**
3. (i) Discuss about the features and functions of PCI and PCIX bus systems. **(8) BLT.2**
(ii) Explain the various functions performed by device drivers. **(8) BLT.2**
4. (i) Explain the functions of device drivers. **(6). BLT.2**
(ii) Explain how data is transferred between USB and PCI bus? **(10). BLT.2**
5. Describe about the allocation of memory to program segments, blocks and memory map of a system. **(16) BLT.1**

6. Write a detailed technical short note on the characteristics of the I2C and CAN bus. **(16) BLT.1**
7. (i) Describe the various components of synchronous serial input and output ports.**(8) BLT.1**
(ii)List the features and characteristics of asynchronous serial input and output ports.**(8) BLT.1**
8. Generalize in detail the function of any one serial communication bus and one parallel communication bus. **(16) BLT.5**
9. Analyze and explain on RS232, RS422, RS485 standards.**BLT.4**
10. Mention the features of buses and common modes used in serial communication. **BLT.3**

UNIT III EMBEDDED FIRMWARE DEVELOPMENT ENVIRONMENT

PART A

1. List the objectives of Embedded product Development Life Cycle.**BLT.1**
2. Describe the concept of EDLC.**BLT.2**
3. Quote the different phases of EDLC. **BLT.1**
4. Generalize why EDLC is essential in embedded systems? **BLT.5**
5. Predict the aim of product development in embedded systems. **BLT.2**
6. Describe the concept of quality in embedded product development.**BLT.1**
7. Discuss the importance of budget allocation in EDLC. **BLT.2**
8. List out the different phases of EDLC.**BLT.1**
9. Design the classic embedded product development life cycle model. **BLT.5**
10. Illustrate the necessity of Product re-engineering. **BLT.3**
11. Define conceptualization.**BLT.1**
12. Discuss about linear /waterfall model. **BLT.2**
13. Mention the issues in hardware software co-design. **BLT.3**
14. Explain about iterative /incremental/foundation EDLC model. **BLT.4**
15. Describe data flow model and its features.**BLT.1**
16. Mention the computational models in EDLC. **BLT.3**
17. Analyze how will you describe a system as a state machine model? **BLT.4**
18. Classify between state machine model and sequential model. **BLT.3**
19. Assess the features of concurrent state machine model.**BLT.6**
20. Grade under which circumstances object oriented model is best suited for embedded design. **BLT.6**

PART B

1. What is hardware software co-design? Explain the fundamental issues in hardware software co-design.(16) **BLT.6**
2. Analyze the different computational models in embedded system design.(16) **BLT.4**
3. Describe sequential program model with an example. (16) **BLT.1**
4. Discuss object oriented programming model for embedded system design. Explain the importance of object oriented model and its features. **BLT.1**
5. Show the different phases of EDLC and summarize the various approaches of EDLC. **BLT.1**
6. What is the difference between Data Flow Graph and Control data flow graph? Explain their significance in embedded system design. **BLT.2**
7. What is state and state machine? Describe the role of state machine in embedded system design. **BLT.2**
8. Explain the role of hardware software co-design in computational model. **BLT.4**
9. Design a classic embedded product development life cycle model and discuss about conceptualization. **BLT.5**
10. Illustrate the phenomenon of Linear/waterfall model in embedded system design. **BLT.3**

UNIT IV RTOS BASED EMBEDDED SYSTEM DESIGN

PART A

1. Compare the difference between RTOS and Operating System.**BLT.6**
2. List any four commercial RTOS.**BLT.1**
3. Assess when is an RTOS not necessary in an embedded system? **BLT.6**
4. How does a data output generated by a process transfer to another using an IPC? **BLT.1**
5. Distinguish between process ,threads and tasks. **BLT.2**
6. What are the different states of a task? **BLT.1**
7. Mention the consequences of context switching. **BLT.3**
8. Mention the characteristics of functions, Interrupt Service Routines and Tasks. **BLT.3**
9. Distinguish between multiprocessing and multitasking. **BLT.2**
10. List out the importance of preemptive scheduling. **BLT.1**
11. Discuss non preemptive scheduling in RTOS. **BLT.2**

