EC5B19 MICROCONTROLLERS AND EMBEDDED SYSTEMS

Aims and Objectives

The aim of this course to provide the student with a detailed understanding of to Microcontrollers and Embedded systems. The course covers fundamentals, The 8051 Architecture, Assembly Language Programming, Instruction set, Serial Communication and Interfacing techniques of 8051 Microcontroller

Contact Hours:72
Credits: 4

Course outline

Unit I

Module I   **10 Hrs**

Introduction to Microcontrollers and Embedded Processors – Microcontrollers survey-four bit, eight bit, sixteen bit, thirty two bit Microcontrollers --Comparing Microprocessors and Microcontrollers-Overview of the 8051 family

Module II   **15 Hrs**

The 8051 Architecture- Hardware- Oscillator and clock-program counter –data pointer-registers-stack and stack pointer-special function registers- -memory organization-program memory-data memory -Input / Output Ports –External memory- counter and timer-serial data Input / output-Interrupts

Module III   **20 Hrs**

8051 Assembly Language Programming-Structure of Assembly language- Assembling and running an 8051 program- Addressing modes-Accessing memory using various addressing modes- Instruction set- Arithmetic operations and Programs-Logical operations and Programs -Jump and Call instructions and Programs -I /O Pot Programs - Single bit instructions and Programs –Timer and counter - and Programs

Unit II

Module IV   **5 Hrs**

8051 Serial Communication -Connection to RS-232- Serial Communication Programming- Interrupts Programming

Module V   **15 Hrs**

Microcontroller Interfacing -Key Board - Displays- Pulse Measurement - D / A and A/D conversion- Stepper Motor-

Module VI   **5 Hrs**

        Basic concept of PIC microcontroller –Microcontroller Architecture – PIC16F Family

Text Book
1. *The 8051 Microcontrollers and Embedded Systems : Muhammed Ali Mazidi*
2. *The 8051 Microcontrollers Architecture, Programming & Applications*
                                              Kenneth J. Ayala

Reference
1.   *Design with PIC Microcontroller: John Petman*

ECB20 Practical - Microcontroller Lab

1. Multiplication of two numbers using MUL command
2. Division of two numbers using DIV command
3. Pick the smallest number among a given set of numbers
4. Pick the largest number among a given set of numbers
5. Arrange 'n' numbers in ascending order
6. Arrange 'n' numbers in descending order
7. Generate a specified time delay
8. Interface a ADC and a temperature sensor to measure temperature
9. Interface a DAC & Generate a stair case wave form – with step duration and no. of steps as variables
10. Flash a LED connected at a specified out put port terminal
11. Interface a stepper motor – and rotate it clock wise or anti clock wise through given angle steps
12. Using Keil software write a program to pick the smallest among a given set of numbers
13. Using Keil software write a program to pick the largest among a given set of numbers
14. Using Keil software write a program to arrange a given set of numbers in ascending order
15. Using Keil software write a program to arrange a given set of numbers in descending order
16. Using Keil software write a program to generate a rectangular wave form at a specified port terminal

Note: Student has to perform the following experiments

(1)   8 Experiments among experiment numbers 1 to 11

(2)   Experiment Numbers from 12 to16 are compulsory

ECB21 DIGITAL COMMUNICATION

Module I   **10 Hrs**

Information Theory – Concept of information, Communication Channel, Entropy - Shannon's theorem-channel capacity- Bandwidth Considerations –Noise trade off – Analog Vs Digital Communication-

Module II   **10 Hrs**

Data Communication Techniques-serial and parallel Communication-asynchronous and synchronous Communication-Coding scheme- ON-OFF, RZ, NRZ, Bipolar-Manchester signaling and differential coding –

Module III   **15 Hrs**

Pulse Digital Modulation:–PCM—Basic blocks- Sampling Theorem – Quantization - Quantization noise, Encoding –Generation and Receiver-Companding-Noise considerations in PCM Systems- -DPCM - Delta modulation –Linear prediction – Adaptive Delta Modulation - multiplexer –TDM

Module IV   **15 Hrs**

Pass band Digital Transmission: Digital bandpass modulation techniques-coherent binary schemes- ASK, FSK, PSK , M array QAM, QPSK , Differential phase shift keying - Pass band Transmission model- Generation, Detection, Signal space diagram, bit error probability .

