Deccan Education Society's
Fergusson College (Autonomous), Pune

Syllabus under Autonomy for

S.Y.B.Sc. (Electronics) for B.Sc. Computer Science Students

From academic year 2017-18

Particulars	Name of Paper	Paper Code	Title of Paper	Type of Paper	No. of Credits
S.Y. B.Sc. Semester III	Theory Paper - 1	ELC2301	Computer Instrumentation	CORE-1	3
	Theory Paper - 2	ELC2302	Computer Organization	CORE- 2	3
	Practical Paper - 1	ELC2303	Electronics Practical -III	PCORE-1	2
S.Y. B.Sc. Semester IV	Theory Paper - 3	ELC2401	Electronic Communication	CORE-3	3
	Theory Paper - 4	ELC2402	Advanced Microcontroller	CORE-4	3
	Practical Paper - 2	ELC2403	Electronics Practical-IV	PCORE-2	2

S.Y. B.Sc. (Computer Science) Semester III
Electronics Paper -1 (ELC2301): Computer Instrumentation

[Credits-3]

Objectives:

1) To study different types of sensors.

 2) To study different types of signal conditioning circuits.

 3) To study data conversion techniques.

 4) To learn use of sensors in different electronic systems

Unit-I	**Sensors:** Definition of sensors and transducers. Classification of sensors: Active and passive sensors. Specifications of sensor: Accuracy, range, linearity, sensitivity, resolution, reproducibility. Temperature sensors (LM-35 and AD590), piezoelectric humidity sensor, optical sensor (LDR), displacement sensor (LVDT), Passive Infrared sensor (PIR), touch sensor, ultrasonic sensor	**14**
Unit-II	**Signal Conditioning:** Introduction to signal conditioning, Transistor amplifier, Operational Amplifier (Characteristics of Op-Amp, Inverting and Non inverting amplifier, Concept of virtual ground), Three OP-amp instrumentation amplifier, Filters: active and passive filters, Op-Amp based filters (Low Pass Filter, High Pass Filter), Band Pass Filter, Band reject filter, Notch Filter	**14**
Unit-III	**Data Converters:** Digital to Analog Converter (DAC): Resistive divider, R-2R ladder, Parameters: Linearity, resolution, accuracy, Analog to Digital Converter: Types of ADC (Flash, Successive approximation, dual slope), Parameters of ADC (Linearity, resolution, conversion time, accuracy) ADC/DAC IC's ADuC 814, IC 0808.	**12**
Unit-IV	**Electronics Systems:** 1. ECG monitoring 2. Liquid level monitoring 3. Vehicle parking system using Ultrasonic sensor 4. Security System 5. Temperature Measurement Systems	**8**

References: 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.

S.Y. B.Sc. (Computer Science) Semester III

Electronics Paper -2 (ELC2302): Computer Organization

[Credits-3]

Objectives:
1. To get familiar with computer organization
2. To study the Intel processor architecture.
3. To study the assembly language programming.

Unit-I	**Memory and Input-Output Organization:** Types of memory, Memory hierarchy in Computer system, Cache mapping techniques, Virtual Memory, Paging and Segmentation. I/O Organization: Input / Output interface, I/O mapped I/O, Memory mapped I/O, Modes of data transfer(Programmed I/O, Interrupt initiated I/O, Direct memory access),	**14**
Unit-II	**Processor Architecture:** Overview of INTEL family of processor, Pentium processor Architecture, Registers, Hardware and software interrupts, Interrupt priority, Interrupt Vector table, Interrupt processing	**12**
Unit-III	**Assembly Language Programming:** Addressing Modes, Instruction set of Pentium Processor (Data transfer, Arithmetic and logical, String, Loop and Jump, String, Processor control, Subroutine, Interrupt), Assembler directives, DOS INT 21H interrupts, Assembly language programs.	**15**
Unit-IV	**Mother Board:** Study of mother board(CPU Socket, Chip set, different slots, Serial connector, parallel connector,) Motherboard Components(Real Time Clock, ROM BIOS, CMOS RAM, CMOS & RTC Battery, PCI slot, AGP), Power supply, Connectors.	**7**
References: 1. Computer System Architecture by Morris Mano Prentice-Hall of India 2. The Pentium Microprocessor by James L. Antonakos Pearson Educaion		

S.Y. B.Sc. (Computer Science) Semester III

Electronics Paper -3 (ELC2303): Electronics Practical-III

[Credits-2]

List of practical

1.	Study of temperature sensor LM 35/AD 590
2.	Designing Temperature controller
3.	Instrumentation Amplifier using OP-AMP
4.	3 bit Flash ADC
5.	R-2R ladder DAC
6.	Filters (low pass and high pass)
7.	Read write action of RAM
8.	Diode matrix ROM
9.	Assembly language programming
10.	Assembly language program to Interface 7 segment display
11.	Assembly language program to Interface Thumbwheel switch
12.	Assembly language program to Interface Stepper motor
13.	Assembly language program to Interface Temperature sensor
14.	Study of mother board

