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 - 2023)

Preamble

The University Grants Commission (UGC) has initiated several measures tobring 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, Kavayitri Bahinabai Chaudhari 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, BoS and faculty 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 BoS meeting and the same will be effectively implemented from the academic year 2023-24. 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 communication and their applications for the society.

5. To provide necessary foundation on microprocessors.

6. To develop observational skills and confidence in using microprocessors 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.

BOS (Electronics and Instrumentation)
Faculty of Science and Technology

KBC North Maharashtra University, Jalgaon

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

Subject: **Electronics**

Choice Base Credit System (With effect from June 2023)

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 Circuits and Applications and Microprocessors (Credits: Theory-04, Practicals-02) ELECTRONICS LAB	ELE-301	**Analog Circuits and Applications**	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
IV	**Electronics-DSC 2D:** Analog Communication and Linear Integrated Circuits (Credits: Theory-04, Practicals-02) ELECTRONICS LAB	Course Code	Course Title	No. of Credits	Clock Hour/ Semester	Marks	
						Int.	Int.
		ELE-401	**Analog Communication**	2	30	40	60
		ELE-402	**Linear Integrated Circuits**	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
S. Y. B. Sc. (Electronics)
Semester III
(Choice Based Credit System)
ELECTRONICS-DSC 2C: Analog Circuits and Applications & Microprocessor
Theory: 60 clock hours
(Credits: Theory-04, Practicals-02, Skill based-02)

Course description:

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

Course objectives:
1. To impart knowledge of analog circuits.
2. To provide the knowledge and methodology necessary for applications of analog circuits
3. To provide exposure of 8085 microprocessor.
4. To have practical exposure of microprocessor and their applications.

Course outcome:

Learner will be able to ….
1. Apply knowledge to develop analog circuits and use for different applications.
2. Apply the concept and knowledge of microprocessors to real life problems.
3. Understand and analyses 8085 microprocessor and its programming.
4. Review, prepare and present technological developments.

KBC North Maharashtra University, Jalgaon
S.Y.B.Sc. (Electronics) Sem-III Paper-I (Credit:02)
(Choice Based Credit System)
ELE-301: Analog Circuits and Applications
(30 clock hour)

Unit 1: Single Stage Amplifier: (04Hrs, 08M)

Classification of Amplifier, Single stage Common Emitter Amplifier and its design, Tuned Amplifier, Distortion and noise in amplifier.

Unit 2: Multistage Transistor Amplifiers: (07Hrs,17M)

Introduction, Block diagram of multistage transistor amplifier, Application of multistage amplifier, Block Diagram of PA system, Explanation of terms - gain, frequency response, decibel gain, Bandwidth. Two stage RC-coupled transistor amplifiers and their design, two stage transformers coupled transistor amplifier, two stage Direct Coupled Amplifier.

Unit 3: Transistor Power Amplifier: (06Hrs,12M)

Difference between voltage and power amplifiers, Block diagram of a practical power amplifier, Classification of power amplifier, Principle of push pull amplifier, Class B Push Pull Power Amplifier operation, cross over distortion, conversion efficiency, heat sinks.

Unit 4: Feedback: (06Hrs, 14M)

Concept of feedback, types of feedback, Topologies of feedback, Effect of negative feedback on gain, non linear distortion, Band width, Noise, Input and output impedance, (derivations are not expected). Emitter follower – operation, characteristics and applications.

Unit 5: Transistorized Oscillator   (07Hrs, 14M)

Tank Circuit, Bark Hausen criterion, Oscillator types, Phase Shift Oscillator, Hartley Oscillator, Colpitts Oscillator, Crystal Oscillator, (working, advantages & disadvantages), RF oscillator.

References:

1.   Principles of Electronics - V. K. Mehta
2.   Electronic Principles - A. P. Malvino
3.   Basic Electronics & Linear Circuits - N. N. Bhargava
4.   Integrated Electronics- Millman Halkias

KBC North Maharashtra University, Jalgaon
S.Y.B.Sc. (Electronics) Sem-III Paper-II (Credit:02)
(Choice Based Credit System)
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

KBC North Maharashtra University, Jalgaon
S.Y.B.Sc. (Electronics) Sem-III Paper-III (Credit:02)
(Choice Based Credit System)
ELECTRONICS LAB: ANALOG COMMUNICATION and MICROPROCESSORS Lab
(60 clock hour)

ELE-303: ELECTRONICS LAB-III

Section A: Analog Circuits and Applications (Any Five)

1. Design, Build and test Single stage Common Emitter Amplifier.
2. Build and test RC-coupled transistor Amplifier.
3. Study of Directional Characteristics of Microphone.
4. Build and test Class B Push Pull Amplifier.
5. Build and test Emitter follower using Transistor.
6. Build and test Phase Shift oscillator for given frequency using Transistor.
7. Build and test Crystal Oscillator using Transistor

Section B: Microprocessors (Any Five)

1. Assembly Language Program for addition/subtraction of two 8-bit numbersusing direct addressing mode.
2. Assembly Language Program for addition/subtraction of numbers usingindirect 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-bitunsigned 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 numberusing 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 ASCIIcharacter.
10. Assembly Language to find smallest/largest number from series of numbers.
11. Assembly Language program to convert BCD number into hexadecimalnumber.

