Rajarshi Shahu Mahavidyalaya, Latur
(Autonomous)

Department of Physics and Electronics

SYLLABUS FOR B.Sc.-III ELECTRONICS

(w.e.f. Academic Year 2019-20)

Under Choice Based Credit System (CBCS)

SEMESTER PATTERN

JUNE 2019

Rajarshi Shahu Mahavidyalaya Latur
(Autonomous)
Department of Physics and Electronics (w.e.f. 2019-20)
Structure of B.Sc. III Electronics Syllabus

Sr No	Course Code	Title	Credits	Periods/ week	Marks		
		Semester V			In Sem	End Sem	Total
1	DSEE-I U-ELE-553	Op Amp and its Applications-IX	2	3	20	30	50
2	DSEE-II U-ELE-554	Communication Electronics-I-XA Or Optical fibre communication-I-XB	2	3	20	30	50
3	SEC-III	Electrical Circuits and Network Skills-III	2	3	20	30	50
4	DSEEP-I U-ELE-555	Electronics Laboratory Course-VII (based on Op Amp and its Applications–IX)	2	3	20	30	50
5	DSEEP-II U-ELE-556	Electronics Laboratory Course-VIII (based on Communication Electronics-I-XA) Or Electronics Laboratory Course-VIII (based on Optical fibre communication-I-XB)	2	3	20	30	50
		Semester VI					
6	DSEE-III U-ELE-653	Digital Electronics-XI	2	3	20	30	50
7	DSEE-IV U-ELE-654	Communication Electronics-II–XIIA Or Microprocessors & Microcontrollers-II-XIIB	2	3	20	30	50
8	SEC-IV	Basic Instrumentation Skill-IV	2	3	20	30	50
9	DSEEP-III U-ELE-655	Electronics Laboratory Course-IX (based on Digital Electronics-XI)	2	3	20	30	50
10	DSEEP-IV U-ELE-656	Electronics Laboratory Course-X (based on Communication Electronics-II–XIIA) Or Electronics Laboratory Course-X (based on Microprocessors & Microcontrollers-II -XIIB)	2	3	20	30	50

B.Sc. III Year, Sem-V
Course Code: U-ELE-553
Operational Amplifier and its Applications-IX
Credits: 2 No of periods / wk: 3 Periods: 45
Marks: 50, End Sem.: 30 & In Sem.:20 (UT: 15 &AT: 05)

Learning Objectives:

1. To understand the parameters of Op-amp.
2. To understand different arithmetic applications such as adder, subtractor, integrator and differentiator etc.
3. To understand designing and implementation of Op-amp to make use as an oscillator.

Course Outcomes: Students will be able to:

1. Understand various op-amp parameters.
2. Build electronic circuits using analog IC's.
3. Use op-amp as adder, subtractor, integrator and differentiator etc.

Unit I: Operational Amplifiers [13 Periods]

Operational Amplifier: Introduction, Block diagram of Op-Amp, Differential Amplifier, basic circuit of Differential Amplifier, operation of Differential Amplifier, AC analysis of differential amplifier(single ended voltage gain),CMRR, Schematic symbol of Op-amp, The Ideal Op-Amp, Power supplies for Op-Amp IC, Equivalent circuit of Op- Amp, Open-Loop Op-Amp configuration, Closed loop Op-Amp configurations: inverting Op-Amp configuration, Non-inverting Op-Amp configuration and differential op-amp configuration, Voltage Gain Expression for Inverting and Non- inverting Op-Amps, Numerical Problems [Book no.-1 Chapter no.-8 & Book no.-2 Chapter no.-25]

Unit II: Op-Amp: **Parameters and Applications [10 Periods]**

The Electrical parameters of Op-Amp such as: Input offset voltage, input offset current, Input Bias current, Input resistance, Output resistance, common mode configuration and Common Mode Rejection Ratio (CMRR), Voltage Supply Rejection Ratio, frequency response of an op-amp, Open-Loop Voltage Closed Loop Voltage Gain, Slew Rate, Bandwidth, Linear applications of an op-amp: Unity Gain Buffer, Op-Amp as an Adder and Subtractor, Problems. [Book no-3 Chapter-2 and Book no.-1 Chapter no.-9]

