Faculty of Science and Technology

Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon

'A' Grade
NAAC Re-Accredited
(3rd Cycle)

Syllabus

For

S. Y. B.Sc. (Electronics)

(*As per Choice Based Credit System*)

(With effect from June - 2019)

Preamble

The University Grants Commission (UGC) has initiated several measures to bring distinction, quality and uniformity in the Higher Education System of the country. The important measures taken to enhance academic standards include enhancements in curriculum, teaching-learning process and examination and evaluation systems. In view of this, North Maharashtra University, Jalgaon has taken several initiatives to upgrade and improve the academic excellence, examination reforms for overall development of the students. As per the expectations of UGC, North Maharashtra University, Jalgaon is going to implement the Choice Based Credit (CBCS) pattern to undergraduate program. As per the initiatives led by the Honorable Vice Chancellor, Pro-Vice Chancellor and Dean of the Faculty of Science and Technology and academic bodies of our university, one day workshop was organized for syllabus framing. Participants in the workshop cooperated with their constructive minds of re-structuring the syllabi of S.Y.B.Sc. (Electronics) as per the CBCS pattern and it has been finalized during the workshop and the same will be effectively implemented from the academic year 2019-20. The main objective of reforming the syllabi of S.Y.B.Sc. (Electronics) is to create man power that can cater the present needs of the society with perfect understanding of Communication Electronics, microprocessors and microcontrollers and complete skill to serve the industry and the country. It is expected that the students studying this course will apply their practical minds to solve real life problems of the society to serve the mankind.

Board of Studies (Electronics and Instrumentation),
KBC North Maharashtra University, Jalgaon.

Objectives:

1. To develop ability of students to apply concepts of Electronics to real life problems.
2. To prepare the students for successful career in industry and motivate them for higher education.
3. To provide exposure to the students for analyzing electronics problems.
4. To provide knowledge on analog and digital communication and their applications for the society.
5. To provide necessary foundation on microprocessors and microcontrollers.
6. To develop observational skills and confidence in using microprocessors and microcontrollers and relate the knowledge of practical concepts for the development of the society.
7. To apply the concepts of Electronics at an advanced level in everyday life of people and appreciate its role to analyze the emerging problems from a societal perspective.

KBC North Maharashtra University, Jalgaon

Class: **S. Y. B. Sc.**

Subject: **Electronics**

Choice Base Credit System (With effect from June 2019)

The Board of Studies in Electronics in its meeting has unanimously accepted the revised syllabus (as per CBCS pattern) prepared by different committees, discussed and finalized in workshop for S.Y.B.Sc. Syllabi revision. The titles of the papers for S.Y.B.Sc. (Electronics) are as given below:

Semester	Course as per UGC Guidelines	Core Course		No. of Credits	Clock Hour/ Semester	Marks	
		Course Code	Course Title			Int.	Ext.
III	**Electronics-DSC 2C:** Analog Communication and Microprocessors (Credits: Theory-04, Practicals-02) ELECTRONICS LAB	ELE-301	Analog Communication	2	30	40	60
		ELE-302	Microprocessors and Applications	2	30	40	60
		ELE-303	ELECTRONICS LAB -III	2	60	40	60
	Skill based course I	ELE-304	Electrical Circuits and Network Skills	2	30	40	60
		Course Code	Course Title	No. of Credits	Clock Hour/ Semester	Marks	
						Int.	Int.
IV	**Electronics-DSC 2D:** Digital Communication and Microcontrollers (Credits: Theory-04, Practicals-02) ELECTRONICS LAB	ELE-401	Digital Communication	2	30	40	60
		ELE-402	Microcontrollers and Applications	2	30	40	60
		ELE-403	ELECTRONICS LAB -IV	2	60	40	60
	Skill based course II	ELE-404	Computational Techniques in Electronics	2	30	40	60

KBC North Maharashtra University, Jalgaon

Syllabus of S. Y. B. Sc. (Electronics)

(Choice Based Credit System)

Semester III

ELECTRONICS-DSC 1 A: ANALOG COMMUNICATION and MICROPROCESSORS

Theory: 60 clock hours

(Credits: Theory-04, Practicals-02, Skill based-02)

Course description:

This course is aimed to provide exposure of analog communications, microprocessors and electrical circuits and networks to students and make them analyze practical circuits of modulation and use of 8085 microprocessor.

Course objectives:

1. To impart knowledge of analog communication.
2. To provide the knowledge and methodology necessary for building modulation circuits.
3. To provide exposure of 8085 microprocessor.
4. To have practical exposure of microprocessor and their applications.
5. To analyse various modulation techniques and explore their potential in consumer electronics.

