

**SARDAR PATEL UNIVERSITY
VALLABH VIDYANAGAR**



SYLLABUS EFFECTIVE FROM: 2017-18

**Syllabus for M.Sc. (Electronics)
Semester I**

For each Theory Paper		Marks
1.	Test of 1½ hours duration and having three questions of 10 marks each. The total marks to be reduced to	15
2.	There will be a minimum of three quiz tests of 10 Marks each. The total marks to be reduced to	10
3.	Seminar	05
Total		30

Practical : (I, II, III and IV semesters)		Marks
1.	Practical test of 3 hours duration	20
2.	Practical Record /Journal & Viva Voce of Experiments	10
Total		30

Project Work : (I, II, III and IV semesters)		Marks
1.	Evaluation	30
Total		30

**M.Sc. (ELECTRONICS)
FIRST SEMESTER
PS01CELE21: SEMICONDUCTOR SCIENCE AND DEVICES**

TOTAL 100 MARKS (EXTERNAL – 70, INTERNAL-30)

University Examination – 3 Hours Duration

Outline:

To introduce the basic concepts Band-Structure of Semiconducting Materials, their properties and application as Electronics Devices.

UNIT-1

Review of free electron theory and its draw backs, Energy bands in solids – Bloch theorem, Effect of lattice periodicity on the allowed states and the Kronig-Penney model, Origin of energy gap, Brillouin zones, Possible wave functions per band, Velocity of electrons according to band theory, Effective mass and concept of hole.

UNIT-2

Distinction between metals, insulators and intrinsic semiconductors, Hall effect in semiconductors, Band shapes of real semiconductors, Density of states in the energy band, Distribution function, Fermi level in intrinsic case, Fermi level in extrinsic case, Low and high doping cases, Amorphous semiconductors.

UNIT-3

Metal – Semiconductor contacts, Rectifying and Ohmic contacts, Heterojunction, Metal – insulator-semiconductor structure, Accumulation, Depletion, Inversion, Surface space charge region, Interface traps and charges, Photonic devices, Optical Absorption in a semiconductor, Photoconduction in semiconductors.

UNIT-4

Photoelectric phenomena in a P-N junction, Solar cell, Hetero junction and other types of solar cells. Display devices, AC and DC electroluminescent devices, Injection luminescence, Radiative recombination processes, Light Emitting Diode (LED), Semiconductor LASER, Plasma display, Liquid crystal displays (LCD).

Outcome:

Upon successful completion of this subject the student will be able to understand the transport phenomena in Semiconducting Materials and various Electronic Devices.

PS01CELE21: SEMICONDUCTOR SCIENCE AND DEVICES

BOOKS:

- 1. Semiconductor Devices: Basic Principles**
Jaspri Singh, (John Wiley & Sons Inc.N.Y,USA)
- 2. Physics of Semiconductor Devices**
S. M. Sze, (Wiley Eastern Limited, New Delhi, INDIA)
- 3. Semiconductor Optoelectronics Devices**
P.Bhattacharya, (Prentice Hall Int. Inc. N.J, USA)
- 4. Optoelectronics: An Introduction**
J.Wilson and J.F.B. Hawkes, (Prentice Hall of India, New Delhi, INDIA)
- 5. Fundamentals of Solid State Physics**
B. S. Saxena, R.C. Gupta and P. N. Saxena, (Pragati Prakashan, Meerut, INDIA)

M.Sc. (ELECTRONICS)
FIRST SEMESTER
PS01CELE22: APPLICATIONS OF ICs & FUZZY ELECTRONICS
TOTAL 100 MARKS (EXTERNAL – 70, INTERNAL-30)
University Examination – 3 Hours Duration

Outline of the Course:

The course consists of the study of very important applications of OP AMP as Active Filter, PLL. Simulation of Circuits using pSPICE along with Fuzzy Logic, Fuzzy set theory, Fuzzy Circuits and introduction to Artificial Neural Network systems.

UNIT-1

Active Filters: Introduction, Frequency Response, Characteristics and Terminology, Classification, First Order Active Filters, First order Active Filters, Audio Filter Applications, Standard – Order Responses, Second-order Low Pass, High Pass, Band Pass and Notch Filters, State-Variable and Biquad filters.

UNIT-2

Higher-Order Filters- Butterworth Response, Chebyshev Response, Elliptical Response, Bessel Response, Higher-Order Filter Design, Cascade Design, Generalized Impedance Converters, RLC Ladder Simulation Design, Filter Sensitivity, OP Frequency Response.