Unit- III: Non-Linear Applications of Op-Amp [12 Periods]

Introduction, the Op-Amp as an Integrator, The Op-Amp as a Differentiator, (Book no-3 Chapter no- 6) Basic Comparator: Zero crossing detector, Non-Zero reference comparators (Inverting and Non-inverting Op-Amp), Schmitt's Trigger, Analog Computation: Solving Differential Equations (Second and Third order type), Op-Amp as a Logarithmic Amplifier

using diode, antilog amplifier using diode, numerical Problems. [Book no-1 Chapter no-8 and 9, Book no-4]

Unit IV: Specialized IC Applications [10 Periods]

Introduction, Pin Diagram of Op-Amp IC741 and Pin functions, oscillators, RC Phase shift Oscillator, Wien Bridge Oscillator, Square Wave Generator using Op-Amp IC741, The Timer IC 555 and Its Pin Functions, Block Diagram of IC555, IC 555 as Astable Multivibrator and Monostable Multivibrator, Problems. [Book no-3 Chapter no-7 and 9]

Recommended Books:

1. Electronic Fundamentals and Applications Integrated and Discrete systems- John D. Ryder, Prentice _ Hall of India Pvt. Ltd New- Delhi (5th Edition)
2. Principles of Electronics-V. K. Mehta and Rohit Mehta, S Chand and company 11th edition
3. Op-Amp and Linear Integrated Circuits-By Ramakant A. Gayakwad, PHI Learning Pvt. Ltd. New Delhi (4th Edition)
4. A textbook of applied electronics by R.S. Sedha, S.Chand publications.
5. Linear Integrated Circuits, by D. Roy Choudhary, Sahil Jail (Wiley Eastern Ltd)

Reference Books:

6. Integrated Electronics- By Millman-Halkias, International Students Edition.
7. Handbook of Integrated Circuit Operational Amplifier- By George B. Rutkowski, D.B. Taraporevala Sons and Co. Pvt.Ltd Prentice –Hall,Inc.
8. Electronic Principles –by A. P. Malvino, David Bates (7th Edition).

B.Sc. III Year, Sem-V
Course Code: U-ELE-554A
Communication Electronics-I-XA
Credits: 2 No of periods / wk: 3 Periods: 45
Marks: 50, End Sem.: 30 & In Sem.:20 (UT: 15 &AT: 05)

Learning Objectives:

1. To understand different types of modulations.
2. To learn different types of demodulation methods.

Course Outcomes: Students will be able to:

1. Understand various communication systems.
2. Explain various modulation types.
3. Elaborate various demodulation techniques.

Unit I: Introduction to Communication Systems: [10 Periods]

Introduction, Basic Communication system, Classification of electronic communication systems: Classification based on direction of communication, Nature of information signal & technique of signal transmission, Need of modulation, Different Types of modulation: AM, FM, PM, Pulse Analog Modulation, Pulse Code Modulation, Demodulation or Detection, Concept of Bandwidth. [Book 1, Chapter-1]

Unit II: Amplitude Modulation: [12 Periods]

Introduction to AM, Mathematical representation of AM wave: Modulation Index, Frequency spectrum of AM wave, Concept of Over modulation, Calculation of modulation index using AM wave and Trapezoidal Display, Power relations in AM wave, Generation of AM: Low Level Modulator, High level Modulation, High level Collector Modulator Circuit, AM Detector Circuits: Simple diode detector, Distortions in the Detector Output, Practical diode detector, Numerical problems. [Book 1, Chapter-2 & 4]

Unit III: Frequency Modulation: [12 Periods]

Introduction to Frequency Modulation(FM) & Phase Modulation (PM),Mathematical representation of FM: Modulation Index, Deviation Ratio, Mathematical Representation of FM, Frequency Spectrum of FM wave, Practical Bandwidth, Phase modulation(PM): How to generate FM from PM, Comparison of FM and PM, Comparison of FM and AM Systems, Generation of FM: Direct Methods for FM Generation, how to generate FM from PM, Transistor Reactance Modulator, Varactor Diode Modulator, Basic FM Demodulators: Principle of Slope Detection, Balanced Slope Detector, Numerical Problems. [Book 1, Chapter-5 & 6]

Unit IV: Pulse Modulation: [11 Periods]