KBC North Maharashtra University, Jalgaon
S.Y.B.Sc. (Electronics) Sem-III Paper-IV (Credit:02)
(Choice Based Credit System)
ELE-304: Electrical Circuits and Network Skills (30 clock hour)

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

KBC North Maharashtra University, Jalgaon
S.Y.B.Sc. (Electronics) Semester IV
(Choice Based Credit System)

ELECTRONICS-DSC 2D: Analog Communication and Linear
Integrated Circuits
Theory: 60 clock hours
(Credits: Theory-04, Practicals-02)

Course description:

This course is aimed at introducing the concepts of analog communication system, various modulation techniques as well as linear integrated circuits like operational amplifier, timer to under Graduate students and provide hands on training of handling applications of opamps a, timers and analog communication circuits.

Course objectives:

1. To impart knowledge of analog modulation, use in transmitters and receivers.
2. To provide the knowledge and applications of Integrated circuits like opamp and timer.
3. To have practical exposure of handling ICs and their uses.

Course outcome:

Learner will be able to ….

1. Apply the concept and knowledge of analog modulation and demodulation.
2. Understand the analog communication to develop new systems.
3. Apply practical knowledge of integrated circuits to solve real life problems of thesociety.
4. Understanding of the course and create scientific temperament and give exposure to the students for independent use linear integrated circuits.
5. Handle hardware and software to shoot problems of the society.

KBC North Maharashtra University, Jalgaon
S.Y.B.Sc. (Electronics) Sem-IV Paper-I (Credit:02)
(Choice Based Credit System)
ELE-401: 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.

KBC North Maharashtra University, Jalgaon
S.Y.B.Sc. (Electronics) Sem-IV Paper-II (Credit:02)
(Choice Based Credit System)
ELE-402: LINEAR INTEGRATED CIRCUITS & APPLICATIONS
(30 clock hour)

Unit 1: Differential Amplifier: (04P, 08M)

Introduction, CMRR, differential amplifier configurations (mention types with circuit diagram only), Emitter coupled differential amplifier, differential amplifier with constant current source.

Unit 2: Operational Amplifier: (08P, 16M)

Block diagram, Schematic symbol, Pin diagram (IC 741), Parameters: - Input impedance, output impedance, input offset voltage, open loop voltage gain, input bias current, slew rate. (Definitions only) Concept of offset Null arrangements Ideal characteristics of an Op-Amp, practical characteristics of an Op-Amp, inverting amplifier, concept of virtual ground, noninverting amplifier, voltage follower.

Unit 3: Applications of Op-Amp: (08P, 16M)

Op- Amp as Adder, Subtractor, Differentiator, integrator, Instrumentation amplifier with three Op-Amps, voltage to current converter with floating load and grounded load, Log amplifier using diode.

Unit 4: Active filters and Comparators: (05P, 10M)

Classification of filter, Active filters – Advantages, limitations and types, first order low pass and high pass active filters (Derivation of gain and designing), Basic comparator, Sample and Hold Circuit, Basic peak detector.

Unit 5: Waveform generators   (05P, 10M)

Timer IC-555 and its application - Pin diagram, Functional block diagram, Concept of multivibrator, Astable Multivibrator – Operation and its applications (Free running ramp generator), Monostable Multivibrator – Operation and its applications (frequency divider), Bistable Multivibrator– Operation, Voltage controlled Oscillator (VCO).

Reference Book:

1. Operational Amplifier - G. B. Clayton
2. Operational Amplifier and Linear Integrated Circuits - R. A. Gaikwad
3. Integrated Circuits - K. R. Botkar

KBC North Maharashtra University, Jalgaon
S.Y.B.Sc. (Electronics) Sem-IV Paper-III (Credit:02)
(Choice Based Credit System)
ELECTRONICS LAB: Analog Communication and Linear Integrated Circuits
ELE-403: ELECTRONICS LAB-IV (60 clock hour)

Section-A: Analog Communication (Any 4)

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: Linear Integrated Circuits (Any 6)

1. Study of parameter of OP-amp (offset Null and output Impedance).
2. Build and test adder and subtractor using OP-Amp.
3. Design, Built and test V-I Convertor using OP-Amp (Grounded Load).
4. Build and test Integrator/differentiator using Op-amp.
5. Design, Built and test Low Pass Active Filter using OP-Amp.
6. Design, Built and test Square and triangular Wave generator.
7. Study of Log Amplifier using diode and Op-Amp.
8. Design, Built and test astable Multivibrator using IC 555.
9. Design, Built and test monostable Multivibrator using IC 555.
10. To Study Voltage Controlled Oscillator.

KBC North Maharashtra University, Jalgaon
S.Y.B.Sc. (Electronics) Sem-IV Paper-IV (Credit:02)
(Choice Based Credit System)

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

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   **(08hour, 16 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   **(10 hour, 20 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   **(06 hour, 12 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.