



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

## ELECTRONICS AND COMMUNICATION ENGINEERING

### TUTORIAL QUESTION BANK

<b>Course Name</b>	:	MICROCONTROLLERS FOR EMBEDDED SYSTEM DESIGN
<b>Course Code</b>	:	BESB16
<b>Class</b>	:	I - M. Tech, II semester
<b>Branch</b>	:	EMBEDDED SYSTEMS
<b>Year</b>	:	2018– 2019
<b>Course Coordinator</b>	:	Mrs. G.Mary swarna latha, Assistant Professor
<b>Course Faculty</b>	:	Mrs. G.Mary swarna latha, Assistant Professor

#### 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.

#### COURSE LEARNING OUTCOMES:

After completing this course the student must demonstrate the knowledge and ability to:

1. Understand principles of embedded systems design and their classification.
2. Understand processor embedded into a system.
3. Explain embedded hardware units and devices in system.
4. Understand concept of embedded software and issues in designing complex system.
5. Discuss design process in embedded system.
6. Explain formalization of system design.
7. Understand key concepts of 8051 architecture, input/output ports and circuits, external memory, counters and timers.
8. Understand key concepts of PIC controllers, memory interfacing, I/O devices.
9. Learn memory controller and memory arbitration schemes.
10. Acquire the knowledge on Programmable system on chip architectures.
11. Understand key concepts of continuous timer blocks, switched capacitor blocks, I/O blocks, digital blocks and programming of PSOC.
12. Distinguish between Embedded CISC and RISC processor architecture.
13. Explain ARM processor architecture, registers set, and modes of operation and overview of Instructions.
14. Understand and apply Exceptions and Interrupt handling Schemes, Context and periods for context switching in embedded system design.
15. Understand and apply Exceptions and Interrupt handling Schemes, Context and periods for context switching in embedded system design.
16. Explain Device driver using interrupt service routine.
17. Understand serial port device driver and device drivers for internal programmable timing devices.
18. Explain the need of Serial communication protocols and Ethernet protocols.
19. Understand SDMA, Channel and IDMA.
20. Explain the necessity of external bus interface.

**UNIT-I**  
**INTRODUCTION TO EMBEDDED SYSTEMS**

**Group – A (Short Answer Questions)**

<b>S. No</b>	<b>Questions</b>	<b>Blooms Taxonomy Level</b>	<b>Course Outcome</b>
1.	What is an embedded system?	Understand	1
2.	What are the typical characteristics of an embedded system?	Knowledge	1
3.	What are the advantages of embedded system?	Knowledge	1
4.	What are the disadvantages of embedded system?	Understand	1
5.	What are the applications of an embedded system	Knowledge	1
6.	List the various embedded hardware units and devices in a system	Knowledge	1
7.	What are the real-time requirements of an embedded system?	Knowledge	1
8.	What are the functional requirements of embedded system?	Knowledge	1
9.	What are the main components of an embedded system?	Understand	1
10.	Define embedded microcontroller.	Knowledge	1
11.	Explain digital signal processing in embedded system continued digitization of signals increasing the role of DSP in ES.	Understand	2
12.	What are the various classifications of embedded systems?	Understand	2
13.	What are the two essential units of a processor on an embedded system?	Understand	2
14.	Give examples for general purpose processor.	Knowledge	3
15.	Define microprocessor.	Understand	3
16.	When is Application Specific System processors (ASSPs) used in an embedded system?	Knowledge	3
17.	Define ROM image.	Understand	3
18.	Define device driver.	Understand	4
19.	Give some examples for small scale embedded systems.	Knowledge	4
20.	Give some examples for medium scale embedded systems	Knowledge	4
21.	Give some examples for sophisticated embedded systems	Knowledge	5