Classification of Pulse Modulation Systems, Continuous and Discrete Time Signals, Sampling Process, Pulse Amplitude Modulation (PAM): Generation of PAM, Types of PAM, Detection of PAM, Pulse Width Modulation (PWM): Generation of PWM Signal, Detection of PWM Signal, Pulse Position Modulation (PPM): Generation of PPM Signal, Demodulation of

PPM, Comparison of PAM, PWM and PPM Systems, Pulse code modulation (PCM): PCM Transmitter (Encoder), PCM Receiver (Decoder). [Book 1, Chapter 7]

Recommended Books:

1. Communication Engineering by J.S. Katre (Second Revised Edition 2011) Tech- Max Publications, Pune.
2. Communication Electronics by Louis E. Frenzel (Second Edition) McGraw-Hill International Editions.

Reference Books:

3. Radio Engineering (Applied Electronics Vol.II) by G. K. Mithal, Khanna Publishers,Delhi-6.
4. Handbook of Electronics by Gupta and Kumar, Pragati Prakashan.
5. Electronic Communications by Dennis Roddy, John Coolen, and Prentice- Hall of India Private limited New Delhi.
6. Electronics Communication Systems, by George Kennedy Fourth Edition, Tata McGraw-Hill Publishing Company Limited.

B.Sc. III Year, Sem-VI
Course Code: U-ELE-554
Optical Fibre Communication -I-XB
Credits: 2 No of periods / wk: 3 Periods: 45
Marks: 50, End Sem.: 30 & In Sem.:20 (UT: 15 &AT: 05)

Learning Objectives:

1. To develop the understanding of elements of an optical fiber transmission link, block Diagram, advantages of optical fiber communication,
2. To develop a knowledge and understanding of the Ray theory of transmission, total Internal reflection, acceptance angle, numerical aperture, meridional and skew rays,
3. Comparing single mode and multimode fibers, linearly polarized modes,
4. Describing various types of optical fibre losses,
5. Understanding of digital and analogue modulations-demodulation using LED and Laser diodes.

Course Outcomes: Students will have the knowledge and skills to:

1. Analyze fiber optics and optical detectors components associated with fiber optics Systems,
2. Distinguish internal reflection, acceptance angle, numerical aperture and skew rays,
3. Identify difference between Coherent and non-coherent sources, quantum efficiency, Modulation capability of optical sources,
4. Explain bending losses, modal dispersion, waveguide dispersion and pulse broadening,
5. Apply the skills necessary to solve practical and design problems for fiber optic Communication systems.

Unit I: Ray Theory of Transmission [12 Periods]

What are optical Fibres?, Importance of optical Fibres**,** Introduction, Propagation of Light in Different Media, Propagation of Light in an Optical Fibre, Basic Structure of an Optical Fibre, and Propagation of light through it, Acceptance Angle and Acceptance Cone of a fibre, Numerical Aperture (General), Numerical Aperture of a Graded index fibre, Modes of Propagation, Meridional and Skew Rays, Comparison of Step and Graded Index Fibres, Applications of fibres.

Unit II: Classification of Fibres and Fibre Fabrication Techniques [12 Periods]

Stepped Index Fibre, Stepped-Index Monomode Fibre, Disadvantages of Monomode fibre, Graded Index Multimode Fibre. Classification of fibre fabrication techniques, External chemical vapor deposition, Axial vapor deposition (AVD),Internal chemical vapor deposition, Fibre Drawing and Coating, Double Crucible_Method, ROD-IN –TUBE Method, Numerical Problems.

Unit III: Fibre Losses and Communication Systems [12 Periods]

Attenuation in Optic Fibres, Materials or Impurity Losses, Rayleigh Scattering Losses, Absorption Loss, Leaky Modes, Bending Losses, Radiation Induced Losses, Temperature Dependence of Fibre Losses, Core and Cladding Losses.

