MICROCONTROLLERS AND DIGITAL SIGNAL PROCESSING LABORATORY

VI Semester: EEE								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
AEC114	**Core**	-	-	3	2	30	70	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 42**				**Total Classes: 42**		

OBJECTIVES:
The course should enable the students to:
I.   Develop assembly language program for arithmetic and logical operations using 8051.
II. Implement convolution using MATLAB.
III. Implement digital signal processing algorithms using MATLAB.

LIST OF EXPERIMENTS

Expt. 1   DESIGN A PROGRAM USING WIN862 AND 8086 MICROPROCESSOR

Design and develop an assembly language program using 8086 microprocessor and to show the following aspects, programming execution debugging to demonstrate the tool chain for WIN862 and hardware for 8086 microprocessor.

Expt. 2   8 AND 16 BIT ARITHMETIC OPERATIONS

a)   Write an ALP program to perform 8 Bit arithmetic operations using 8051
b)   Write an ALP program to perform 16 Bit arithmetic operations using 8051

Expt. 3   NUMBER OF ZEROS AND ONES IN ANY NUMBER

a)   write an ALP program to count the number of ones in any number
b)   Write an ALP program to count the number of zeros in any number

Expt. 4   TIMER / COUNTER IN 8051

Write an ALP program and verify timer/counter in 8051

Expt. 5   UART OPERATION IN 8051

Write an ALP program to operate UARE in 8051.

Expt. 6   INTERFACE SEVEN SEGMENT DISPLAY

Write an ALP program to interface 8051 and keyboard

Expt. 7   ADC, DAC WITH 8051

a)   write an ALP program to convert analog signal to digital signal using 8051
b)   write an ALP program to convert digital signal to analog signal using 8051

Expt. 8	CONVOLUTION

a) Generation of linear convolution without using built in function in MATLAB
b) Generation of circular convolution without using built in function in MATLAB

Expt. 9	DISCRETE FOURIER TRANSFORM

Compute the Discrete Fourier Transform and IDFT with and without fft and ifft in MATLAB

Expt. 10	POWER SPECTRUM

Determination of power spectrum of a given sequence.

Expt. 11	DIT - FAST FOURIER TRANSFROM

Implementation of Decimation-in-time radix-2 FFT algorithm

Expt. 12	DIF - FAST FOURIER TRANSFROM

Implementation of Decimation-in-frequency radix-2 FFT algorithm

Expt. 13	IIR FILTER

Implementation of LP/HP IIR digital filter

Expt. 14	FIR FILTER

Implementation of LP/HP FIR digital filter

Reference Books:

1. Kenneth.J.Ayala. The 8051 microcontroller, 3rd Edition, Cengage learning, 2010.
2. D V Hall, "Microprocessors and Interfacing", Tata McGraw-Hill Education, 3rd Edition 2013.
3. A K ray and K M Bhurchandani, "Advanced microprocessors and peripherals", Tata McGraw-Hill Education, 2nd Edition 2006.
4. Fundamentals of Digital signal processing - LoneyLudeman, John wiley, 2009.
5. Digital signal processing: fundamentals and applications - Li Tan Elsevier, 2008.

Web References:

1. https://www.nptel.ac.in/downloads/106108100/
2. https://www.the8051microcontroller.com/web-references
3. https://www.eceweb1.rutgers.edu/~orfanidi/ece348/
4. https://www.eecs.umich.edu/courses/eecs452/refs.html
5. https://www.dsp.sun.ac.za/lab-reference-guide/

Course Home Page:

LIST OF EQUIPMENT REQUIRED FOR A BATCH OF 36 STUDENTS:

S. No	Name of the Equipment	Range
1	Regulated Power Supply	0-5V & 12V DC
2	Digital Storage Oscilloscope	0-20 MHz
3	8086 Trainer Kits with keyboard	43 No.s
4	8051 Trainer kits with keyboard	40 No.s
5	Serial Interface cable	45 No.s
6	Stepper Motors	45 No.s
7	A/D Device	14 No.s
8	A/D and Dual D/A Devices	27 No.s
9	Dual D/A Devices	14 No.s
10	PPI 8255	12 No.s
11	USART 8251	7 No.s
12	Keyboard/ Seven segment controller	7 No.s
13	Traffic Light Controller	3 No.s
14	RTC/ Tone generator	3 No.s
15	Elevator	2 No.s
16	SRAM and DRAM	2 No.s
17	DMA Controller	1 No.s
18	LCD Display	40 No.s
19	Timer/Counter, UART and Interrupt	44 No.s
20	Keyboard	40 No.s
21	Hardware: Desktop Computers (04 nos), ESA 86 / 88 trainer kit. Software: win 862, Keil µVision Tools	