Course outcome:

Learner will be able to ….

1. Apply knowledge to develop circuits of analog modulation and demodulation.
2. Apply the concept and knowledge of microprocessors to real life problems.
3. Analyse modulation circuits and understand the behaviour of the systems.
4. Understand and analyse 8085 microprocessor and its programming.
5. Review, prepare and present technological developments.

ELE-301: Analog Communication (30 clock hour)

Unit 1: Basics of Electronic communication:

Importance of Electronic communication, Types of Signals-Analog signal, Digital signal & base band signal (Definition only), Block diagram of an electronic communication system. Types of electronic communications-Simplex, half and full duplex, Brief idea of frequency allocation for radio communication system in India (TRAI). Electromagnetic communication spectrum, band designations and usage, Concept of Noise, signal-to-noise(S/N) ratio. **(6 Hour, 12 Marks)**

Unit-2 Amplitude Modulation:

Basics of modulation, Need of modulation, Types: Amplitude Modulation (AM), Angle modulation (Frequency and Pulse Modulation), Amplitude Modulation: Mathematical representation of AM wave and its meaning, Modulation index, frequency spectrum, power relations, Concept of side bands(DSB-SC, SSB-TC, SSB-SC,VSB) modulation, Transistorized AM Modulator(Emitter modulator), Advantages, disadvantages and applications of AM, Block diagram of AM Transmitter and its operation, AM Super heterodyne receiver- Block diagram and it's working with waveforms, Demodulation-AM Diode detector. **(10 Hour, 20 Marks)**

Unit 3: Angle Modulation:

Basic concept of angle modulation, Frequency Modulation (FM)-modulation index and frequency spectrum, equivalence between FM and PM, Comparison of AM and FM, Advantages, disadvantages and applications of FM, Generation of FM using VCO, FM detector (Ratio detector). **(8 Hour, 16 Marks)**

Unit 4: Analog Pulse Modulation:

Introduction, Need and Advantages of pulse Modulation, Basic Principles of PAM, PWM and PPM modulation, Multiplexing: introduction of FDM and TDM.

(6 Hour, 12 Marks)

Reference Books:

- Electronic Communications, D. Roddy and J. Coolen, Pearson Education, India.
- Advanced Electronics Communication Systems- Tomasi, 6th edition, Prentice Hall.
- Modern Digital and Analog Communication Systems, B.P. Lathi, 4th Edition, 2011, Oxford University Press.
- Electronic Communication systems, G. Kennedy, 3rd Edn., 1999, Tata McGrawHill.
- Principles of Electronic communication systems – Frenzel, 3rd edition, McGrawHill
- Communication Systems, S. Haykin, 2006, Wiley India
- Electronic Communication system, Blake, Cengage, 5thedition.
- Wireless communications, Andrea Goldsmith, 2015, Cambridge University Press

ELE-302: Microprocessors and Applications (30 clock hour)

Unit 1: Fundamentals of Microcomputer

Simple Microcomputer Architecture, Input/output Devices, Address bus, Data bus, Control bus, Data storage (idea of RAM and ROM). Computer memory, Memory Interfacing, Memory Map. High level language, Low level language, Assembler, Compiler. **(4 Hour, 8 Marks)**

Unit 2: Architecture of 8085 Microprocessor.

Features of 8085, Block diagram, function of each block, Registers, ALU, Stack memory, Stack Pointer, Program counter, Concept of Interrupt, Hardware interrupts. Pin-out diagram of 8085, function of each pin, Data and address buses, De-multiplexing the Bus AD7-AD0, Timing states (T-state), Machine Cycle, Instruction cycle. Timing diagram for Read and write operation (MOV A,M and MOV M,A) **(8 Hour, 16 Marks)**

Unit 3: Instruction set of 8085 Microprocessor.

Study of addressing mode for 8085:-Implied Addressing, Register Addressing, Immediate Addressing, Direct Addressing, Register Indirect Addressing, Instruction set: Data transfer instructions, Arithmetic Instructions, Logical Instructions, Branching Instructions, Stack, I/O and Machine Control Instructions. **(8 Hour, 16 Marks)**

Unit 4: Assembly Language Programming.

Assembly Language Format, Arithmetic Programs: - 8-bit addition, 8-bit subtraction, Decimal addition and subtraction of two 8-bit numbers, 8-multiplication, one's and two's complement of 16-bit numbers, find largest and smallest Number from a series of given number.

Code Conversion Programs: Hex to ASCII conversion, BCD to binary conversion.