Module V   **10 Hrs**

Communication system interfaces and standards-current loops-RS232 standard-X21- Communication Equipment-Modem-Different types, Multiplexers and Concentrators

Module VI   **12 Hrs**

Spread Spectrum Techniques: Pseudo- noise sequences –a notion of spread spectrum – Direct sequence spread spectrum with coherent binary phase shift keying – Signal space Dimensionality and processing gain –Probability of error – Frequency hop spread spectrum

Text Book
1. *Communication Systems : Simon Haykins, John Wiley & Sons, Inc., 4th Edition, 2001*

2. *Principles of Communication : Taub and Schilling*

References
1. *Digital Communications Fundamentals and Applications: Bernard Sklar, Person Education, 2nd edition*

2.*Modern Digital and Analog communication system: B.P.Lathi, Oxford University Press, 3_{rd} edition*

EC5B22 PRACTICAL - COMMUNICATION LAB

List of Experiments
1. Collpitts Oscillator
2. Hartley Oscillator
3. Second order High Pass Filter, Plot the frequency response
4. Second order Low Pass Filter, Plot the frequency response
5. Second order Band Pass Filter, Plot the frequency response
6. Universal Active Filter, Plot the frequency response
7. Collector Modulation
8. Base Modulation
9. Phase Locked Loop, Determination of lock range and capture range
10. FM Modulation using PLL IC
11. Voltage Controlled Oscillator Using 566 IC, Design free running frequency

12. Pulse Modulation- PAM , PWM , PPM
13. IF Amplifier
14. Balanced Mixer
15. Opto coupler
16. ASK,PSK, FSK

All the experiments are compulsory, Circuit Design is required.

EC5B23 COMPUTER HARDWARE
Unit I

Module 1 (7 hours)

Introduction: Functional units, Basic operational concepts, PC family
Motherboard: Form factor types: AT, ATX, NLX, WTX, BTX, Mother board components, Motherboard logic
Text: 1. Computer Organisation, Carl Hamacher
2. Troubleshooting, Maintaining & Repairing PCs, Stephen J. Bigelow
3. IBM PC and Clones, B. Govindarajalu

Module 2 (13 Hours)

Processor-internal organization, Types, packaging, over clocking, Sockets/Slots, Heat sinks Co-processors, Chipset
BIOS-functions, DOS-BIOS interaction, POST, POST sequence, POST error indications, BIOS Set up, Expansion buses-type & features
Text   :1. Computer Organisation, Carl Hamacher
2. . IBM PC and Clones, B. Govindarajalu
3. Upgrading and Repairing PCs, Scot Mueller

Module 3 (12 Hours)
Memory: RAM-Static & Dynamic, memory refresh logic, ROM-Types, concept of Cache memory- L1/L2 cache, virtual memory
Memory modules: SIMM, DIMM & RIMM features, Memory banks, System Logical memory layout
Ports- serial, parallel, USB, IEEE-1394, connectors
Text   1. Computer Organisation, Carl Hamacher
         2. Upgrading and Repairing PCs, Scot Mueller

Unit II
Module 4 (20 Hours)
Storage Devices: Hard Disk Drive- construction, Types , IDE, SCSI & SATA, connectors/interfaces, RAID, Data organization , operation, capacity, speed and storage improvements, features, installation, Partitioning, Formatting, MBR, DBR, File Systems-FAT, Root Directory, HDC, Floppy Disk & Drive, FDC, Optical storage: CD ROM technology, operation , DVD- capacity(sides and layers, Blu-ray disc, tape back-up, Complete Booting process
Text   1. All About Hard Disk Drives, Manahar Lotia
         2. Upgrading and Repairing PCs, Scot Mueller