**Group - B (Long Answer Questions)**

S. No	Questions	Blooms Taxonomy Level	Course Outcome
1.	What is the need for IDE in an Embedded Architecture? Discuss.	Knowledge	1
2.	Explain the software embedded systems and the process of converting a assembly program into the file for ROM image with suitable block diagrams.	Understand	1
3.	Explain the basic processors and hardware units used in the embedded system	Knowledge	2
4.	Explain how software is embedded into a system	Knowledge	3
5.	Explain the different program layers in the embedded software and also the process of converting a "C" program into the file for ROM image with suitable block diagrams.	Understand	4
6.	Explain the software tools in designing of an embedded system.	Understand	4
7.	Explain complex systems design and processors used in embedded systems.	Knowledge	5
8.	Explain about the steps involved in design process of an embedded system.	Knowledge	5
9.	Explain about the classification of embedded systems.	Understand	6
10.	Explain about the formalization of embedded system design.	Understand	6

**UNIT-II  
MICROCONTROLLERS**

**Group – A (Short Answer Questions)**

S. No	Questions	Blooms Taxonomy Level	Course Outcome
1.	What is the size of internal RAM and ROM in 8051 microcontroller?	Understand	7
2.	List the features of 8051 microcontroller.	Knowledge	7
3.	What are the registers used in 8051 microcontroller.	Knowledge	8
4.	What are the types of instructions used in 8051 microcontroller.	Understand	8
5.	What are the I/O ports used in 8051 microcontroller.	Understand	8
6.	What is I/O Byte programming in 8051 microcontroller.	Knowledge	9
7.	What is I/O port bit programming in 8051 microcontroller.	Knowledge	9
8.	What are the control signals used for external memory interfacing in 8051 microcontroller.	Understand	11
9.	What are timers and counters used in 8051 microcontroller.	Knowledge	12
10..	What families of PIC microcontrollers are available?	Understand	12
11	What are the registers used in PIC microcontroller.		

**Group – B (Long Answer Questions)**

S. No	Questions	Blooms Taxonomy Level	Course Outcome
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1.	Draw the architecture of the 8051 microcontroller and describe each internal block.	Understand	7
2.	Explain in detail about IO ports, circuits and IO programming in 8051 microcontroller.	Knowledge	7
3.	Explain how the external memory is interfaced with 8051 microcontroller with suitable diagrams.	Understand	8
4.	How many counters and timers used in 8051 microcontroller and list the specifications of the counters and timers.	Knowledge	8
5.	Explain with examples various addressing modes supported by 8051 and PIC microcontroller?	Understand	8
6.	Draw the architecture of the PIC microcontroller and describe each internal block.	Understand	9
7.	Describe various operating modes of timers/counters and associated control registers of PIC 16C6X.	Knowledge	9
8.	Explain about various registers used in PIC microcontroller.	Understand	11
9.	Explain about memory controller and memory arbitration schemes used in PIC microcontroller.	Understand	12
10.	Explain the memory organization of Micro Chip PIC 16C6X.	Understand	12

**UNIT-III  
EMBEDDED RISC PROCESSORS**

**Group – A (Short Answer Questions)**

S. No	Questions	Blooms Taxonomy Level	Course Outcome
1	List various families of PSOC microcontroller.	Understand	13
2	Write brief note on continuous timer blocks in PSOC.	Understand	14
3	What is the difference between RISC and CISC Architecture?	Knowledge	14
4	Write a short on I/O blocks in PSOC.	Knowledge	15
5	Write brief note on digital blocks in PSOC.	Understand	15

6	Write a brief notes on how the change of modes take place in ARM?	Understand	13
7	What is current program status register?	Knowledge	14
8	What are the various processor modes of ARM.	Understand	14
9	What is Barrel shifter in ARM processor?	Understand	15
10.	Explain different data processing instructions in ARM 7	Knowledge	15

**Group - B (Long Answer Questions)**

S. No	Questions	Blooms Taxonomy Level	Course Outcome
1	Explain the architecture of programmable system on chip with suitable block diagram.	Understand	13
2	Explain continuous timer blocks and switched capacitor blocks.	Knowledge	14
3	Discuss overview of programmable system on chip.	Understand	14

