S.Y.B.Sc. Computer Science (Electronics)
Revised Syllabus
To be implemented from A.Y. 2014-15

Structure of S. Y. B. Sc. (Computer Science) Course

Sem-I	Paper-I : Digital System Hardware (ELC 211)	Paper-II: Analog Systems (ELC 212)
Sem-II	Paper-I:The 8051 Architecture, Interfacing & Programming (ELC 221)	Paper-II:Communication Principles (ELC 222)
Sem-I & II	Paper- III: Practical Course (ELC 203)	

Equivalence Subject/Paper and Transitory Provision

Semester	Old Syllabus	New Syllabus
Semester I	Paper-I: Microprocessor and programming (**ELC211**)	Paper-I: Digital System Hardware (**ELC 211**)
	Paper- II: Communication Principles (**ELC 212**)	Paper-II: Communication Principles (**ELC 222**)
Semester II	Paper-I: 8051 Microcontroller and Embedded Systems (**ELC 221**)	Paper-I: The 8051 Architecture,Interfacing and Programming (**ELC 221**)
	Paper-II: Digital Signal processing (**ELC 222**)	Paper-II: Analog Systems (**ELC 212**)
Semester I and II	Practical course	Paper- III: Practical Course (**ELC 203**)

S.Y.B.Sc. (Computer Science) Electronics -Semester I

Paper - I: Digital System Hardware (ELC 211)

Objectives:
1. To study the applications of logic gates.
2. To use K-maps for digital circuit design.
3. To study and understand basics of microprocessors
4. To understand fundamentals of multicore technology

UNIT- 1: Digital circuit design [12]

Introduction to digital circuit design, Circuit design using logic gates: Binary to gray converter, Gray to Binary converter, Decimal to BCD encoder
Circuit designusing state table/K-map: Design of Full adder, full subtractor, BCD to seven segment decoder, Concept of excitation table, Design of 3 bit synchronous up counter , 3 bit random sequence generator .

UNIT- 2: Memory [12]

Memory Architecture, Memory Hierarchy, Introduction to USB storage device, Memory parameters (Access time, speed, capacity, cost), Vertical & horizontal Memory expansion (increasing the capacity, increasing word size), Associative Memory, Cache memory, cache mapping techniques, virtual memory, virtual memory mapping (paging and segmentation).

UNIT- 3: Computer Organization [14]

Concept of Address Bus, Data Bus, Control Bus. Register based CPU organization, stack organization, I/O organization: need of interface, block diagram of general I/O interface. Working concepts like polling, interrupt initiated data transfer. Concept of DMA , DMA transfer, DMA Controller Serial communication: Synchronous, asynchronous and their data transmission formats, RS–232, General block diagram of UART.

UNIT- 4: Microprocessor [10]

Evolution of Microprocessor (8086 to Pentium 4), Features like address, data, bus size, speed, cache capacity, number of parallel instructions executed. Concept of RISC & CISC, Von-Neumann & Harvard Architecture, Concept of pipeline. Architecture of basic microprocessor:

8086 & Pentium (Basic Version), Introduction to multicore processors, its development and impact on Hardware, Software.

Recommended Books:

1. Fundamental of Digital electronics : R.P. Jain ,
2. Digital design : M. Morris Mano, Prentice-Hall of India
3. Computer System Architecture : Morris Mano, Prentice-Hall of India
4. The Pentium Microprocessor : James Antonakos
5. Microprocessors and Interfacing Programming and Hardware: Douglas V. Hall- TATA McGRAW-HILL EDITION
6. The Intel Microprocessors : Barry B. Brey- Pearson Education Asia

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S.Y.B.Sc. (Computer Science) Electronics-Semester I

Paper-II: Analog Systems (ELC 212)

Objectives:

1) To understand basics of analog electronics
2) To study different types of sensors
3) To understand different types of signal conditioning circuits
4) To learn data conversion techniques
5) To apply knowledge of analog systems in different applications

UNIT -1: Analog Electronic System [14]

Introduction of analog electronic systems. Definition of sensors and transducers. Classification of sensors: Active and passive sensors. Specifications of sensors: Accuracy, range, linearity, sensitivity, resolution, reproducibility. Temperature sensors (LM-35 and AD590), pH sensor, piezoelectric humidity sensor, optical sensor (LDR), displacement sensor (LVDT), Passive Infrared sensor (PIR), tilt sensor, touch sensor, ultrasonic sensor

UNIT- 2: Signal Conditioning [14]

Introduction to signal conditioning, Signal conditioning of passive sensors using bridge circuit: Wheatstone 's bridge, Level Shifter, Amplifier, Three OP-amp instrumentation amplifier, Filters; active and passive filters, Concept of Order of filters. Working principle of Single order Op-Amp based Low Pass Filter, High Pass Filter, Band Pass Filter, Notch Filter, Band reject filter; Working of Voltage to frequency Converter using OpAmp.