Any ten experiments from above list of experiments

S.Y. B.Sc. (Computer Science) Semester IV

Electronics Paper -1 (ELC2401): Electronic Communication

[Credits-3]

Objectives:
1. To study modulation and demodulation techniques.
2. To understand multiplexing and multiple access technique.
3. To understand Wireless communication techniques

Unit-I	**Basics of communication** Types of Communication(Wired and wireless, Base band and Modulated signal communication), Electromagnetic spectrum, Signal bandwidth, Channel bandwidth, Data rate, Baud rate, Nyquist theorem, Shannon theorem.	**10**
Unit-II	**Modulation and Demodulation** Introduction to modulation and demodulation. Amplitude, Phase and Frequency modulation, Circuit diagram and working of transistorized amplitude modulator and diode demodulator, modulation index. Concept of ASK, FSK, BPSK, QPSK and block diagram of MODEM using FSK.	**14**
Unit-III	**Multiplexing and Multiple access technique:** 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 (FDMA , TDMA , CDMA).	**14**
Unit -IV	**Wireless Communication system** 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, comparison of 3G,4G,5G...., GSM, Hand over, GPRS, RFID, Zigbee, Bluetooth and Wi-Fi (Comparison based on range, data rate, frequency, Power).	**10**
References: 1. Communication - Frenzel 2. Modern Electronic Communication G.M. Miller 7th Edition 3. Mobile Communication Jochen Schiller 4. Wireless Communications and Networks William Stallings		

References:
1. Communication - Frenzel
2. Modern Electronic Communication   G.M. Miller 7th Edition
3. Mobile Communication Jochen Schiller
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S.Y. B.Sc.(Computer Science) Semester IV

Electronics Paper -2 (ELC2402): Advanced Microcontroller
[Credits-3]

Objectives:

1. To get familiar with ARM series microcontrollers
2. To study architecture of ARM-7 microcontroller.
3. To study programming for ARM 7.
4. To learn applications of ARM 7.

Unit-I	**ARM Processor Fundamentals** Introduction to 16 and 32-bit Processors, Comparison of RISC & CSIC, Comparison of Von-Neumann and Harvard Architecture, The ARM programmer's model: Registers, Current program status register Pipeline, Exception, Interrupts and the vector Table, Core Extensions, Introduction to LPC214X, Features, Applications, Architecture overview, ARM7TDMI processor, On-chip flash memory, On-chip static RAM, Memory map, Pin description, Pin connect block, LPC 214X GPIO-IODIR, IOSET, IOCLR, IOPIN, LPC214X DAC, LPC214X ADC.	**10**
Unit-II	**ARM-7 Instruction set** Introduction of instruction set, Thumb Instruction Set: Thumb Register usage, ARM-Thumb Interworking, Other Branch instructions, Data Processing Instructions, Single Register Load-Store Instructions, Multiple Register Load-store Instructions, Stack Instructions, Software Interrupt Instruction	**15**
Unit-III	**Embedded C Programming tools** Overview of embedded C compilers and Optimization embedded C features, data types, looping Structures, Register Allocation, Function calls, use of Pointers. Introduction to C complier for LPC214X, and development tools.	**12**
Unit-IV	**Embedded C Programming** Embedded C programs to interface: LED, 7 segment display, LCD, Thumb-wheel switch, relay, stepper motor. Internal module programming: DAC, ADC.	**11**

References:
1. ARM System Developers Guide-Designing and Optimizing System Software book by Andrew N. Sloss, Dominic Symes, Chris Wright.
2. Co-Verification of Hardware and Software for ARM SoC Design, by Jason Andrews.
3. ARM System On Chip Architecture, by Steve Furber.
4. The insider"s guide to the Philips ARM7 based Microcontrollers, An Engineer Introduction LPC2100 Series, Trevor Martin, Hitex ltd.
5. LPC 214x User Manual.

S.Y. B.Sc. (Computer Science) Semester IV
Electronics Paper -3 (ELC2403): Electronics Practical-IV
[Credits-2]

List of practical

1.	Study of Amplitude Modulation and Demodulation
2.	Study of Frequency Modulation and Demodulation
3.	Study of Time Division Multiplexing
4.	Study of Frequency Shift Keying
5.	Wireless Communication using Zigbee
6.	LED interfacing to LPC2148(ARM 7)
7.	Interfacing LCD to ARM 7
8.	Programming in embedded C to interface Switch
9.	DAC module Programming
10.	Programming in embedded C to interface Stepper motor
11.	Programming in embedded C to interface 7 Segment display
12.	Programming in embedded C to interface sensor

Any eight experiments from above list and Hobby project/ Poster/ Any other activity (equivalent to 2 experiments)