Communication Systems: Introduction, Transmitter for Fibre Optic Communication, High Performance Transmitter Circuit (LED Digital Transmitter), LED Analog Transmitter, Comparison between Analog and Digital Transmitter, LASER Transmitter, Digital Laser Transmitter, Analog Laser Transmitter, Analog laser transmitter with A/D conversion and digital multiplexing**.**

Unit IV: Optical Fibre Communication and Measurements on Optical Fibres

[12 Periods]

Introduction, Important Applications of Integrated Optic Fibre Communication Technology, Long-Haul Communication, Introduction to measurements, Measurements of Numerical Aperture (NA), Measurement of fibre Attenuation, Measurements of Dispersion Losses, Measurements of Refractive Index, Cut-Off Wavelength Measurement, Measurements of Mode Field Diameter (MFD):Direct measurement of MFD.

Recommended Books:

1. Optical Fibre and Fibre Optic Communication Systems, S.K. Sarkar (S. Chand & Comp. Ltd, New Delhi.
2. Optical Fiber Communications: Principles and Practice- John M. Senior (PHI) Third Edition, Pearson Publications

Reference Books:

3. Optical Fiber Communications- Gerd Keiser (Mc Graw Hill Education) Fifth Edition.
4. Fundamentals of Fiber Optics in Telecommunication and Sensor Systems, Edited By B. P. Pal, New Age International Publisher, New Delhi, 1st Edition (2006)
5. Introduction to Fibre Optics- A. Ghatak and Thyagrajan (Cambridge University Press)
6. Principles of Optics-Max Born and Emil Wolf, Cambridge University Press, 7th (Expanded) edition.

B.Sc. III Year, Sem-V
Course Code: U-SEC-
Skill Enhancement Course -III
Electrical Circuits and Network Skills-III
Credits: 2 No of periods / wk: 3 Periods: 45
Marks: 50, End Sem.: 30 & In Sem.:20 (UT: 15 &AT: 05)
Theory: 30 Periods

Learning Objective: The aim of this course is to enable the students to design and trouble shoots the electrical circuits, networks and appliances through hands-on mode.

Course Outcomes: Students will be able to:

1. Apply the knowledge of electricity to solve the complex electrical problems.
2. Make electrical circuit analysis.
3. Make Grounding and isolating connections to electrical equipment.

Basic Electricity Principles: Voltage, Current, Resistance, and Power, Introduction to DC and AC circuits, Active and passive two terminal elements, Ohms law, Voltage-Current relations for resistor, inductor, capacitor, Kirchhoff's laws, Thevenin's theorem, Norton's theorem, maximum power transfer theorem and superposition theorem. (**10 Periods)**

Generators and Transformers: DC Power sources. AC/DC generators. Inductance, capacitance, and impedance. Operation of transformers. (**6 Periods)**

Solid-State Devices: Resistors, inductors and capacitors. Diode and rectifiers. Components in Series or in shunt. Response of inductors and capacitors with DC or AC sources (**7 Periods**)

Electrical Protection: Relays. Fuses and disconnect switches. Circuit breakers. Overload devices. Ground-fault protection. Grounding and isolating. Relay protection device (**7 Periods**)

Practical: 15 Periods

Laboratory Exercises (Any Five of the following):

1. Verification of Kirchhoff's current law and voltage law.
2. Verification of super position.
3. Verification of maximum power transfer theorem
4. Verification of Thevenin's theorem.
5. Verification of Norton's theorem.
6. Study of transformers.
7. Study of Fuses and switches.

Reference Books:

1. Electrical Circuits, K.A. Smith and R.E. Alley, 2014, Cambridge University Press
2. A text book in Electrical Technology – B.L. Thereja - S Chand & Co.
3. A text book of Electrical Technology – A. K. Thereja
4. Performance and design of AC machines - M G Say ELBS Edn.

B.Sc. III Year, Sem-V
Course Code: U-ELE-555
Electronics Laboratory Course-VII
Credits: 2 No of periods / wk: 3
Marks: 50, End Sem.: 30 & In Sem.:20 (RB-10 & AT: 10)

Learning Objectives:

1. To understand Op-amp parameters.
2. To make use of Op-amp for various arithmetic applications
3. To make use of Op-amp in different electronic applications.

Course Outcomes: students will be able to:

1. Determine parameters of Op-amp.
2. Make use of Op-amp in different arithmetic applications.
3. Construct electronic oscillator with Op-amp.