4	Explain the programming of PSOC with a suitable example.	Knowledge	15
5	Explain the features of PSOC microcontroller in detail.	Understand	15
6	Explain the architecture features of ARM TDML.	Knowledge	13
7	Discuss the embedded RISC architectural features of ARM TDML.	Understand	14
8	Draw a neat program model of ARM and explain its different modes of usage.	Understand	14
9	Explain the multiple register transfer instruction set of ARM processor.	Knowledge	15
10.	Explain the complete ARM register set in different modes of ARM processor.	Understand	15

**UNIT-IV**  
**INTERRUPTS AND DEVICE DRIVERS**

**Group – A (Short Answer Questions)**

S. No	Questions	Blooms Taxonomy Level	Course Outcome
1	What is interrupt service routine(ISR)?	Understand	16
2	Write a short note on interrupt table.	Understand	17
3	What are the classification of all interrupts.	Knowledge	17
4	What is status register or interrupt pending register?	Understand	17
5	Write a short note on context switching.	Knowledge	18
6	Explain the functions involved in exception handling or ISR function.	Understand	18
7	Define context and context switching.	Understand	18
8	Define interrupt latency.	Knowledge	16
9	Define interrupt service dead line.	Understand	17
10	How is the vector address used for an interrupt source.	Knowledge	16

**Group – B (Long Answer Questions)**

S. No	Questions	Blooms Taxonomy Level	Course Outcome
1	Explain the features of interrupt service routine (ISR) call.	Understand	16
2	How do the device driver functions and ISRs differ? How do the ISR calls differ in 80x86 and 8051?	Understand	17
3	What do you mean by throwing an exception? How is the exception condition during execution of a function handled?	Understand	17

4	How is the context switching handled in ARM7?	Understand	17
5	What is device programming and explain the features of device driver.	Knowledge	18
6	Explain device drivers for internal programming timing devices with an example.	Understand	18
7	Explain about interrupt latency period and dead line for an interrupt in detail.	Knowledge	18
8	Explain in detail about the interrupt servicing mechanism.	Knowledge	16
9	Why is the context switching in an embedded processor faster than saving the pointers and variables on the stack using stack pointer?	Understand	17
10.	Write short notes on Interrupt vectors and interrupt vector table.	Knowledge	16

**UNIT-V**  
**NETWORK PROTOCOLS**

**Group – A (Short Answer Questions)**

S. No	Questions	Blooms Taxonomy Level	Course Outcome
1	List serial communication protocols.	Understand	19
2	What are the uses of CAN protocol.	Knowledge	19
3	What are the uses of I <sup>2</sup> C protocol.	Knowledge	19
4	What are the uses of SPI protocol.	Understand	19
5	What are the uses of USB protocol.	Knowledge	20
6	What is IDMA protocol used in embedded systems?	Knowledge	20
7	What is Ethernet protocol used in embedded systems?	Knowledge	20
8	Write a short note on external bus interface protocol.	Understand	20
9	List various network protocols.	Knowledge	20

**Group – B (Long Answer Questions)**

S. No	Questions	Blooms Taxonomy Level	Course Outcome
1	Explain briefly about Ethernet protocol and SDMA.	Understand	19
2	Explain briefly about serial communication protocol and SDMA.	Knowledge	19
3	a) Discuss about I2C bus communication with its devices. b) How does CAN differ from I2C?	Knowledge	19
4	Explain serial communication protocols with an example.	Understand	19
5	Discuss about CAN bus communication with its devices.	Understand	20
6	Explain ethernet protocols with an example.	Knowledge	20
7	Explain the following(i)SDMA (ii) channel and IDMA.	Understand	20

8	Explain external bus interface protocol used in embedded systems.	Knowledge	20
9	Discuss about network protocols used in embedded systems.	Understand	20

Prepared by Mrs. G.Mary swarna latha, Assistant Professor, ECE.

**HOD, ECE**