(6 Hour, 12 Marks)

Unit 5: Microprocessor and Interfacing Applications

Intel 8255 pin diagram, block diagram, Control word format, modes of operation, Bit Set/Reset mode , DAC (IC 1408) and ADC (IC 0801) and their Interfacing with 8085.

(4 hour, 8 Marks)

Reference Books:

- Hall D.V.,"Microprocessor and Interfacing-Porgramming and Hardware" 2nd Ed., Tata McGraw-Hill Publishing Company Limited, 2008
- Gaonkar R.S., ''Microprocessor Architecture, Programming and Applications", 5th Ed., Penram International,2007.
- 8080A/8085 Assembly Language Programming by Lance A. Leventhal

ELECTRONICS LAB: DSC 1A LAB: ANALOG COMMUNICATION and MICROPROCESSORS Lab (60 clock hour)

ELE-303: ELECTRONICS LAB-III

(Student should perform at least 4 experiments from section A using Kits and 5 from section B)

Section A: Analog Communication

1. To build and test an Amplitude Modulator using transistor
2. To build and test diode detector for demodulation of AM signal
3. To study FM generator and detector circuit
4. To study AM transmitter and receiver
5. To study FM transmitter and receiver
6. To study TDM
7. To study FDM

Section B: Microprocessors

1. Assembly Language Program for addition/subtraction of two 8-bit numbers using direct addressing mode.
2. Assembly Language Program for addition/subtraction of numbers using indirect addressing mode.
3. Assembly Language Program to multiply 8-bit unsigned number by 8-bit unsigned number using repeated addition.
4. Assembly Language Program to divide 8-bit unsigned number by 8-bit unsigned number using repeated subtraction.
5. Assembly Language Program to add two 16-bit Numbers.
6. Assembly Language Program to calculate the sum of the series of number using subroutine.
7. Assembly language program to transfer a block of data from one location to another location of memory.
8. Assembly Language Program to convert 8 bit decimal number into hexadecimal form
9. Assembly Language program to convert the hex number into an ASCII character.
10. Assembly Language to find smallest/largest number from series of numbers.
11. Assembly Language program to convert BCD number into hexadecimal number.

Reference Books:

- Communication Systems, S. Haykin, 2006, Wiley India
- Electronic Communications, D. Roddy and J. Coolen, Pearson Education, India.
- 8080A/8085 Assembly Language Programming by Lance A. Leventhal

ELE-304: Electrical Circuits and Network Skills (30 clock hour)

Objective: The main goal of designing this course is to expose students to practical aspects of electronics. Therefore, it is not expected anywhere to teach physics behind topics covered in the syllabus.

Unit 1: Electrical Drawing and Symbols

Circuit Symbols of all Electronics devices, Electrical Equipment, Blueprint – Only definition, Reading of Circuit Schematic **(3 hour, 6 Marks)**

Unit 2: Basic Electricity Principles and Devices

Voltage, Current, Resistance, Power, Ohm's Law, Series-parallal circuits, AC and DC supply, Use of multimeter, voltmeter and ammeter in measurement. Resistor, capacitor and Inductor (Only different Types of each), Series and parallel combinations of R, C and L , power meter

(6 hour, 12 Marks)

Unit 3: Generators, Motors and Transformers

AC generator – working principle and diagram, Single phase and three phase motor-working principal and construction(Design), Step up and Step down transformer-working principal and construction. **(8 hour, 16 Marks)**

Unit 4: Electrical Wiring

Different types of Conductors and cables – Solid and Stranded, Different types of electrical joints, Insulation-classification, Rubber Elastomers Insulation, Cable Tray, Soldering material, flux, Procedure, Technique, Breadboard, Preparation of Extension board- wiring diagram of two, three pin plug and switch. **(8 hour, 16 Marks)**

Unit 5: Electrical Protection

Types of Relays (Solid state, Reed, Electromagnetic), Fuse – role, current rating, voltage rating, cartridge fuse and SMD fuse (Only diagrams), Circuit breakers (MCB) – Principle, and Advantages MCB over fuse Grounding and Isolation. Concept of earthing.

(5 hour, 10 Marks)

Reference Books:

- Cables and Wiring by John Cadick Delmar publishers Chapter 4
- Basic Electronics: Solid State by B.L. Theraja
- A text book of Electrical Technology Vol-II A.C. and D.C. Machines by B. L. Theraja, S.Chand
- Modern Electronic Equipment: Troubleshooting, Repair and Maintenance by R. S. Khandpur, Tata McGraw Hill Publishing Company Limited

Semester IV

ELECTRONICS-DSC 2D: Digital Communication and Microcontrollers

Theory: 60 clock hours

(Credits: Theory-04, Practicals-02)

Course description:

This course is aimed at introducing the concepts of digital communication including mobile and satellite communication to Under Graduate students and provide hands on training of handling microcontrollers and digital communication circuits.