List of Experiments

1. Study of Op-Amp Parameters.
2. Determination of CMRR using Op-Amp.
3. Study of AC Inverting Op-Amp.
4. Study of DC Inverting Op-Amp.
5. Study of AC non-inverting Op-Amp.
6. Study of DC non-inverting Op-Amp.
7. Study of Adder and Subtractor using Op-Amp.
8. Study of differentiator and integrator using Op-Amp.
9. Study of Schmitt Triggers using Op-Amp.
10. Phase shift oscillator using 741.
11. Op-amp as log amplifier.
12. Use of Op-amp for solving differential equation.
13. Construct and study differential amplifier using transistors.

Note- At Least 06 Experiments Should be performed by Each Student from this Lab.

B.Sc. III Year, Sem-V
Course Code: U-ELE-556A
Electronics Laboratory Course-VIIIA
Credits: 2 No of periods / wk: 3
Marks: 50, End Sem.: 30 & In Sem.:20 (RB-10 & AT: 10)

Learning Objectives:

1. To understand generation and detection of different modulation techniques using IC's.
2. Analyze various waveforms using function generator.

Course Outcomes:

Students will be able to construct various modulators & demodulators using different IC's and transistors.

List of Experiments

1. AM Modulator.
2. Linear diode detector for AM.
3. FM generation using IC8038.
4. FM detection.
5. PAM Generation.
6. PWM Generation.
7. PPM Generation.
8. Function generator using IC8038.

Note- At Least 06 Experiments Should be performed by Each Student from this Lab.

B.Sc. III Year, Sem-VI
Course Code: U-ELE-556B
Electronics Laboratory Course-VIIIB
Credits: 2 No of periods / wk: 3
Marks: 50, End Sem.: 30 & In Sem.:20 (RB-10&AT: 10)

Learning Objectives:

1. To study different modulations using optical fiber.
2. To understand transmission and reception of analog as well as digital signals using optical fiber

Course outcomes: Students will be able to:

1. Make use of optic fiber for transmission and reception of signals.
2. Design modulation techniques using optic fiber.
3. Determine effect of losses on the performance of optical communication.

List of Experiments

1. Study & calculation of attenuation loss in optic fiber link.
2. Study of coupling light into fiber.
3. Study of numerical aperture.
4. Study of Pulse width modulation using optic fiber.
5. Frequency modulation using optic fiber link.
6. Transmission and reception of digital signal using optical fiber.
7. Transmission and reception of analog signal using optical fiber.
8. Measurement of Propagation loss.

Note- At Least 06 Experiments Should be performed by Each Student from this Lab.

B.Sc. III Year, Sem-VI
Course Code: U-ELE-653
Digital Electronics-XI
Credits: 2 No of Periods / wk: 3 Periods: 45
Marks: 50, End Sem.: 30 & In Sem.:20 (UT: 15 &AT: 05)

Course Objectives:

1. To imbibe basic digital design techniques.
2. To learn and understand design of combinational and sequential circuits.

Course outcomes: students will be able to:

1. Understand, analyze and design various combinational and sequential circuits.
2. Conduct experiments using digital IC's for a given application/problem statement.
4. Have skill to build and troubleshoot digital circuits.

Unit I: Combinational Circuits: [13 Periods]

Introduction, Exclusive-OR (XOR) gate and (XNOR) gate: using NAND gates.
Binary Adders: Half adder, full adder, half Subtractor, full Subtractor, serial and parallel addition, parallel adder, BCD(8421) adder, Excess-3 adder, encoder, decimal to BCD (diode matrix) encoder, decoder, BCD-to-decimal decoder, BCD-to-7-segment decoder, Multiplexer, Demultiplexer. [Book No. 1, Chapter-6]

Unit II: Flip – Flops: [10 Periods]

Introduction, Sequential Circuits: The Flip-Flop, The Basic Flip – Flop Circuit (The Latch), The RS Flip-Flop, The Clock, The level-Clocking Vs. Edge clocking, The Clocked RS Flip-Flop, JK- Flip-Flop, Master – Slave JK Flip-Flop, D-Flip-Flop, T- Flip-Flop, Asynchronous Inputs (PRESET and CLEAR), Flip-Flop Timing Considerations, Flip-Flop Applications: flip flop as debouncer switch. [Book No. 1, Chapter 7]

Unit III: Digital Counters (Binary Counters): [15 Periods]