Module 5 (10 Hours)
Input/Output devices: Printers: Dot matrix, Inkjet, Laser , Keyboards-switches, working, connectors/interfaces, Pointing and positioning devices – types, construction & working ,wireless input devices, Digital camera, Scanner-types, Monitor
Text   1. All About Printers/Keyboards/Mouse, Manahar Lotia
         2. Upgrading and Repairing PCs, Scot Mueller

Module 6 (10 Hours)
Special board: Sound, Modem, NICs, Graphical accelerators, Video (Block diagram approach only) SMPS: types- voltages, UPS, Batteries,
Test equipments, Software Diagnostics: PC Tools and Norton Utilities, Viruses, Antiviruses
Text: 1. IBM PC and Clones, B. Govindarajalu
        2. All About Hard Disk Drives, Manahar Lotia
        3. Upgrading and Repairing PCs, Scot Mueller

EC5D01 *OPEN COURSE*

AUDIO AND VIDEO ELECTRONICS

Aim of the course:
To enable the student to expertise in the field of Audio and video engineering.

Contact hours: 72

Credits : 4

Course Outline

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Unit I
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Module I   **8 Hours**

Speech, Music and noise – Mechanism of hearing of human ear. Nature of sound reflections, refractions, diffractions, absorption noise – general considerations on acoustics of studio reverberation- acoustics of auditorium- growth and decay of sound in enclosures, acoustic materials

Module II   **14 Hours**

Construction and working principle of various types of microphones, directivity, sensitivity, frequency responses of microphones, construction and working principle of various types of loud speakers, frequency response, directivity, distortion power handling capacity of speakers, columns and enclosures for speakers, crossover networks in columns

Module III   **14 Hours**

Sound recording methods, sound on disc, constructional characteristics of stylus microgroove, head, tracking error and compensation- Magnetic recording, DC and AC bias, frequency response, speed equalisation and signal to noise ratio, recording circuits, Dolby system concept, optical storage systems-Coding and decoding applied to CD – CD-R

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Unit II
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Module IV   **12 Hours**

Elements of Television System:- Basic Block Schematic of Monochrome TV Transmitter and receiver, Gross structure, flicker& interlaced scanning ,number of scanning lines. Horizontal and Vertical resolution, Resolution and Bandwidth. Composite video signal-Vertical and horizontal synchronization, Vestigial Sideband Transmission, transmission of Sound signal. Modulation Positive and Negative Modulation and its comparison -Picture tubes. Television Cameras, Working Principle and operation of CCD cameras

Module V   **12 Hours**

Colour Television-Compatibility considerations, Colour response of human eye, three colour theory, additive mixing of colours, chromaticity diagram, Luminance and chrominance, Block schematic explanation of Colour TV Cameras. Colour difference signal and its generation. Colour signal transmission, Modulation of colour Difference signals and colour burst signal. Basic Colour Television Systems: PAL, NTSC and SECAM.-Block Schematic, explanation and Comparison

Module VI   **12 Hours**

Concept of HI-FI Stereo amplifiers-bass control, treble control and balance control, loudness control in stereo amplifier, distortion in stereo amplifiers, typical circuits installation of the stereo system. PA system and projection equipment, pre amplifiers, high wattage audio amplifier, Horns and their poor handling capacity working principles and operation of film projector.

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EC5D01 *OPEN COURSE*

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COMPUTER ASSEMBLING

Aim of the course:

To get an in-depth knowledge of computer hardware and hence to create a confidence in using and assembling PC

Contact Hours: 72
Credit   :4

Course Outline

Unit I

Module I   **8 Hours**
Computers-History, PC Components- Hardware and Software, PC Architecture
Text Book: 1.IBM PC and Clones- Govindarajalu, TMH
            2.Upgrading and Reparing PCs – Scot Meuller- Pearson Edn.

