



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

## ELECTRONICS AND COMMUNICATION ENGINEERING

### TUTORIAL QUESTION BANK

Course Name	:	EMBEDDED SYSTEM DESIGN
Course Code	:	A70440-15
Class	:	IV - B. Tech I Sem
Branch	:	ECE
Year	:	2018 – 2019
Course Coordinator	:	Mr. N Paparao Assistant Professor, ECE Dept
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#### COURSE OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

MIDTERM-I			
UNIT-I			
INTRODUCTION TO EMBEDDED SYSTEMS			
PART – A (SHORT ANSWER QUESTIONS)			
S. No	Question	Blooms Taxonomy Level	Course Outcome
1.	Define a System with an example?	Understand	1
2.	Discuss briefly about an embedded system?	Understand	1
3.	Write the advantages of embedded system?	Understand	1
4.	Write the disadvantages of embedded system?	Remember	1
5.	Give the applications of an embedded system?	Understand	1
6.	Describe various classifications of embedded systems?	Remember	1
7.	Give two essential units of a processor on an embedded system?	Understand	1
8.	Analyze the execution unit of a processor in an embedded system do?	Understand	1
9.	Give the classification of embedded system?	Remember	2
10.	Discuss the various embedded system requirements?	Understand	2
11.	Give examples for small scale embedded systems?	Understand	1
12.	Give examples for medium scale embedded systems?	Understand	1
13.	Give examples for large scale embedded systems?	Remember	1
14.	Define is the operational quality attribute?	Understand	2
15.	Define is the non-operational quality attribute?	Understand	2
PART - B (LONG ANSWER QUESTIONS)			
1.	What is an embedded system? Explain the different applications of embedded systems?	Remember	1

2.	Explain the various purposes of embedded systems in detail with illustrative examples?	Understand	1
3.	List out and Discuss in detail about the different classifications of embedded systems. Give an example for each?	Understand	1
4.	Discuss in detail about different characteristics of embedded systems with related examples.	Remember	1
5.	Explain quality attribute in the embedded system development context?	Understand	1
6.	What are the different qualities attributes to be considered in an embedded system design?	Understand	1
7.	Define operational quality attribute? Explain the important operational quality attributes to be considered in any embedded system design?	Understand	2
8.	Define non-operational quality attribute? Explain the important operational quality attributes to be considered in any embedded system?	Understand	2
9.	Discuss in detail about the quality attribute Response in the embedded system design context?	Remember	3
10.	Describe the quality attribute Throughput in the embedded system design context?	Understand	3
11.	Explain the quality attribute Reliability in the embedded system design context?	Remember	3
12.	Discuss in detail about the quality attribute information security in the embedded system design context?	Understand	3
13.	Explain the quality attribute portability in the embedded system design context?	Remember	3

### **PART - C (PROBLEM SOLVING & ANALYTICAL QUESTIONS)**

1	Give examples for general purpose processor? And explain in detail about processor?	Remember	1
2	Describe embedded cores?	Understand	1
3	Explain the real life example on the bonding of embedded technology with human life?	Understand	2
4	Discuss about the product life cycle of an embedded product development?	Remember	3

## **UNIT-II TYPICAL EMBEDDED SYSTEM**

### **PART – A (SHORT ANSWER QUESTIONS)**

1	Describe the components used as the core of an embedded system?	Understand	4
2	Give the difference between microprocessor and microcontroller?	Understand	4
3	Define is digital signal processing (DSP)?	Understand	4
4	Define is processor architecture?	Remember	4
5	Define programmable logic device?	Understand	5
6	Write the difference between RISC and CISC processors?	Understand	5
7	Write the difference between PLD and ASIC?	Remember	5
8	Write the difference between masked ROM and OTP?	Understand	6
9	Discuss the different types of RAM used for embedded system design?	Understand	6
10	Define SRAM cell?	Remember	6
11	Define DRAM cell?	Understand	6
12	Define Relay? What are the different types of relays are available?	Understand	6
13	Define is PPI device?	Remember	6
14	Write is the difference between I2C and SPI communication interface?	Understand	6
15	Write the merits and limitations of the RS232 interface?	Understand	6

16	Write the merits and limitations of the IEEE1394 interface over USB?	Remember	6
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**PART – B (LONG ANSWER QUESTIONS)**