Introduction, Basic Flip-Flop Counter, Modulus of a Counter, Types of Counter Asynchronous (Ripple) Counter, Mod-8 Ripple Counter, Mod-6 Ripple Counter, Asynchronous Mod-8 Down Counter, Asynchronous Up/Down Counter, Asynchronous Mod-10 (Decade) Counter, Example Asynchronous BCD Counter, Disadvantages of Asynchronous Counter, Synchronous Counters, Synchronous Mod -16 Counter (Serial Carry), Synchronous Mod-10 counter (Decade)(Parallel Carry), Applications of Counters. [Book No. 1, Chapter 8]

Unit IV: Shift Registers: [7 Periods]

Introduction, Basic Shift Register Operations, Serial In / Serial out Shift Registers, Serial In / Parallel out Shift Registers, Parallel In/ Serial out shift Registers, Parallel In /Parallel Out Shift Registers, Shift Register Counters: The Johnson Counter, The Ring Counter.
[Book No. 2, Chapter 9]

Recommended Books:

1. Digital Principles and Circuits- Dr. C. B. Agarwal, Himalaya Publishing House (1st Edition)
2. Digital Fundamentals (10th Edition) Thomas L. Floyd – Pearson.

Reference Books:

3. Digital Principle and Applications- By Donald P. Leach, Albert Paul Malvino Gautam Saha (Seventh Edition)Tata McGraw Hill Education Private Limited New Delhi
4. Digital Fundamentals (Eighth Edition) - Floyd and Jain Pearson Education.
5. Modern digital Electronics (25th Ann. Edition Fourth edition, -TATA Mc Graw Hill) by R. P .Jain.
6. Digital Electronics-(Second Edition) in introduction to theory and Practice by William H. Gothmanm.

B.Sc. III Year, Sem-VI
Course Code: U-ELE-654A
Communication Electronics-II-XIIA
Credits: 2 No of periods / wk: 3 Periods: 45
Marks: 50, End Sem.: 30 & In Sem.:20 (UT: 15 &AT: 05)

Learning Objectives:

1. To impart knowledge about digital communication system.
2. To inculcate the knowledge about RADAR.
3. To imbibe the applications of OFC.
4. To make aware about modern communication system.

Course Outcomes: Students will be able to:

1. Understand digital communication system.
2. Understand RADAR system.
3. Understand modern digital satellite communication.

Unit I: Radio Receivers: [12 Periods]

Function of a Receiver, Types of AM Receiver: Tuned Radio Frequency (TRF) Receiver, Superheterodyne Receivers, Characteristics of Radio Receivers: Sensitivity, Selectivity, fidelity, Image frequency and its Rejection, Double Spotting, FM Receiver: Block diagram of FM Receiver, Numerical Problems. [Book 1, Chapter 4 & 6]

Unit II: RADAR Systems: [10 Periods]

Introduction, Basic Principles, Radar Equation, Factors Influencing Maximum Range, Types of Radar, Basic Pulsed Radar System, Important Terms Used in Pulsed Radar, Duplexers, Moving Target Indicators (MTI), Continuous Wave(CW) Doppler Radar with IF amplification. [Book 2 & 3, Chapter 11 & 14]

Unit III: Introduction to Optical Fibres: [12 Periods]

Introduction, Importance of Optical Fibres, Generations of Telephone System and Optical Fibre, Propagation of light in different media, Propagation of light waves in an optical fibre, Basic structure of an optical fibre, and propagation of light wave through it, Acceptance angle & Acceptance Cone of a fibre, Numerical Aperture (general), Comparison of Single Mode and Multimode Fibres, Comparison of Step Index and Graded Index fibres, Applications of Fibres, Classification of Optical Fibres: Stepped Index fibre, Stepped-Index Monomode fibre, Graded Index Multimode Fibre, Numerical problems. [Book 4, Chapter: 1, 2, and 3]

Unit IV: Modern Communication Applications: [11 Periods]

Satellite Communications Systems: General Block Diagram, A Transponder, Frequency bands, Modems: Digital data transmission, Block diagram of FSK modem, General block diagram of a UART, A digital FSK modulator, A digital FSK demodulator, Introduction to Networks: A Simple communication network, A Star LAN configuration, A Ring LAN

configuration, A Bus LAN configuration, Comparison of LAN topologies, Light-wave communications systems: Basic elements of a fiber-optic communications system, Cellular Radio Systems: General block diagram of a Cellular Radio.
[Book 5, Chapter 11.2, 12.2, 12.4, 13.1, 14.2]

