

S.Y.B.Sc. Computer Science: Electronics**Revised Syllabus****To be implemented from June 2009.**

1) Title of the course: Second Year B.Sc. Computer Science : Electronics

2) Introduction :

The syllabus at S.Y.B.Sc.(Computer Science) contains proper blend of core theoretical concepts of Microprocessor Architecture and assembly language programming , with introduction to microcontrollers , principles of communication systems and applications in the fields like embedded systems and digital signal processing. Semester Pattern is followed at S.Y.B.Sc. Electronic Science. Student taking admission to S.Y.B.Sc.(Computer Science) have to complete 4 theory courses two each semester and one practical course (Annual) in subject Electronics. In the theory courses adequate knowledge of Microprocessor Architecture and Programming, Communications Principles, 8051 Microcontroller and embedded systems and Digital Signal Processing. In the practical course of 100 marks there are compulsory experiments along with the activities to be done. There are two types of activities – One by the student by his own area of interest and other to be organised by the teacher such that it will enhance the practical quality skills of the students.

3) Aims and Objectives :

The aim of the course is to generate the manpower with adequate theory knowledge of the Microprocessor and microcontroller, Assembly Language, communication principles, embedded system and Digital signal processing. The advanced topics like Digital Signal Processing and 8051 Microcontroller along with embedded system will open doors for the students to work in recent modern development environment of electronics in the world.

Following are the objectives –

- i) To design the syllabus with specific focus on key Learning Areas.
- ii) To equip student with necessary fundamental concepts and knowledge base.
- iii) To develop specific practical skills.
- iv) To develop specialists in hardware-software co-design for application specific electronic system.
- v) To prepare students for demonstrating the acquired knowledge.
- vi) To encourage student to develop skills for accepting challenges of upcoming technological advancements.

These objectives can be achieved by implementing this syllabus at the second year B.Sc. Computer Science in the subject Electronics.

4) Eligibility: First Year B.Sc. Computer Science Pass / ATKT .

5) Examination –

A) Pattern of Examination :

i) Semester and Practical

Theory Papers - Two Theory papers of 50 marks per semester
(Internal examination 10 +
Semester Examination 40, Total 50)

Practical - At the end of year 100 marks Examination.
(Internal examination 20 +
Semester Examination 80, Total 100)

ii) Pattern of the question Paper:

The pattern adopted for theory and practical examination is as below.

Theory: The topic wise weightage is decided as per lecture allotted to cover the syllabus for the topics. The Internal option is also taken into consideration in the process. Equal weightage is given for each topic, and none of the topic can be put up as option by the student for examination.

Internal Examination 10 Marks

Four types of questions – Objective, Fill in the blanks, True or False and One sentence answer.

There are two or three different sets of the question papers used for internal examination in the same class for same paper.

It is continues evaluation process and is executed by the teacher conducting the course.

External Examination 40 Marks

Pattern is as follows-

Q.1 Answer any all of the following : 10 marks

Compulsory no internal option , contains one mark.

Q.2 Answer any TWO. : 10 marks

Three questions are given, each having 5 marks, any two are to be solved.

Q.3 Answer any TWO. : 10 marks

Three questions are given, each having 5 marks, any two are to be solved.

Q.4 Answer any ONE. : 10 marks

Two questions are given solve any one is to be solved for 10 marks.

OR

Split the 10 mark question with proper weightage for the topics

Practical : Internal Marks 20 : Continuous assessment

External Examination 80 Marks. –

Have to perform 2 experiments of 40 marks of the duration 3 hours each. (Practical Examination is scheduled in two sessions.)

B) Standard of passing: Candidate must score 40% marks at the semester examination in each course.

i.e. 16 marks at semester theory paper

32 marks at the practical course

There is no separate passing for internal course , however the total marks of internal and external should cross 40% of the total marks to be awarded for the paper.

- C) ATKT Rules:** As per University statutes
- D) Award of Class:** It will as per University rules as –
 Above 70% First class with distinction
 Between 60% to 70% First Class
 Between 50% to 60% Second Class
 From 40% to 50 % Pass class.
- E) External Students:** Not applicable for this course. External Students are not admitted for the course.
- F) Setting of Questions paper/ Pattern of Question paper:**
 Setting of the question paper is as per University Schedule and it is centralized system adopted by University of Pune. Pattern of question paper will be as per decided by Board of Electronic Science, University of Pune.
- G) Verification of Revaluation:** As per University Statues and rules for verification and revaluation of marks in stipulated time after declaration of the semester examination result.