UNIT- 3: Data Converters [12]

Digital to Analog Converter (DAC): Resistive divider, R-2R ladder, Parameters: Linearity, resolution, accuracy, Analog to Digital Converter (ADC): Types of ADC- Flash, Successive approximation, dual slope. Parameters of ADC: Linearity, resolution, conversion time, accuracy. Applications of DAC and ADC.

UNIT – 4: Case studies [08]
Temperature monitoring system using LM35, Intruder detector system using PIR sensor, Water Level Indicator system using float switch, Electrocardiography (ECG).

Recommended Books:

1. Sensors & Transducers : Dr. A. D. Shaligram: CTC publications
2. Op-Amps and Linear Integrated Circuits: Ramakant Gaikwad: PHI: 4th Ed.
3. Electronic Instrumentation: H. S. Kalsi: TMH: 2nd Ed.
4. Modern Electronic Instrumentation and Measurement Techniques: Albert D. Helfrick, William D. Cooper: PHI publications
5. Electronic measurements : K.A. Bakshi, A. V. Bakshi and U. A. Bakshi, Technical publications.
6. A Course in Electrical and Electronic measurements and Instrumentation: A.K. Sawhney: Dhanpat Rai & Sons Educational & technical publishers
7. Handbook of Biomedical instrumentation: R. Khandpur, Tata McGraw Hill Publications 2003.

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S.Y.B.Sc(Computer Science) Electronics- Semester II

Paper-I: The 8051 Architecture, Interfacing & Programming (ELC 221)

Objectives:

1.   To study the basics of 8051 microcontroller
2.   To study the Programming and interfacing techniques of 8051
3.   To apply knowledge of 8051 to design different application circuits
4.   To introduce the basic concepts of advanced Microcontrollers

UNIT- 1: Basics of Microcontroller & Intel 8051 architecture   [12]

Introduction to microcontrollers, difference in controller and processor. Architecture of 8051, Internal block diagram, Internal RAM organization, SFRS, pin diagram of 8051, I/O ports and specifications of I/O Ports, External Memory Interface.

UNIT-2: Programming model of 8051   [12]

Instruction classification, Instruction set, Addressing Modes: Immediate, register, direct, indirect and relative, assembler directives (org, end), features with example, I/O Bit & Byte programming using assembly language for   LED and seven segment display (SSD) interfacing. Introduction to 8051 programming in C.

UNIT- 3: Timer / counter, serial communication, Interrupts & Programs using 'C'   [12]

TMOD, TCON, SCON, SBUF, PCON Registers, Timer modes, programming for time delay using mode 1 and mode 2. Introduction to interrupt ,Interrupt types and their vector addresses, Interrupt enable register and interrupt priority register(IE,IP), Synchronous and asynchronous serial communication , Programming serial port without interrupt, Use of timer to select baud rate for serial communication.

UNIT- 4: Interfacing, programming using 'C' & Applications of 8051   [12]

 Interfacing ADC, DAC, LCD, stepper motor. Study of advance micro controllers (ARM & PIC): Features and applications

Recommended books:
1.   8051 microcontroller and Embedded system using assembly and C :
        Mazidi, Mazidi and McKinley, Pearson publications
2.   The 8051 microcontroller – Architecture, programming and applications: K.Uma
        Rao and AndhePallavi, Pearson publications.
3.   ARM System Developers guide: Sloss, Andrew n. Symes.
4.   Design with PIC microcontrollers: Peatman, Pearson publications.

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S.Y.B.Sc(Computer Science) Electronics-Semester II
Paper- II: Communication Principles (ELC 222)

Objectives:

1.   To understand basics of communication systems.
2.   To understand modulation, demodulation and multiplexing of signals.
3.   To understand digital communication techniques
4.   To introduce concepts in advanced wireless communication.

UNIT-1: Introduction to Electronic Communication   [12]

Importance of Communication, Elements of Communication system, Electromagnetic spectrum, types of communication, serial communication, Concepts of communication system: Signal bandwidth, channel bandwidth, data rate, baud rate, Nyquist theorem, Signal to noise ratio, and channel capacity, error handling code- Hamming code, Shannon theorem, and concept of companding.

UNIT-2: Modulation and Demodulation   [14]

Introduction to concepts of modulation and demodulation. Modulation techniques: Analog modulation: Amplitude, Phase and Frequency modulation, Circuit diagram and working of transistorized amplitude modulator and diode demodulator. Equation of amplitude modulated wave, modulation index and frequency spectrum. (Phase and frequency modulation circuits are not expected).
Digital modulation: Pulse Amplitude Modulation (PAM), Pulse Code Modulation (PCM) Block diagram and working, delta modulation circuit, MODEM - concept of ASK, FSK, BPSK, QPSK and block diagram of MODEM using FSK.