Recommended Books:

1. Communication Engineering by J.S. Katre (Second Revised Edition 2011) Tech- Max Publications, Pune.
2. Microwave Engineering by Sanjeev Gupta, Khanna Publishers.
3. Radio Engineering (Applied Electronics Vol.II) by G. K. Mithal, Khanna Publishers, Delhi-6
4. Optical Fibers & Fiber Optic Communication Systems- Dr.Subir Kumar Sarkar, S. Chand & Company Ltd.
5. Communication electronics by Louis E. Frenzel (Second Edition) McGraw-Hill International Editions.

Reference Books:

6. Electronics Communication Systems, by George Kennedy Fourth Edition, Tata McGraw-Hill Publishing Company Limited.
7. Electronics communication, by Dennis Roddy and John Coolen, Prentice-Hall of India private limited, New Delhi.

B.Sc. III Year, Sem-V

Course Code: U-ELE-654B

Microprocessors & Microcontrollers-II-XIIB

Credits: 2 No of periods / wk: 3 Periods: 45

Marks: 50, End Sem.: 30 & In Sem.:20 (UT: 15 &AT: 05)

Course Objectives:

1. To understand 8085 microprocessor architecture and programming.
2. To understand interrupts of 8085 and programs over interrupts.
3. To compare microprocessor and microcontroller.
4. To understand 8051 and PIC microcontroller architecture and programming.

Course Outcomes:

1. Know the architecture of 8085.
2. Write programs over 8085 microprocessors.
3. Know architecture and instruction set of 8051 and PIC microcontrollers.

Unit I Introduction to 8085 Microprocessor: [12 periods]

CPU Architecture, Register Organization, 8085 Instruction Set, Addressing modes. Stack &Subroutines, Instruction Cycle, Interrupts of 8085(Hardware and software).

Unit II Interfacing: [11 periods]

Memory interfacing, I/O interfacing, Memory mapped I/O, I/O mapped I/O, Peripheral Interfacing – Programmable I/O-8255 Interface, ADC – 0809, DAC – 0808, Seven segment LED, 4 x 4 Matrix keyboard, stepper motor.

Unit III Introduction to MCS51
[12 periods]

Introduction to concept of microcontroller, comparison of Microprocessor and Microcontroller Comparison of all 8 bit microcontrollers, Intel 8051 microcontroller Architecture, Pin diagram, Memory organization of 8051, special function registers, Internal structure of I/O ports, operation of I/O ports. Interfacing of 8051 with external Memory, Addressing Modes, and Instruction Set.

Unit IV Interfacing & Application [10 periods]

Interfacing: RAM ROM, LCD, ADC, DAC, Keyboard, stepper motor Minimum system design &Application: Interfacing of Temperature Sensor (LM35) 8051, connection to RS232.

Recommended Books:

1. Microprocessor Architecture, Programming and Applications with 8085, Ramesh S. Gaonkar – Wiley Eastern Limited- IV Edition.
2. Muhammad Ali Mazidi, "Microprocessors and Microcontrollers", Pearson, 2006.

Reference books:

3. Fundamentals of Microprocessor & Microcomputer: B. Ram—Dhanpat Rai Publications.
4. Microchip PIC16F87X datasheet
5. PIC Microcontrollers, Milan Verle, mikro Elektronika, 1st edition (2008)

B.Sc. III Year, Sem-V
Course Code:
Skill Enhancement Course -IV
Basic Instrumentation Skill-IV
Credits: 2 No of periods / wk: 3 Periods: 45
Marks: 50, End Sem.: 30 & In Sem.:20 (UT: 15 &AT: 05)
Theory: 30 Periods

Learning Objective: This course is to get exposure with various aspects of instruments and their usage through hands-on mode. Experiments listed below are to be done in continuation of the topics.

Course Outcomes:

After successful completion of the course the students will be able to:

1. Make use of CRO as a versatile measuring device.
2. Use Digital multimeter for measuring voltages and currents.
3. Balance the various bridges.

