INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER - 1

Four B.Tech VI Semester End Examinations, April - 2020
Regulations: IARE-R16
MICROCONTROLLER AND DIGITAL SIGNAL PROCESSING
(EEE)

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 Different Registers Used In 8086 And Its Memory Segmentation ?What Are The Registers Used To Access Memory?   [7M]

   b) What is the difference between microprocessor and microcontroller?   [7M]

2 a) Explain the Architecture Of 8051 With Internal And External Memory Organization?   [7M]

   b) Explain the internal and external interrupts?   [7M]

UNIT – II

3 a) Explain the addressing modes of 8051?   [7M]

   b) Write an assembly language program to count number of one's in a given 8 bit data?   [7M]

4 a) Explain the instruction set of 8051?   [7M]

   b) Write an assembly language program for a timer to generate delay using 8051?   [7M]

UNIT – III

5 a) Explain the external memory of 8051?   [7M]

   b) Write an assembly language program to interface analog to digital converter using 8051?   [7M]

6 a) Explain the clock circuits of 8051?   [7M]

   b) Write an assembly language program to interface seven segment numeric display interface using 8051?   [7M]

UNIT – IV

7 a) Derive the complete DIF FFT for 8-point sequence and draw signal flow graph   [7M]

   b) compute the linear convolution of finite duration sequences h (n) = {1, 2} and x(n) = {1, 2, -1, 2,3, -2, -3, -1, 1, 1, 2, -1 } by overlap add method   [7M]

8 a) What are the differences and similarities between DIT and DIF FFT algorithms   [7M]

b) Determine whether the following system is [7M]

        i. Linear
        ii. Causal
        iii. Stable
        iv. Time invariant

$y(n) = \log_{10} |x(n)|$. Justify your answer

UNIT – V

9   a) What are the important features of FIR filter and explain advantages and disadvantages of FIR filters over IIR flters [7M]

   b) Design a high pass filter using hamming window with a cut-off frequency of 1.2radians/second and N=9 [7M]

10   a) Discuss & Explain Transformation of Analog filters into equivalent digital filters using Bilinear transformation method [7M]

   b) Design an analog Butterwoth filter has a -2db passband attenuation at a frequency of 20 rad/sec. and at least -10db stop band attenuation at 30 rad/sec. [7M]

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I. COURSE OBJECTIVES

The course should enable the students to:

S.No	Description
I	Enrich the knowledge of evolution of processor.
II	Apply the concept of assembly language programs for different applications.
III	Analyze and apply the concepts of discrete signals using discrete fourier transform.
IV	Analyze and design IIR and FIR digital filters.

II. COURSE LEARNING OUTCOMES

Students who complete the course will have demonstrated the ability to do the following

S. No	Description
AEC022.01	Understand and Describe the evolution and basic architecture of 8086
AEC022.02	Discuss the segmentation and programming model and List out the register organization
AEC022.03	Understand the difference between microprocessors and microcontrollers
AEC022.04	Understand and describe input/output ports of 8051 and register organization
AEC022.05	Describe different types of memory like special function register for program memory and data memory
AEC022.06	Discuss the addressing modes of 8051 microcontroller
AEC022.07	Discuss the instruction set of 8051 microcontroller
AEC022.08	Develop assembly language program for 8051 based operations.
AEC022.09	Discuss and illustrate the Timers/counters, serial communication
AEC022.10	Understand and discuss external memory
AEC022.11	Understand and discuss clock circuits and i/o memory
AEC022.12	Develop assembly code for real time control.
AEC022.13	Develop assembly code for real time control to interfacing ADC and DAC
AEC022.14	Understand the frequency domain representation and discrete Fourier transforms
AEC022.15	Understand the FFT and FFT algorithms, inverse FFT and FFT with general radix- N.
AEC022.16	Analyze and design of FIR digital filters
AEC022.17	Analyze and design of IIR filters and digital filters using window techniques

III.   MAPPING OF SEMESTER END EXAMINATION TO COURSE LEARNING OUTCOMES:

SEE Question No.			Course learning Outcomes	Blooms Taxonomy Level
1	a	AEC022.01	Understand and Describe the evolution and basic architecture of 8086	Remember
	b	AEC022.03	Understand the difference between microprocessors and microcontrollers	Understand
2	a	AEC012.03	Understand and describe input/output ports of 8051 and register organization	Understand
	b	AEC022.04	Understand and describe input/output ports of 8051 and register organization	Understand
3	a	AEC022.10	Understand and discuss external memory	Remember
	b	AEC022.08	Develop assembly language program for 8051 based operations.	Remember
4	a	AEC022.07	Discuss the instruction set of 8051 microcontroller	Understand
	b	AEC022.08	Develop assembly language program for 8051 based operations.	Understand
5	a	AEC022.08	Discuss the instruction set of 8051 microcontroller	Understand
	b	AEC022.13	Develop assembly code for real time control to interfacing ADC and DAC	Understand
6	a	AEC022.11	Understand and discuss clock circuits and i/o memory	Remember
	b	AEC022.13	Develop assembly code for real time control to interfacing ADC and DAC	Understand
7	a	AEC012.14	Compare the characteristics of IIR and FIR filters.	Understand
	b	AEC012.13	Design of finite impulse response (FIR) filters for a given specification	Remember
8	a	AEC012.13	Compare the characteristics of IIR and FIR filters	Remember
	b	AEC012.13	Given the difference equation of a discrete-time system to demonstrate linearity, time-invariance, causality and stability, and hence show whether or not a given system belongs to the important class of causal, LTI (linear time-invariant) systems.	Understand
9	a	AEC012.15	Understand the tradeoffs between normal and multi rate DSP techniques and finite length word effects.	Understand
	b	AEC012.15	Understand the tradeoffs between normal and multi rate DSP techniques and finite length word effects.	Remember
10	a	AEC012.16	Understand the signal interpolation and decimation, and explain their operation	Understand
	b	AEC012.16	Understand the signal interpolation and decimation, and explain their operation	Remember

Signature of Course Coordinator   **HOD, EEE**