Module II   **12 Hours**

Microprocessor Types-Generation, Processor Specifications, Processor Sockets and Slots- Math Co-Processor- Popular Intel Processors-P4, P5, & P6 Processors- Processor Installation stopes.
Text Book: .Upgrading and Reparing PCs – Scot Meuller- Pearson Edn.

Module III   **16 Hours**

Motherboard- Form Factor- Components, Chipsets-Evolution, North Bridge/South Bridge Architecture, Hub Architecture, Intel i810E Chipset features and architecture, Super I/O chips, System Bus-Types, functions and features, FSB, Memory Bus, I/O Bus, Mother board settings and installation Steps.

Text Book: .Upgrading and Reparing PCs – Scot Meuller- Pearson Edn.

Unit II

Module IV   **10 Hours**

BIOS- Hardware and Software, Motherboard BIOS, ROM Hardware, Shadowing, POST, ROM upgrading/flashing, Plug and Play BIOS
Text Book: 1.IBM PC and Clones- Govindarajalu, TMH
                 2.Upgrading and Reparing PCs – Scot Meuller- Pearson Edn.

Module V   **13 Hours**

Memory-Basics, ROM, DRAM, Cache Memory: SRAM, RAM Memory Types- FPM, EDO, Burst EDO, SDRAM, DDR-SDRAM, RDRAM- SIMM, DIMM & RIMM Memory, Memory selection, Installation and Trouble shooting, IDE interface- ATA IDE, Serial ATA- SCSI Interface- Hard Disk Drive- Construction and operaration- Formatting & Partitioning, Installation, Partition Utilities- FDISK, Partition Magic

Text Book: Upgrading and Reparing PCs – Scot Meuller- Pearson Edn.

Module VI   **13 Hours**

OS Concepets- DOS & Windows OS – Features, LINUX OS- Features, Steps in Installing OS

Text Book: .Upgrading and Reparing PCs – Scot Meuller- Pearson Edn.

(For getting full advantage of this course a demonstration of the PC peripherals and their installation may be carried out)

EC5D01 *OPEN COURSE*

ELECTRONIC COMMUNICATION

UNIT I

Aim of the course:

To enable the student to become an expert in various communication techniques, modulation, concept of digital modulation and data communication

Contact Hours : 4
Credits   : 4

UNIT I

Module I

What is communication, Uses of communication, the structure and types of communication systems, communication systems and data communication

Text book: Chapter 1- Data Communications, William L Scweber, Mc Graw Hill, 1998

Module II

The communication channel, electromagnetic wave, frequency and wavelength, the electromagnetic spectrum, bandwidth, bandwidth and channel capacity, bandiwidth and distance

Text book: Chapter 2- Data Communications, William L Scweber, Mc Graw Hill, 1998

Module III

Modulation and demodulation, types of modulation, amplitude modulation, frequency modulation, phase modulation

Text book: Chapter3-3.1,3.3,3.4,3.5,3.6- Data Communications, William L Scweber, Mc Graw Hill, 1998

Unit II

Module IV

Multiplexing, space division multiplexing frequency division multiplexing, time division multiplexing

Text book: Chapter 4-4.3, 4.4, 4.5,4.6- Data Communications, William L Scweber, Mc Graw Hill, 1998

Module V

Description of digital systems, advantages of digital systems, role of the medium, wire and cable air and vacuum, fiber optics

Text book: Chapter 5- 5.1, 5.2, 6-6.1, 6.2, 6.3, 6.4 Data Communications, William L Scweber, Mc Graw Hill, 1998

Module VI
Role of modems, modem functions, operation of a modem, originate and answer connecting the modem to the line, other specialised modems- fiber optic modems, direct connection modems, digital modems

Text book: Chapter 10- 10.5, 10.7 Data Communications, William L Scweber, Mc Graw Hill, 1998

Reference Text Books: 1. Electronic communication systems – Kennedy, Davis – Tata
        Mc Graw Hill
     2. Electronic Communications, Roddy & Coolen, Pearson Education
        4th Ed.