1.	List out and Discuss in detail about the components of typical embedded systems.	Understand	4
2.	Which are the components used as the core of an embedded systems? Explain the merits and drawbacks?	Remember	4
3.	What is the difference between microprocessor and microcontroller? Explain the role of micro processors and micro controllers in embedded systems?	Understand	4
4.	Define digital signal processing (DSP)? Explain the role of DSP in embedded system design?	Remember	4
5	What is processor architecture? What is the different processor architectures available processor/controller design? Give an example	Understand	4
6	What is programmable logic device? What are different types of PLDs? Explain the role of PLDs in embedded system design?	Remember	5
7	What are the different types of memories used in embedded systems design? Explain the role of each?	Understand	5
8	List out the different types of memories used for program storage in embedded systems design?	Remember	5
9	Classify the advantages of FLASH over other program storage memory in Embedded system design?	Understand	5
10.	Define sensor? Explain its role in embedded system design? Illustrate with an example?	Understand	6
11.	Define actuator? Explain its role in embedded system design? Illustrate with an example?	Remember	6
12.	Explain the different factor that needs to be considering in the selection of memory for embedded system?	Understand	6
13.	What are differences between general purpose processor and application specific instruction set processors with an example?	Remember	6
14.	i. Explain the on different onboard communication interface in brief? ii. Explain the on different external communication interface in brief?	Understand	6
15.	Explain the sequence of operation for communicating with an I2C slave device?	Remember	6
16.	Explain in detail about the RS 232 serial interface with pin configuration?	Understand	6

**PART - C (PROBLEM SOLVING & ANALYTICAL QUESTIONS)**

1	Draw the interfacing diagram for connecting an LED to the port pin of a microcontroller. The LED is turned ON when the microcontroller port pin is at Logic 0.	Understand	6
2	Explain the sequence of operation for communicating with 1 wire slave device.	Remember	6
3	Write a ALP program to interface 7 segment LED display to microcontroller 8051?	Understand	6
4	Write a ALP program to interfacing matrix keyboard to microcontroller 8051?	Remember	6

**UNIT-III  
EMBEDDED FIRMWARE**

**PART - A (SHORT ANSWER QUESTIONS)**

1	Define Assembly Level Language?	Remember	7
2	Discuss about format of the assembly level language?	Remember	7
3	What is absolute object file?	Understand	7

4	Write the difference between compiler and cross compiler?	Understand	7
5	Define inline assembly?	Understand	7
6	Give the limitations of the high level language based development?	Remember	7
7	Write short notes on Linker and Locater?	Understand	7
8	Discuss about the object to hex file converter?	Remember	7
9	Define embedded firmware?	Understand	7
10	Define super loop model design in embedded firmware design?	Understand	7
11	Discuss briefly about approachment of embedded operating system?	Understand	7
12	What is mean by mnemonics? Give the example?	Remember	7
<b>MID TERM-II</b>			
13	Distinguish between the assembly language and machine language?	Understand	7
14	What are the assembler directive instructions? Give example?	Remember	7
15	List out the drawbacks of the assembly language based development?	Understand	7
16	What is the process to perform the translation of assembly to machine code?	Remember	7
17	Define the functionality of cross compiler conversion?	Understand	7
18	What are the steps are require in firmware execution flow?	Remember	7
19	Give the examples of RTOS employed in embedded product development?	Understand	7
20	Define Watch Dog Timer?	Understand	7
21	Write brief notes on Library file creation and usage?	Understand	7
22	Define general purpose operating system? Give the example	Understand	7
23	Define RTOS? Give the example?	Understand	7
24	Distinguish between the general purpose operating system and real time operating system?	Remember	7
25	Compare between the assembly level and high level languages based development?	Understand	7
26	Compare between the mixing assembly with high level and mixing high level languages with assembly?	Remember	7
<b>PART- B (LONG ANSWER QUESTIONS)</b>			
1	What is embedded firmware? What are the different approaches available for embedded firmware development?	Understand	8
2	Define RESET Circuit? Explain the role of RESET circuit in embedded	Remember	7
3	Explain the functionality and role of Real Time Clock in embedded	Understand	7
4	Discuss in detail about the functionality and role of Watch dog Timer in embedded system.	Remember	7
5	Explain the functionality and role of Brown out protection circuit in embedded system.	Understand	7
<b>MID TERM-II</b>			
6	Explain the various steps involved in the assembling of an assembly language program?	Remember	8
7	Explain the advantages of Assembly level language based on embedded firmware development?	Understand	8
8	Determined the high level language based on embedded firmware development technique?	Remember	8
9	Discuss about source file to object file translation in the assembly language based development?	Understand	8
10	Explain about library file creation and usage in the assembly language based development?	Remember	8
11	Write the advantages and drawbacks of assembly language based development?	Understand	8
12	Write the advantages and limitations of high language based development?	Remember	8