6) Structure of the course :

i)

- a) **Compulsory Paper** : Four theory papers
- b) **Optional Paper** : Nil
- c) **Question paper** : **Theory -**
For Internal Examination 10 Marks
For Semester Examination 40 Marks
- Practical**
For Internal Examination 20 Marks
For Semester Examination 80 Marks

ii) **Medium and Instructions: ENGLISH**

7) Equivalence subject/Paper and Transitory Provision:

Semester	OLD Syllabus	New Syllabus
Semester I	ELC 211 Computer Organisation	Microprocessor Architecture And Programming
	ELC 212 Process Control Instrumentation	Communications Principles
Semester II	ELC 221 Microprocessors	8051 Microcontroller and Embedded systems
	ELC 222 Communication Principles	Digital Signal Processing

- 8) University Terms: More than 75% attendance is necessary for the course as per University statutes.**
16 Weeks will be available for completion of theory course.
Practical course will be throughout the year.
- 9) Subject wise Detail Syllabus and Recommended books:**

S.Y.B.Sc. Computer Science Semester I

Electronics: Paper- I MICROPROCESSOR ARCITECTURE AND PROGRAMMING

- 1) Computer Organization** [12]
 CPU organisation: Different registers organisation
 Memory organisation: cache mapping, memory management (Segmentation, paging), memory mapping.
 I / O organisation: I / O interface, DMA concept, Serial bus interface (RS 232, USB), Parallel port, PCI bus, PCMCIA bus
- 2) Introduction to microprocessor** [8]
 Features of Pentium based microprocessors (Data bus, Address bus, Speed, Addressable memory capacity, cache memory, Number of instructions executed parallely)
 Pentium microprocessor architecture
 General purpose, Special purpose Registers of Pentium microprocessor
 Real mode and protected mode addressing
- 3) Pentium Processor** [12]
 Pentium addressing mode
 Instruction set of Pentium
 Interrupt processing in Pentium: classification of interrupt, Interrupt handler, Interrupt vector table, multiple interrupt processing, DOS INT 21H, Interrupt function codes
- 4) Assembly programming** [16]
 Introduction to assembler (NASM), Assembly directives, introduction to Programming (Flow chart, Algorithm, program), Assembly programmes of Addition, subtraction, multiplication, division, code conversion, Array processing (Finding largest-smallest number, arranging elements in ascending – descending order), I/O related programming (Reading of key from keyboard, displaying string, displaying graphic character), software device driver.

Recommended Books:

1	Morris Mano	Computer System Architecture(3 rd Edition)	PHP
2	Berry B. Brey & C.R. Sarms	The Intel Microprocessors	Pearson Education
3	James Antonakos	Pentium Microprocessors	Pearson Education
4	Michel Meyers	Managing and troubleshooting PC	
5	William Stalling	Computer Organisation and Architecture (2002)	PHI
6	Ron White	How computer Works(4 th Edition)	Techmedia Publication
7	Scott Mueller	Upgrading and repairing PC's (10 th Edition)	
8	Stephen J. Bigelow	Troubleshooting, Maintaining and repairing PC's (5 th Edition)	TMH
9	Peter Abel	Assembly Language Programing	PHP

S.Y.B.Sc. Computer Science Semester I
Electronics: Paper- II **Communications Principles**

1. Introduction to Electronic Communication [10]

Importance of Communication, Elements of Communication system, Electromagnetic spectrum, types of communication, Concepts of communication system: channel bandwidth, Nyquist theorem, S/N ratio, channel capacity, error handling, Shannon theorem, companding, Data rate, baud rate ,serial communication and protocol.