12. What is shared data problem? How will you eliminate it? **BLT.1**
13. What is the use of semaphore? **BLT.1**
14. Examine the importance of disability of interrupts in Embedded System ? **BLT.3**
15. Analyze the situations which lead to priority inversion? **BLT.4**
16. How will you define active task in the context of Vx works? What are the features of Vx WORKS?
BLT.5
17. Explain the functions performed by Realtime OS in an embedded system? **BLT.4**
18. Mention the features of RT Linux. **BLT.3**
19. Summarize the goals of operating system? **BLT.2**
20. Compose the advantages of mail boxes in RTOS. **BLT.5**

PART B

1. Explain the principle of preemptive and non preemptive multitasking. Discuss about the scheduling algorithms suitable to these two types of multitasking. **(16) BLT.2**
2. (i) Explain the goals of operating system services. **(8) BLT.4**
(ii) Explain the three alternative systems in RTOS for responding a hardware source call with a neat sketch. **(8) BLT.4**
3. (i) Describe the features of Vx works RTOS. **(8) BLT.1**
(ii) Examine the case study of an embedded system for a smart card. **(8) BLT.1**
4. Write the fifteen point strategy for synchronization between the processes, ISRs, OS functions and tasks for resource management. **(16) BLT.1**
5. Describe the features of various Contemporary Real Time Operating Systems. **(16). BLT.1**
6. Explain the basic concepts of RTOS. What are the different types of RTOS? Explain the features of Micro OS-II **(16). BLT.4**
7. Generalize about the use of semaphores for the critical sections of a task with necessary diagram. **(16) BLT.5**
8. Summarize the system level and task service functions of $\mu\text{C}/\text{OS}$. **(16) BLT.6**
9. What is shared data problem? Demonstrate how shared data problem will be handled in real time system. **(16) BLT.3**
10. Illustrate and Explain the use of semaphore in multitasking? What are the various semaphore operations? **BLT.3**

UNIT V EMBEDDED SYSTEM APPLICATION DEVELOPMENT

PART A

1. Assess about application specific embedded system. **BLT.6**
2. Discuss the importance of temperature and level sensor in washing machine. **BLT.2**
3. Describe the different models of washing machines. **BLT.2**
4. Differentiate between top loading and front loading. **BLT.2**
5. Name the different phases of operations of washing machine. **BLT.1**
6. Mention the importance of input interface and output interface in Washing machine. **BLT.3**
7. Compare High Speed Electronic Control Unit and Low Speed Electronic Control Unit. **BLT.6**
8. Name the various components used in smart card application. **BLT.1**
9. Illustrate the role of interfacing I/O circuit in smart card. **BLT.3**
10. List out the different types of memories used in contactless smart card. **BLT.1**
11. Comment on charge pump circuit in smart card. **BLT.1**
12. Discuss the role of processor in smart card. **BLT.2**
13. List the embedded devices present in a high end car. **BLT.1**
14. Mention the requirements of Adaptive cruise control in a car. **BLT.3**
15. What is adaptive control? How does adaptive control algorithm differ from feedback proportional control? **BLT.1**
16. Analyze the features in OS for automobile applications? **BLT.4**
17. How does contactless smart card hardware derive power? **BLT.5**
18. Generalize the features needed in the OS for a smart card. **BLT.5**
19. Infer the advantage of encryption when using a fabrication key, personalization key, utilization lock and PIN? **BLT.4**
20. Mention the importance of sensors and actuators in embedded applications. **BLT.3**

PART B

1. Discuss the role of an embedded application which provides extensive support in home automation. **BLT.2**
2. With neat diagram explain the functionality of Automatic washing machine. **BLT.6**

3. Describe of various types of electronic control units employed in automotive applications.
BLT.2
4. Describe the role of embedded system in automotive domain.**BLT.1**
5. Mention the different communication buses used in automotive applications.**BLT.3**
6. Describe the architecture of a contactless smart card. **BLT.1**
7. Tabulate the requirements and functionalities of smart card communication system. **BLT.1**
8. Illustrate with neat class diagram explain the task card communication in brief. **BLT.3**
9. Summarize how the task of reading ports in smart card synchronizes with the port device driver.**BLT.2**
10. Generalize the tasks and ISRs required for a smart card system. Explain the actions of each and discuss the task priority assignments in a smart card system. **BLT.5**