<b>PART – C (PROBLEM SOLVING &amp; ANALYTICAL QUESTIONS)</b>			
1	Give the examples for situations demanding mixing of C with assembly? Explain the techniques for mixing of C with assembly?	Understand	8
2	Give the examples for situations demanding mixing of assembly with C? Explain the techniques for mixing assembly with C?	Remember	8
<b>UNIT-IV RTOS BASED EMBEDDED SYSTEM DESIGN</b>			
<b>PART- A (SHORT ANSWER QUESTIONS)</b>			
1.	What is an operating system?	Understand	9
2.	Define kernel?	Remember	9
3.	Discuss about kernel space and user space?	Understand	9
4.	Define monolithic and micro kernel?	Remember	9
5.	What is task control block?	Understand	9
6.	Define virtual memory?	Remember	9
7.	Discuss how accurate time management is achieved in real time kernel?	Understand	9
8.	Explain process life cycle?	Remember	9
9.	Define process control block?	Understand	9
10.	Analyze how threads and process are related?	Remember	9
11.	Give the difference between threads and process in detail?	Understand	10
12.	Give the comparison between multitasking, multiprogramming, multi processing?	Remember	10
13.	Discuss all activities are involved in the context switching?	Understand	10
14.	Define task scheduling?	Remember	10
15.	Explain the different queues are associated with process scheduling?	Understand	10
<b>PART – B (LONG ANSWER QUESTIONS)</b>			
1.	Define kernel? What are the different functions handled by a general purpose kernel?	Understand	9
2.	What is the difference between a general purpose kernel and real time kernel? Give an example for both?	Remember	9
3.	Explain the difference between memory management of general purpose kernel and real time kernel?	Understand	9
4.	Determined the how accurate time management is achieved in real time kernel?	Remember	9
5.	Discuss in detail about the TASK and Process in the operating system	Understand	9
6.	Discuss in detail about the memory architecture of a process?	Remember	9
7.	Explain various activities involved in the creation of process and threads?	Understand	10
8.	What is process control block (PCB)? Explain the structure of the PCB	Remember	9
9.	What is task control block (TCB)? Explain the structure of the TCB	Understand	9
10.	Discuss in detail about how Threads and process are related? what are the common to process and threads?	Remember	10
11.	Determined how multithreading can improve the performance of an application with an illustrative example?	Understand	10
12.	Discuss in detail about thread context switch and the various activities performed in thread context switching for user level and kernel level threads	Understand	10
13.	List out the all activities are involved in context switching? Explain each one individually?	Remember	10
14.	Determined the different multitasking models in the operating system context?	Understand	9
15.	List out the various factors to be considered for the selection of scheduling criteria?	Remember	9

16.	List out the different types of non-preemptive scheduling algorithms? State the merits and demerits of each?	Understand	10
17.	Explain the different types of preemptive scheduling algorithms? State the merits and demerits of each?	Remember	10
18.	Discuss in detail about Explain Round Robin (RR) process scheduling with interrupts?	Understand	10
19.	Explain starvation in the process scheduling context? Explain how it can be effectively tackled?	Understand	10
20.	Define IDLEPROCESS? What is the significance of it in the process scheduling context?	Remember	10

**PART - C (PROBLEM SOLVING & ANALYTICAL QUESTIONS)**

1.	What is the difference between Hard and Soft real time systems? Give an example for Hard and Soft real time kernels?	Understand	10
2.	Explain how Threads and process are related? What are the common to process and threads?	Remember	9

**UNIT- V  
TASK COMMUNICATION**

**PART - A (SHORT ANSWER QUESTIONS)**

1.	Define deadlock?	Understand	11
2.	Discuss about Coffman conditions?	Understand	11
3.	Discuss about the different methods of handling deadlocks?	Remember	11
4.	Give the difference between buffer over run and buffer under run?	Understand	11
5.	Define task synchronization?	Remember	11
6.	Give the difference between mutex and semaphores?	Understand	11
7.	Analyze the critical section problem?	Remember	11
8.	Define device driver?	Understand	11
9.	Discuss about the sleep and wakeup mechanism for mutual exclusion.	Remember	11
10	What is Inter process communication?	Understand	11
11	What is mean by test and set lock?	Understand	11
12	Define semaphore?	Understand	11
13	Define message passing?	Understand	11
14	Define shared memory?	Remember	11
15	What is mean by remote procedure call?	Understand	11

**PART - B (LONG ANSWER QUESTIONS)**

1.	Explain the various process interaction models in detail?	Understand	11
2.	What is interprocess communication (IPC)? Give an overview of different IPC mechanisms adopted by various operating systems?	Remember	11
3.	Determined The message passing technique for IPC. What are the merits and demerits of message based IPC?	Understand	11
4.	Explain the synchronous and asynchronous messaging mechanisms for IPC under windows kernel?	Remember	11
5.	Define priority inversion? What are the different techniques adopted for handling priority inversion?	Understand	11
6.	Explain the different task communication synchronization issues encountered in inter process communication?	Remember	11
7.	Determined the mutual exclusion in the process synchronization context? Explain the different mechanisms for mutual exclusion?	Understand	11
8.	Explain the interlocked functions for locked based mutual under windows OS.	Remember	11
9.	What is semaphore? Explain the different types of semaphores. Where it is used?	Understand	11

10.	Explain the semaphore based process synchronization under windows OS	Remember	11
11.	What is critical section? What are the different techniques for controlling access to critical section?	Understand	11
12.	Discuss in detail about the event and event object based synchronization mechanism for IPC Windows OS.	Understand	11
13.	Explain in detail about the architecture of Device drivers.	Remember	11
<b>PART – C (PROBLEM SOLVING &amp; ANALYTICAL QUESTIONS)</b>			
1	Discuss in detail about the critical section object for process synchronization? Why critical section object is based synchronization	Understand	11
2	Explain the different functional and non-functional requirements that need to be evaluated in the selection of RTOS.	Remember	11

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