2. Modulation and Demodulation [10]

Basics of modulation and Demodulation Introduction to Modulation techniques: Analog (Amplitude, Phase, Frequency modulation), Digital modulation, PAM, PCM, delta modulation, MODEM - concept of ASK, FSK, QPSK, MSK, GMSK, 16 QAM

3. Multiplexing and Multiple Access Techniques [10]

Space division multiplexing ,Time division multiplexing , Frequency Division Multiplexing , Code division multiplexing , Introduction to multiple access ,FDMA ,TDMA , Spread spectrum multiple access : Frequency Hopped Multiple access , CDMA, Hybrid spread spectrum techniques , SDMA.

4. Introduction to wireless Communication [08]

Introduction to antennas, Parameters of antenna, multielement antennas (arrays), multidirectional and omni directional antenna, microstrip antenna ,Concept of wireless communication

Comparison of wired and wireless communication, Wireless communication architecture, Ad-hoc networks, Protocols – listing and details of RFID.

5. Mobile communication [10]

Introduction to mobile communication, Cellular concept, Working of GSM: Hand over, RTS-CTS protocol, Introduction to GPRS, IR transmission, blue tooth

Applications: SMS , EMS ,MMS

Recommended Books:

1	Micheal A . Miller	Digital and Data Communication ,4 th edition	Jaico Pub. House
2	Thiagarajan Vishwanathan	Telecommunication switching system and networks	PTH
3	Frenezel Louis E.	Communication Electronics	TMH
4	Rappaport	Wireless Communication, 2 nd edition	PHI
5	Schiller Jochen	Mobile Communication	Pearson
6	Stern and Mahmoud	Communication systems : analysis and design	Pearson
7	Yi-Bang LIN	Wireless & Mobile Network Architectures	Wiley India
8	Imrich Chal amtac	Wireless Communication Technology	Roy Blake

S. Y. B. Sc. Computer Science Semester II

Electronics : Paper- I 8051 Microcontroller and Embedded systems

1. **8051 microcontroller block diagram,** (12)
(Registers, Flags, PSW, PC, Input/Output Pins, Ports, Internal memory, External memory Oscillator & Clock, counters and Timers, Serial Data IO Transfer, Interrupts)

Instruction set (To be covered quickly with no questions directed to wards syntax of Instructions)
2. **I/O port programming: sensor and indicators interface** (06)
8051 I/O programming, I/O bit manipulation programming.
3. **Timer and counter programming** (06)
Programming 8051 timers, counter programming, programming timers 0 and 1 in 8051 C.
4. **Serial port programming with and without interrupt** (06)
8051 interrupts, programming timer interrupts, programming external hardware interrupts, o/programming the serial communication interrupt, interrupt priority in the 8051
5. **Real world interfacing:** (06)
Parallel and serial ADC, DAC interfacing, LCD interfacing
6. **Embedded systems:** (12)
Definition, examples, classification – w.r.t. size and real time requirements, software tools required for development – cross assemblers, cross compilers, locators, loaders, simulators, emulators

Recommended Books:

1	Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. Mckinlay	“The 8051 microcontroller and Embedded systems using Assembly and C”, Second Edition	Pearson
2	KENNETH AYALA, DELMAR CENGAGE FEARNING	“The 8051 Microcontroller Architecture ,Programming & Applications” , Third Edition	TMH
3	Michael Barr and Anthony Massa	“Programming Embedded systems with 'C' and GNU development tools” Second Edition	Shroff Publishers
4	Myke Predko	Programming and customizing the 8051 microcontroller	TMH
5	RajKamal	Embedded systems Architecture, Programming and Design	TMH

S. Y. B. Sc. Computer Science Semester II

Electronics : Paper- II Digital Signal Processing**1: Electronic Signals and Systems (12)**

Basics: Concept of signal and signal processing, Block diagram representation of a DSP system Analog to Digital conversion of signals classification of signals, concept of sampling of CT signals, presentation of DT signal .

Fourier Transform: Fourier Transform, Concept of Amplitude and phase spectrum of CT signals, Discrete Time Signals, Discrete Fourier Transform, Inverse DFT, Fast Fourier Transform.

Concept of convolution and co-relation

Concept of transfer function of DT system, Impulse response, Time and frequency domain analysis of DT system using transfer function, concept of realization of transfer function.

2: Time and Frequency Domain analysis of DT signals (12)

Laplace Transform: Definition, Inverse Laplace transform, Properties of LT, Applications in t-domain, s-domain signal analysis.