UNIT-3

Phase Locked Loops: Operating principles of the PLL, Major building Blocks of the PLL, Typical Monolithic PLL ICs, Applications of the PLL
Simulation of Circuit using pSpice: Introduction to Spice, Circuit Descriptions, DC Circuit Analysis, Transient Analysis, AC Circuit Analysis, Analysis of OP AMP Circuits

UNIT-4

Introduction to Fuzzy Electronics: Fuzzy sets, Basic Concepts, Operations on Fuzzy Sets, Algebraic Operations, Fuzzy relations, Geometrical Illustration, Fuzzy Logic, Fuzzy Algebra, Truth Tables, Fuzzy Functions. Concepts of Fuzzy Logic Circuits, Fuzzy Flip- flops, Fuzzy Logic Circuits in Current Mode, Fuzzy Numbers.
Electronic Neural Network: Introduction, The Biological System, Learning Algorithms, Neural Network Models.

Outcome of the Course:

This course will enable the learner to understand the various types of filters, PLL circuits for different applications. The student will also get an idea of simulation of circuits using pSPICE, Fuzzy System and Artificial Intelligence.

PS01CELE22: APPLICATIONS OF ICs & FUZZY ELECTRONICS

Basic Text & Reference Books:-

- 1. Design with operational Amplifiers and Analog Integrated Circuits**
Sergio Franco, (McGraw-Hill Book Company, 1988, N.Y., USA)
- 2. Integrated Circuits**
K.R. Botkar, (Khanna Publishers, New Delhi, INDIA)
- 3. SPICE for Circuits and Electronics using pSPICE**
Muhammad Rashid, (Second Edition, 1999)
- 4. Introduction to applied Fuzzy Electronics**
Ahmad M. Ibrahim, (Prentice- Hall of India Pvt. Ltd., 1999, New Delhi, INDIA)
- 5. Op-Amps and Linear Integrated Circuits**
Ramakant A. Gayakwad, (Prentice- Hall of India Pvt. Ltd., New Delhi, INDIA)
- 6. Applications and Design with Analog Integrated Circuits**
J. Michael Jacob, (Prentice- Hall Inc., N.Y., USA)

M.Sc. (ELECTRONICS)
FIRST SEMESTER
PS01CELE23: MICROPROCESSOR & MICROCONTROLLER SYSTEMS
TOTAL 100 MARKS (EXTERNAL – 70, INTERNAL-30)
University Examination – 3 Hours Duration

Outline:

To introduce the basic concepts of 8 bit microprocessor, microcontroller programming and interfacing techniques with assembly language programming.

UNIT-1

Basic Interfacing concept: Address Decoding, Control Signal Generation, Chip Select Logic. I/O Interfacing using IN and OUT instructions of 8085, Memory Mapped I/O. Interfacing Input and Output Devices. Basics in Programmable I.O. Device Making 8212 Programmable. The 8155/8156 Chip and Applications, The 8355/8755 Chip and Applications. Designing of 8085 based minimum system.

UNIT-2

The 8255 PPI and applications. The 8253/8354 Timer / Counter Chip and its applications, The 8257 DMA Controller and its applications. Basic Concept in I/O microprocessor interfacing.

UNIT-3

Overview of Microcontroller, Introduction to 8051 architectures I/O. Pins/Ports Circuit, Internal and external Memory organization, timer/ Counter section, Interrupts, Serial I/O in 8051.

UNIT-4

Programming of 8051, Study of data moving instructions, arithmetic and logical operations, Jump and call operations. Application development on 8051 based system using Simulator and Assembler. Classification of Serial I/O. Serial I/O Interfacing with 8051.

Outcome:

Upon successful completion of this subject the student will be able to:

1. Understand the hardware architecture of the 8-bit microprocessor and microcontroller and Programming of simple assembly code
2. Design an interface with various I/O devices including memory

PS01CELE23: MICROPROCESSOR & MICROCONTROLLER SYSTEMS

BOOKS:

1. **Microprocessor Architecture, Programming and application with 8085/8080A**
Ramesh S Gaonkar, (Willey Estern Limited, New Delhi, INDIA)
2. **Microprocessor - I**
B.P.Borole and V.J.Vibhute, (Technova Publications, Pune, INDIA)
3. **The 8051 Microcontroller: Architecture, Programming and Application**
Kenneth J. Ayala, (Penram International, N.Y., USA)

PS01EELE21: ANALYTICAL AND BIOMEDICAL INSTRUMENTS
TOTAL 100 MARKS (EXTERNAL – 70, INTERNAL-30)
University Examination – 3 Hours Duration

Outline:

The course covers Theory, operating principle and operation of Analytical & Bio-medical Instruments

UNIT-1

pH meters, Principle of pH measurements, Electrodes for pH measurements, Principle and working operation of Ultraviolet ,Visible Spectrophotometer, Principle and working of Infrared Spectrophotometer.

