Hall Ticket No | | | | | | | | | | |

Question Paper Code: AEC016

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER-I

B.Tech VII Semester End Examinations, November - 2019

Regulations: IARE-R16

EMBEDDED SYSTEMS

(Only for ECE)

Time: 3 hours **Max. Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1	a)	Explain classification embedded systems based on complexity and performance requirements and give some examples.	[7M]
	b)	Compare and contrast top–down and bottom–up design in embedded systems design process.	[7M]
2	a)	Define Quality attributes and witre the types of Quality attributes? Discuss the Operational Quality attributes of embedded computing applications.	[7M]
	b)	Examine the architecture for an embedded system design process and Demonstrate the digital camera application with neat diagram.	[7M]

UNIT – II

3	a)	Explain the difference between “pointer to constant data” ‟ and “constant pointer to data‟ in Embedded C programming. Explain the syntax for declaring both.	[7M]
	b)	Sketch the diagram of keyboard interfacing and explain in detail about the each pin specifications?	[7M]
4	a)	Explain the Basic techniques for reading from I/O port pins for building the Embedded hardware?	[7M]
	b)	Analyze the basic flow of control construct in, i. Constant time statements ii. Sequence of statements iii. For loops iv. While loops	[7M]

UNIT – III

5	a)	Define Semaphores and task scheduling? Explain in detail about Semaphores, task states and scheduling.	[7M]
	b)	Discuss in detail about how to choose an RTOS with an example. Write the examples of RTOS employed in embedded product development?	[7M]
6	a)	Discuss in detail about the critical section object for process synchronization? Why critical section object is based synchronization.	[7M]

b) Differentiate the different functional and non-functional requirements that need to be evaluated in the selection of RTOS. expalin in detail. [7M]

UNIT – IV

7 a) Explain the differences between 'Host Computer System' and 'Target System' in terms of their hardware and software. [7M]

b) Compare the characteristics of various software architectures for embedded applications. [7M]

8 a) Why in general Host machine is used for the developments of embedded system software. Explain various software development tools provided by a Host system? [7M]

b) Explain the function and use of the following test equipment for embedded system development, [7M]

i. Oscilloscope
ii. Ohm-meters

UNIT – V

9 a) Explain memory organization of ARM processor is different from conventional general purpose processors memory organization. [7M]

b) Give hardware and software at functional level for designing elevator controller using basic design principles using a RTOS. [7M]

10 a) Define CAN Bus? Explain in detail about the CAN Bus architecture and give its features and applications. [7M]

b) Demonstrate the various architectural features of one of the SHARC processors of your choice with its functional block diagram. [7M]

INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

COURSE OBJECTIVES:

The course should enable the students to:

I	Imbibe knowledge about the basic functions, structure, concepts and applications of Embedded Systems.
II	Understand Real time operating system concepts.
III	Analyze different tools for development of embedded software.
IV	Be acquainted the architecture of advanced processors.

COURSE OUTCOMES (COs):

CO Code	Description
CO 1	Understand the basic concepts of embedded system and various applications and characteristics, formalisms for system design of embedded system design
CO 2	Discuss the concepts of C and develop the C programming examples with Keil IDE, and understand the concepts of interfacing modules using embedded C.
CO 3	Understand the fundamentals of RTOS and its programming and task communication, Task synchronization with its issues and techniques.
CO 4	Develop an examples using embedded software and understand the debugging techniques
CO 5	Discuss the concepts of advanced processors like ARM and SHARC and protocols of I2C and CAN bus.

COURSE LEARNING OUTCOMES:

AEC016.01	Understand basic concept of embedded systems.
AEC016.02	Analyze the applications in various domains of embedded system.
AEC016.03	Develop the embedded system and Design process and tools with examples.
AEC016.04	Understand characteristics and quality attributes of embedded systems, formalisms for system design.
AEC016.05	Understand the basic programming of c and its looping structure.
AEC016.06	Analyze the embedded C programming in Keil IDE, and compiling and building the hardware.
AEC016.07	Understand different concepts of display and keyboard interfacing using embedded C.
AEC016.08	Understand different concepts of serial communication using embedded C and user interfacing
AEC016.09	Remember the basics of operating system and its commands.
AEC016.10	Understand and analyze the RTOS concepts for firmware development.
AEC016.11	Remember how to choose an RTOS, task scheduling, semaphores and queues, hard real-time scheduling considerations.
AEC016.12	Understand the task communication, its programming and Task synchronization with its issues and techniques.
AEC016.13	Develop host and target machines for linking to embedded software.
AEC016.14	Develop debugging techniques for testing on host machine with examples.
AEC016.15	Remember the advanced processors such as ARM and SHARC.
AEC016.16	Understand the bus protocols such as I2C and CAN bus.
AEC016.17	Design an application based on advanced technological changes.

MAPPING OF SEMESTER END EXAMINATION TO COURSE LEARNING OUTCOMES:

SEE Question No.		CLO Code	Course learning Outcomes	CO code	Blooms Taxonomy Level
1	a	AEC016.01	Understand basic concept of embedded systems.	CO 1	Understand
	b	AEC016.03	Develop the embedded system and Design process and tools with examples.	CO 1	Understand

SEE Question No.		CLO Code	Course learning Outcomes	CO code	Blooms Taxonomy Level
2	a	AEC016.04	Understand characteristics and quality attributes of embedded systems, formalisms for system design.	CO 1	Understand
	b	AEC016.02	Analyze the applications in various domains of embedded system.	CO 1	Understand
3	a	AEC016.05	Understand the basic programming of c and its looping structure.	CO 2	Understand
	b	AEC016.07	Understand different concepts of display and keyboard interfacing using embedded C.	CO 2	Understand
4	a	AEC016.08	Understand different concepts of serial communication using embedded C and user interfacing	CO 2	Understand
	b	AEC016.05	Understand the basic programming of c and its looping structure.	CO 2	Understand
5	a	AEC016.10	Understand and analyze the RTOS concepts for firmware development.	CO 3	Understand
	b	AEC016.09	Remember the basics of operating system and its commands.	CO 3	Remember
6	a	AEC016.11	Remember how to choose an RTOS, task scheduling, semaphores and queues, hard real-time scheduling considerations.	CO 3	Remember
	b	AEC016.12	Understand the task communication, its programming and Task synchronization with its issues and techniques.	CO 3	Understand
7	a	AEC016.13	Develop host and target machines for linking to embedded software.	CO 4	Understand
	b	AEC016.13	Develop host and target machines for linking to embedded software	CO 4	Understand
8	a	AEC016.13	Develop host and target machines for linking to embedded software	CO 4	Understand
	b	AEC016.14	Develop debugging techniques for testing on host machine with examples.	CO 4	Understand
9	a	AEC016.15	Remember the advanced processors such as ARM and SHARC.	CO 5	Understand
	b	AEC016.16	Understand the bus protocols such as I2C and CAN bus.	CO 5	Understand
10	a	AEC016.17	Design an application based on advanced technological changes.	CO 5	Understand
	b	AEC016.16	Understand the bus protocols such as I2C and CAN bus.	CO 5	Understand

Signature of Course Coordinator **HOD, ECE**