UNIT-3: Multiplexing and Multiple Access Techniques   [14]

Study of multiplexing and multiple access techniques: Space division multiplexing ,Time division multiplexing , Frequency Division Multiplexing , Code division multiplexing, spread spectrum techniques: DSSS, FHSS, Introduction to multiple access and corresponding access types: FDMA , TDMA , CDMA.

UNIT- 4: Wireless Communication system   [10]

Introduction to wireless communication system. Need of wireless communication systems. Antenna – Introduction, Need, working Principle, Parameters of antenna: Gain, directivity, Radiation pattern, Beam width, Bandwidth, front to back ratio (FBR).

Introduction to mobile communication, Cellular concept, Working of GSM, Hand over, Introduction to GPRS. Introduction to RFID, Zigbee, Bluetooth and Wi-Fi (Comparison based on range, data rate, frequency, Power).

Recommended Books:
1.   Communication Electronics : Principles and Applications. L.E.Frenzel 3rd Edition.
2.   Modern Electronic Communication.   G.M. Miller 7th Edition.
3.   Mobile Communication Jochen Schiller 2nd Edition.
4.   Wireless Communications: Principles and Practice. Rappaport
5.   Wireless Communications and Networks. William Stallings

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Paper- III: Practical Course (ELC-203)

Objectives:

1. To use basic concepts for building various applications in electronics.
2. To understand design procedures of different electronic circuits as per requirement.
3. To build experimental setup and test the circuits.
4. To develop skills of analyzing test results of given experiments.

- Total Practical to be conducted 20.

- 16 experiments compulsory: At least four practical from each of the A B C D groups.

- One activity equivalent to 2 experiments by the student.

    a. Continuation of F. Y. activity.

    b. Electronics project

    c. Documentation type experiments

    d. Presentation/Seminar on Electronics /advanced topic/research topics.

- One activity equivalent to 2 experiments to be arranged by the teacher – Arrange atleast two practical demonstrations / Workshops /Industrial visit which will enhance quality and skills of the student.

- Examination will be conducted on 16 experiments as well as on activities.

Practical Examination –

A) Internal Marks 20: 16 marks for experiments and 04 marks for activities

B) Annual examination: 80 Marks **in Two sessions of 3 Hrs each as usual practice.**

Session I- 40 marks: Practical work 32 marks , Oral based on the student's own activities 8 marks

Session II -40 marks: Practical work 32 marks, Oral based on common activities arranged by teachers 8 marks

32 Marks can be divided as -Circuit diagram / flowchart and algorithm   10

Connection / program	05
Demonstration and working explanation	10
Results	05
Result analysis / conclusion / comments	02

Group A: List of Practicals (Digital System Hardware): Any Four

1. Build and test code converter using logic gates – binary to gray , gray to binary .
2. Build and test Decimal to BCD encoder using logic gates.
3. Build and test 3 bit synchronous counter using JK flip flops.
4. Build and test 4 bit sequence generator for counting sequence 0,2,4, 6, 8, 1, 3, 5, 7, 9, 0
5. Study of read and write action of RAM (using IC 2112/4 or equivalent).
6. Serial communication using RS 232 and ZigBee

Group B: List of Practicals (Analog Systems): Any Four

1. LM-35 based temperature sensing system/Optocoupler /opto-isolator based system.
2. Low Pass Filter and High Pass Filter using IC-741 Op Amp.
3. Build and test DAC using R-2R Ladder network.
4. Flash ADC using discrete components.
5. Build and test LDR based light control system.
6. Study of Linear Variable Differential Transformer.
7. Build and test Instrumentation Amplifier.

Group C :List of Practicals (Microcontroller): Any Four

1. Arithmetic, logical & code conversion problems using assembly/C programming
2. Interfacing the thumbwheel & seven segment display.
3. Traffic light controller using microcontroller.
4. Interfacing LCD to Microcontroller.
5. Waveform generation using DAC Interface.
6. Event counters using opto- coupler using seven segment display / LCD.
7. Speed Controller of stepper motor using microcontroller.

Group D: List of Practicals (Principles of Communication): Any Four

List of Practicals (Principles of Communication): Any Four

1. Build and test Amplitude Modulator and Demodulator.
2. Build and test Time Division Multiplexing circuit.
3. Build and test Frequency Shift Keying.
4. Build and test Delta Modulation circuit using IC.
5. Build and test Pulse Amplitude Modulation.
6. Study of radiation pattern of antenna.
7. Build and test Hamming Code generator and detector circuit.

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