Course objectives:

1. To impart knowledge of pulse modulation, mobile and satellite.
2. To provide the knowledge and methodology necessary for using microcontroller chips
3. To have practical exposure of handling microcontroller and interfacing applications.

Course outcome:

Learner will be able to ….

1. Apply the concept and knowledge of digital communication to develop new systems.
2. Apply practical knowledge of microcontrollers to solve real life problems of the society.
3. Understanding of the course and create scientific temperament and give exposure to the students for independent use of microcontroller for innovative applications.
4. Gain knowledge of microcontroller programming.
5. Handle hardware and software to shoot problems of the society.

ELE-401: Digital Communication (30 clock hour)

Unit1: Basics of Digital Communication:

Block diagram of Digital communication system, Communication channel types and their characteristics (bit rate, bandwidth, repeater distance), Chanel modelling, Channel noise and its effect, Comparison of analog and digital communication system, Advantages and disadvantages of digital communication. **(6 hour, 12 Marks)**

Unit 2: Pulse Code Modulation:

Sampling process, Nyquist sampling theorem, quantization process, Quantization error, Quantization noise, Pulse Code Modulation (PCM): Block diagram and working of PCM transmitter and receiver, Advantages and disadvantages of PCM.

(6 hour, 12 Marks)

Unit 3: Digital Modulation Techniques:

Amplitude Shift Keying (ASK): Generation (Concept), waveforms, advantages, disadvantages and applications (list).

Frequency Shift Keying (FSK): Generation (Concept), waveforms, advantages, disadvantages and applications (list).

Phase Shift Keying (PSK)/Binary Phase Shift Keying (BPSK).: Generation(Concept),, waveforms, advantages, disadvantages and applications (list). **(4 hour, 8 Marks)**

Unit 4: Satellite communication:

Introduction, need, geosynchronous satellite orbits, geostationary satellite advantages of geostationary satellites. Block diagram of transponders, path loss, ground station, simplified block diagram of earth station. Uplink and downlink. Applications of Satellite. Introduction to GPS, VSAT network. **(5 hour, 10 Marks)**

Unit 5: Mobile Telephony System:

Basic concept of mobile communication, frequency bands used in mobile communication, concept of cell sectoring and cell splitting, frequency reuse, handshaking, SIM number, IMEI number, need for data encryption, architecture (block diagram) of mobile communication network, idea of GSM, CDMA, TDMA and FDMA technologies, simplified block diagram of mobile phone handset, 2G, 3G and 4G concepts. **(9 hour, 18 Marks)**

Reference Books:

- Electronic Communication systems, G. Kennedy, 3rd Edn., 1999, Tata McGrawHill.
- Communication Systems, S. Haykin, 2006, Wiley India
- Wireless communications, Andrea Goldsmith, 2015, Cambridge University Press

ELE-402: Microcontrollers and Applications (30 clock hour)

Unit 1: Introduction to Microcontroller

Block diagram of microcontroller, Advantages of microcontroller, Comparison between microprocessor and microcontroller, Applications of microcontroller (list only) **(3 hour, 6 Marks)**

Unit 2: Architecture of 8051 Microcontroller

8051 microcontroller – Features, Block diagram, Pin out diagram, CPU registers, Flags and Program Status Word, Program Counter, Data Pointer, Special Function Registers& their Format, Stack& Stack Pointer, Internal RAM /ROM, Oscillator & Clock, Concept External Memory, Ports-0,1,2 & 3,Counter and Timers, Serial data input/ output transfers, Interrupts. **(8 hour, 16 Marks)**

Unit 3: Addressing Modes and Instructions

Addressing modes, data moves Instructions, Arithmetic Instructions, Logical Instructions, Jump and Call and Loop Instructions, flag manipulation instructions. **(8 hour, 16 Marks)**

Unit 4: 8051 Microcontrollers Programming

Assembly language programming- simple data transfer, arithmetic, logical, looping and code conversion programming (packed BCD to ASCII conversion, Binary to ASCII conversion. **(8 hour, 16 Marks)**

Unit 5: 8051 I/O port Programming

Introduction of I/O port programming, I/O port pins description and their functions, I/O port programming in 8051 (using assembly language), I/O programming: Bit manipulation. **(3 hour, 6 Marks)**

Reference Books:

- 8051 microcontroller and embedded systems using assembly and C, M.A. Mazidi, Pearson Education India
- 8051 microcontrollers, Satish Shah, Oxford University Press
- Embedded Microcontroller Systems: Real time interfacing, J. W. Valvano, 2011, Cengage Learning

ELECTRONICS LAB- DSC 1B LAB: Digital Communication and Microcontrollers

ELE-403: ELECTRONICS LAB-2 (60 clock hour)

Section-A: Digital Communication (Any 4)

(Following experiments should be performed using simulation only)

1. To study PCM
2. To study PAM
3. To study PWM
4. To study PPM
5. To study ASK
6. To study FSK
7. To study PSK

Section-B: Microcontroller (Any 4)

1. Write a program to add/subtract two 8 bit numbers.
2. Write a program to compute 1+2+3+……..+N (say N=10).
3. Write a program to find average of five 8 bit numbers.
4. Write a program to find that the given numbers is prime or not.
5. Write a program to find the factorial of a number.
6. Write a program to covert an ASCII number to Hex number.
7. Write a program to the smallest of an array of N 8 bit unsigned numbers (N is an 8 bit numbers).

Section-C: Interfacing Applications (Any 2)

1. Use one of the four ports of 8051 for interfacing eight LED. Simulate binary counter (8 bit) on LED.
2. Program to glow first four LED then next four using TIMER application.
3. Program to run a count down from 9-0 in the seven segment LED display.
4. Interface 7 segment display with 8051 and display HELP on it.
5. Interface stepper motor to 8051 and write program to move the motor through given angle in clockwise or anti-clock wise direction.

Reference Books:

- Communication Systems, S. Haykin, 2006, Wiley India
- Wireless communications, Andrea Goldsmith, 2015, Cambridge University Press
- 8051 microcontroller and embedded systems using assembly and C, M.A. Mazidi, Pearson Education India
- 8051 microcontrollers, Satish Shah, Oxford University Press
- Embedded Microcontroller Systems: Real time interfacing, J. W. Valvano, 2011, Cengage Learning

ELE-404: Computational Techniques in Electronics (30 clock hour)

Objective: The aim of this course is not just to teach computer programming and numerical analysis but to emphasize its role and gain skills to students in solving problems in Electronics.

* **Instruction: It is advised to teach this course using ICT tools.**

Unit 1: Algorithms and Flowchart

Algorithm: Definition, properties and development, examples, Flowchart: Concept of flowchart, symbols, guidelines, types, examples **(02 Hours, 04 Marks)**

Unit 2: Fundamentals of C

Basic structure of C program, Character set, C tokens, Keywords and Identifiers, Constraints, Variables, Data Types, Declaration of variables, Assigning values to variables, Operators - arithmetic, relational, logical, assignment, increment and decrement, conditional, bitwise, special operators, Evaluation of Arithmetic expressions, Operator precedence and Associativity, I/O statements: Reading and writing a single character, Standard and Formatted Input and Output statements, Preprocessor Directives, Simple programming exercises **(04 Hours, 08 Marks)**

Unit 3: Decision making, Branching and Looping

Statements – if, if-else, Nesting of if-else, else-if Ladder, switch, break, ?: Operator, goto, Entry and Exit controlled loops, Statements – while, do-while, for, Features of for loops, Nesting of for loops, Jumping out of a loop, Skipping a part of a loop - Use of continue statement, Simple programming exercises **(02 hour, 4 Marks)**

Unit 4: Arrays and User Defined Functions

One-dimensional array – Declaration and Initialization, Introduction to two and multi -dimensional arrays, Simple programming exercises. Need for user defined functions, Form of C functions, Return values and their types, Calling a function, Category of Functions, Use of keyword –void, Recursion, Functions with arrays, ANSI C function definition and declaration, Simple programming exercises **(5 hour, 10 Marks)**

Unit 5: Numerical Techniques using C language

Roots of Equations: Bisection method, Problems Based on these methods.
Numerical Integration: Trapezoidal Rule, Simpson's 1/3rd Rule, Problems
Numerical Differentiation: Runge Kutta Method, Problems
System of Linear Equations: Gauss Elimination Method, Problems.**(14 hour, 28 Marks)**

Unit 5: Numerical Simulation of Simple Circuits

RC, RL and RLC circuits using differential and integral methods, Loop current analysis using Gauss Elimination Method, Average and RMS value of current using integral methods. **(3 hour, 6 Marks)**

Reference Books:

- . Yashavant Kanetkar, Let Us C , BPB Publications
- Programming in ANSI C, Balagurusamy, 2nd edition, TMH.
- Introduction to Numerical Analysis", S. S. Sastry, Prentice Hall India.