Z-transform: Definition, Inverse Z-transform, difference equation and its solution

Digital Filters: Concept, Impulse Invariant and BLT method for designing of DT filters, IIR and FIR filters, brief introduction of window technique for DT filters

3: Digital Signal Processor (12)

Digital signal processor Architecture, Multiplier and Accumulators, ALU and Barrel shifter, Memory and Cache, Registers, Buses, peripheral interfaces.

4: Applications of DSP: (12)

Practical A/D and D/A converters : Important parameters .

Audio signal processing in detail, summary of the DSP applications for the - Filtering, Modulation, demodulation, Motion control and positioning, seismography, Radar, Sonar, noise reduction and echo cancellation, speech recognition, interference rejection, image processing.

Recommended Books:

1	S. Salivahan, A. Valuraj, C.Gnanapriya	Digital Signal Processing , 2006 Edition	TMH
2	Charles Schuller, Mahesh Chugani	Digital Signal Processing: A Hands on Approach , 2006 Edition	TMH
3	John G Proakis, Dimitris G Monolkis	Digital Signal Processing: - Principles, Algorithms and Applications	Pearson
4	Steven W.Smith, Newnes	Digital Signal Processing- A practical Guide for Engineers and Scientists	Elsevier
5	Palan N.G.	Computer Algorithms in Signal Processing	Technova
6	Haykin Simon , Veenan Barry	Signals and Sysytems	John Wiley
7	Bhat P.V.	Network Analysis and Synthesis	Technova
8	John Prokis	DSP using MATLAB	Pearson

LIST OF PRACTICALS :

Group “A” Microprocessor based experiments:

1. Interfacing of keyboard and comparing two strings. (One string is in the program and other string read from keyboard.)
2. Read the strings through the keyboard. Arranging strings in ascending and descending order.
3. Code conversion (Decimal to hex, hex to decimal, decimal to binary, binary to decimal by hex dabble and double dabble method.)
4. Finding largest and smallest of a number in an array.
5. Finding roots of quadratic equation and finding factorial of a number.
6. Define cursor position and display character string using different font size and colour.
7. Read and display printer status.
8. Interfacing seven-segment display through parallel port of Pentium motherboard.
9. Interfacing stepper motor to parallel port of Pentium motherboard.

Requirement for Microprocessor based experiments:

1. NASMW/ NASM 32
2. NASM IDE

Group “B” Micro controller based Experiments:

1. Arithmetic and logical problems – String addition, Largest/Smallest number in string, hex to decimal conversion and vice versa.
2. Frequency generation using 8051 micro controller.
3. To design and test rolling display using 8051 micro controller.
4. To design and test traffic light control system using 8051 micro controller.
5. To design and test thumb wheel switch and SSD 8051 interfacing with microcontroller.
6. Interfacing D.C. motor and speed control using PWM.
7. To study waveform generator (square, triangular and saw tooth using DAC) with microcontroller.
8. Write a program for interfacing LCD with microcontroller.
9. Write a program to generate even/odd parity and check the parity of a number.

Requirement for Micro controller based Experiments:

1. IDE 8051 (Assembler)
2. ISP programmer
3. 89S51/52
4. Target board (PCB).

Group “C” Communication

1. Build and test FSK Modulation / Demodulation.
2. Build and test TDM.
3. Build and test Hamming code for error detection and correction.
4. Study of PN sequence generator for Spread Spectrum communication.
5. Study of Radiation pattern of an antenna.
6. Demonstration of working of Wi-fi card.
7. Demonstration Experiment on RFID application.

Group “D” Digital Signal Processing

- 1) Study of Fourier Analysis of Different Wave shapes.
 - 2) Synthesis of Waveforms using multiple sine waves.
 - 3) Study of Sampling theorem, Aliasing and it's effect.
 - 4) Study of transfer function and convolution principles.
 - 5) Study of FIR and IIR Digital filters.
 - 6) Study of windowing techniques for filters.
 - 7) Study of AM modulation and demodulation.
 - 8) Study of FSK and ASK modulation and demodulation.
 - 9) Demonstration experiment on image processing and compression.
 - 10) Demonstration experiment on sound processing and compression.
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