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Question Paper Code:BESB02



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER-II

M.Tech I Semester End Examinations, January - 2020

Regulations: IARE-R18

MICROCONTROLLERS AND PROGRAMMABLE DIGITAL SIGNAL PROCESSING

(Embedded Systems)

Time:3hours

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) Describe the evolution and main trends of the microcontroller market until the appearance of ARM Cortex core micro controllers. [7M]
b) What are the major address ranges in Memory Map of Cortex M3? [7M]
- 2 a) Describe the various Registers and Special Registers in Cortex M3 processor [7M]
b) What is Pipeline mechanism? Discuss about Reset Sequence and bit banding? [7M]

UNIT – II

- 3 a) What are the special registers used to indicate the value of the current running exception and interrupt? [7M]
b) Briefly describe the functionalities of Nested Vectored Interrupt Controller [7M]
- 4 a) What happens to a typical reset vector, what's the meaning of the Vector Table offset Register? [7M]
b) What are the priority options for Cortex M core interrupt handling [7M]

UNIT – III

- 5 a) Describe the Features and Functionalities of LPC 17XX general purpose parallel I/O (GPIO). [7M]
b) List out the various Serial Interfaces of LPC 17XX Microcontroller. [7M]
- 6 a) Discuss about the SSP serial I/O controller of LPC 17XX Microcontrollers. [7M]
b) Explain the General-purpose DMA controller of LPC 17XX Microcontroller. [7M]

UNIT – IV

- 7 a) What is the role of Barrel shifter in Programmable DSP? [7M]
b) List the features of TI DSP processor family. [7M]
- 8 a) Explain the MAC unit of Programmable DSP Processors. [7M]
b) Explain about circular addressing mode of Programmable DSP Processors? [7M]

UNIT – V

- 9 a) What are the different buses of DSP TMS320C6000 processor and their functions? [7M]
b) List the addressing modes of DSP TMS320C6000. [7M]
- 10 a) Write short notes on (a) Direct Memory Access (b) Flash Memory Interface to DSP Processor. [7M]
b) Describe the various on-chip peripherals of DSP TMS320C6000 processor. [7M]



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COURSE OBJECTIVES:

I	Compare and select ARM processor core based SoC with several features/peripherals based on requirements of embedded applications.
II	Identify and characterize architecture of Programmable DSP Processors
III	Develop small applications by utilizing the ARM processor core and DSP processor based platform

COURSE OUTCOMES (COs):

CO 1	Analyze the characteristics of ARM Cortex-M3 processor.
CO 2	Understand the various Exceptions and Interrupts in Cortex-M3 processor.
CO 3	Study the features of LPC 17xx microcontrollers based on Cortex-M3 processor.
CO 4	Identify and analyze the characteristics Programmable DSP Processors.
CO 5	Understand the TMS320C6000 series DSP Processor architectures.

COURSE LEARNING OUTCOMES:

BESB02.01	Understanding the ARM Cortex-M3 processor: Applications, Programming model – Registers, Operation modes, Exceptions and Interrupts, Reset Sequence.
BESB02.02	Study the Instruction Set, Unified Assembler Language, Memory Maps, Memory Access Attributes, Permissions, Bit-Band Operations.
BESB02.03	Discuss the Unaligned and Exclusive Transfers. Pipeline, Bus Interfaces.
BESB02.04	Examine the various Exceptions, Types, Priority, Vector Tables, Interrupt Inputs and Pending behavior, Fault Exceptions
BESB02.05	Discuss the Supervisor and Pendable Service Call, Nested Vectored Interrupt Controller.
BESB02.06	Understand the Basic Configuration, SYSTICK Timer, Interrupt Sequences, Exits, Tail Chaining, Interrupt Latency.
BESB02.07	Describe the LPC 17xx microcontroller- Internal memory, GPIOs, Timers.
BESB02.08	Study the features of ADC, UART and other serial interfaces.
BESB02.09	Understand the concepts of PWM, RTC, WDT.
BESB02.10	Describe the Programmable DSP (P-DSP) Processors: Harvard architecture, Multi port memory.
BESB02.11	Study the features of architectural structure of P-DSP- MAC unit, Barrel shifters.
BESB02.12	Understand the Introduction to TI DSP processor family.
BESB02.13	Study the VLIW architecture and TMS320C6000 series, architecture study, data paths, cross paths.
BESB02.14	Understanding the ARM Cortex-M3 processor: Applications, Programming model – Registers, Operation modes, Exceptions and Interrupts, Reset Sequence.
BESB02.14	Understand the Introduction to Instruction level architecture of C6000 family, Assembly Instructions memory addressing, for arithmetic, logical operations.
BESB02.15	Describe the Code Composer Studio for application development for digital signal processing, On chip peripherals, Processor benchmarking.

MAPPING OF SEMESTER END EXAMINATION TO COURSE LEARNING OUTCOMES:

SEE Question No.	CLO Code	Course learning Outcomes	Course Outcome	Blooms Taxonomy Level	
1	a	BESB02.01	Understanding the ARM Cortex-M3 processor architecture	CO 1	Understand
	b	BESB02.02	Study the Instruction Set, Unified Assembler Language, Memory Maps.	CO 1	Understand
2	a	BESB02.03	Discuss the Unaligned and Exclusive Transfers. Pipeline, Bus Interfaces.	CO 1	Understand
	b	BESB02.03	Discuss the Unaligned and Exclusive Transfers. Pipeline, Bus Interfaces.	CO 1	Understand
3	a	BESB02.04	Understand the different types of interrupts	CO 1	Remember
	b	BESB02.05	Discuss the Supervisor and Pendable Service Call, Nested Vectored Interrupt Controller.	CO 1	Understand
4	a	BESB02.06	Understand the Basic Configuration, SYSTICK Timer, InterruptSequences, Exits, Tail Chaining, Interrupt Latency.	CO 2	Understand
	b	BESB02.05	Discuss the Supervisor and Pendable Service Call, Nested Vectored Interrupt Controller.	CO 2	Understand
5	a	BESB02.07	Describe the LPC 17xx microcontroller- Internal memory, GPIOs, Timers.	CO 2	Remember
	b	BESB02.8	Study the features of ADC, UART and other serial interfaces.	CO 3	Understand
6	a	BESB02.08	Study the features of ADC, UART and other serial interfaces.	CO 3	Remember
	b	BESB02.09	Understand the concepts of RTC	CO 3	Understand
7	a	BESB02.10	Describe the Programmable DSP (P-DSP) Processors: Harvard architecture, Multi port memory.	CO 4	Understand
	b	BESB02.12	Understand the Introduction to TI DSP processor family.	CO 4	Remember
8	a	BESB02.11	Study the Circular addressing mode of Programmable DSP Processors	CO 4	Understand
	b	BESB02.11	Study the Circular addressing mode of Programmable DSP Processors	CO 4	Remember
9	a	BESB02.14	Understand the Introduction to Instruction level architecture of C6000 family, Assembly Instructions memory addressing, forarithmic, logical operations.	CO 5	Understand
	b	BESB02.13	Study the VLIW architecture and TMS320C6000 series, architecture study, data paths, cross paths.	CO 5	Understand
10	a	BESB02.13	Study the VLIW architecture and TMS320C6000 series, architecture study, data paths, cross paths.	CO 5	Understand
	b	BESB02.14	Understand the Introduction to Instruction level architecture of C6000 family, Assembly Instructions memory addressing, forarithmic, logical operations.	CO 5	Understand

Signature of Course Coordinator

HOD, ECE