UNIT-2

Atomic Absorption, Spectrophotometers, Nuclear Magnetic Resonance, Instrumentation, Applications, Gas Chromatography, Instrumentation, Applications of Gas Chromatography, High Performance Liquid Chromatography (HPLC),Electron Microscope.

UNIT-3

Cardiovascular circulation system, Electrocardiographs, Cardiac Muscle Physiology, Electrocardiogram Machine, Electrocardiogram Leads and Wave configuration, Sphygmomanometer method Pacemakers-Need for Cardiac pacemaker-External Pace makers-Implantable pace makers-recent developments in Implantable Pacemakers.

UNIT-4

Ultrasonic transducers, Properties of Ultrasound, Basic modes of Transmission, Ultrasonic measuring system, Ultrasonographic techniques, Multi elements Transducer system, Applications, Function of Kidneys, Hemodialysis machines, Artificial Kidney, Dialyses,

Outcome:

This course gives importance to Analytical and Biomedical Instruments and its applications in each field and motivates students to explore new horizons

BOOKS:

1. **Hand Book of Analytical Instruments**
R.S.Khandpur. (Tata McGraw Hill Publishing Company Ltd. New Delhi, INDIA)
2. **Hand Book of Biomedical Instruments**
R.S.Khandpur. (Tata McGraw Hill Publishing Company Ltd. New Delhi, INDIA)
3. **Biomedical Instrumentation and Measurements**
Leslie Cromwell, Fred J.Weibll and Frich A. Pfeiffer, (Prentice Hall Of India Pvt.Ltd.New Delhi, INDIA)
4. **Instrumentation methods of Chemical Analysis**
Chatwal, Anand, (Himalaya Publishing House, New Delhi, INDIA)
5. **Electronic Instrumentation**
John A. Allocca and Allen Stuart, (Reston Publishing – A Prentice Hall Co.,Reston, Virginia, USA)
6. **Advanced Medical Instrumentation and Equipment**
S.E.Sutphin, (Prentice Hall, Inc., N.J, USA)
7. **Bioelectronics Measurement**
Dean A.Demarre and David Michaels (Prentice –Hall Inc., N.J., USA)

M.Sc. (ELECTRONICS)
FIRST SEMESTER
PS01EELE22: NETWORK ANALYSIS
TOTAL 100 MARKS (EXTERNAL – 70, INTERNAL-30)
University Examination – 3 Hours Duration

Outline:

The course is to impart useful skills on the students in order to enhance their fundamental knowledge and circuit analysis capability.

UNIT-1

Network Model, Network variables and elements- active and passive, Ladder network, Source transformations, Star-delta transformation, Node voltage and mesh current methods, Formulation of network equations. RLC network, Series RLC networks, Zero input and zero state response, Response of RLC network for exponential inputs.

UNIT-2

System function, Types of system functions, Impedance and admittance of RLC elements, Laplace transformation and useful theorems, Heaviside's partial fraction expansion technique, Transfer function- poles and zeroes, Application of Laplace transform to networks.

UNIT-3

Network theorems- Super position, Thevenin, Norton, Millman, Reciprocity and Maximum power transfer theorems, Two port networks and parameters, Networks topology, Concept of a network graph, Chords or links.

UNIT-4

Formulation of network equations, Network filters, Symmetrical networks, Filter characteristics, Attenuators- Symmetrical, Equalizers- attenuation and phase, Fourier series, and convergence, Fourier transforms, Application to networks.

Outline:

After completion of the course students will learn different methods involves in analysis both linear and non-linear networks. Also provides with basic information on how to perform circuit analysis using network parameters.

BOOKS:

- 1. Network Theory**
N.C.Jagan and C.Lakshminarayana, (BS Publications, Hyderabad, INDIA)
- 2. Network Analysis**
(Including passive network synthesis), C.L.Wadhwa, (New Age International (P) Ltd, Publishers, New Delhi, INDIA)
- 3. Network and systems**
D.Roy Chowdhary, (New Age International Publishers, New Delhi, INDIA)
- 4. Network Analysis**
M.E Van Valkenburg, (Prentice Hall of India Pvt. Ltd., New Delhi, INDIA)