Basic of Measurement: Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements. (**5 Periods**)

Multimeter: Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance. (**6 Periods**)

Digital Multimeter: Block diagram and working of a digital multimeter. Measurements with digital multimeter dc voltage and dc current, ac voltage, ac current and resistance etc. (**5 Periods**)

Cathode Ray **Oscilloscope:** Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only– no mathematical treatment), brief discussion on screen phosphor, visual persistence & chemical composition. Time base operation, synchronization. Front panel controls.

Use of CRO for the measurement of voltage (dc and ac frequency, time period. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope: Block diagram and principle of working. (**9 Periods**)

Impedance Bridges & Q-Meters: Block diagram of bridge, Working principles of basic (balancing type) RLC bridge, Function generator: Block diagram and working. (**5 Periods**)

Practical: 15 Lectures

Laboratory Exercises (Any Five of the following):

1. To study the loading effect of a multimeter while measuring voltage across a low resistance and high resistance.
2. To observe the limitations of a multimeter for measuring high frequency voltage and currents.
3. To measure Q of a coil and its dependence on frequency, using a Q- meter.
4. Measurement of voltage, frequency, time period and phase angle using CRO.
5. Measurement of rise, fall and delay times using a CRO.
6. Measurement of R, L and C using a LCR bridge/ universal bridge.
7. Use of Dual Trace Oscilloscope.
8. Use of function generator.

Reference Books:

1. A text book in Electrical Technology - B L Thereja - S Chand and Co.
2. Electronic Devices and circuits, S. Salivahanan & N. S. Kumar, 3rd Ed., 2012,
3. Electronic Devices, 7/e Thomas L. Floyd, 2008, Pearson India
4. Electronic Measuring Instruments by Kalsi

B.Sc. III Year, Sem-VI
Course Code: U-ELE-655
Electronics Laboratory Course-IX
Credits: 2 No of periods / wk: 3
Marks: 50, End Sem.: 30 & In Sem.:20 (RB-10&AT: 10)

Learning Objectives:

1. To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronic circuits.
2. To impart how to design digital circuits.

Course Outcomes:

1. Students will be able to design different combinational and sequential circuits.

List of Experiments

1. Binary half Substractor and Full Substractor using NAND gates.
2. BCD (8421) Adder.
3. Study of RS, JK, T and D type Flip flops.
4. Mod 8- Synchronous Counter.
5. Asynchronous BCD Counter.
6. Ring Counter using Flip flop.
7. Johnson's counter using Flip flop.
8. Study of Multiplexer.
9. Study of De-Multiplexer.
10. BCD to decimal decoder.
11. BCD to 7-segment decoder.

Note- At Least 06 Experiments Should be performed by each student from this Lab.

B.Sc. III Year, Sem-VI
Course Code: U-ELE-656A
Electronics Laboratory Course-XA
Credits: 2 No of periods / wk: 3
Marks: 50, End Sem.: 30 & In Sem.:20 (RB-10&AT: 10)

Learning Objectives:

1. To study the various amplifiers.
2. To understand different parameters of OFC like NA, bending loss and power etc.

Course Outcomes: students will be able to:

1. To design different amplifiers.
2. Know different parameters of OFC.
3. Design and construct different electronic circuits using analog IC's.

List of Experiments

1. Study of tuned RF amplifier.
2. Study of tuned IF amplifier.
3. Study of Audio amplifier using LM380/386.
4. Data transmission using OFC.
5. Determination of numerical aperture of given optical fibre.
6. Study of bending loss of given optical fibre.
7. Calculation of transmitting and receiving power using optical fibre.
8. FSK modulator (using IC555).
9. Analog multiplexing (TDM) using IC4051.

Note- At Least 06 Experiments Should be performed by Each Student from this Lab.

B.Sc. III Year, Sem-V
Course Code: U-ELE-656B
Electronics Laboratory Course-XB
Credits: 2 No of periods / wk.: 3
Marks: 50, End Sem.: 30 & In Sem.:20 (RB-10 & AT: 10)

Learning objectives:

1. To practice a programs on 8051 simulator and hardware kit.
2. To use the knowledge to interfacing of LED, LCD to 8051.

Course outcome:

1. Use the knowledge of instruction set to perform practical over 8051 and PIC Microcontrollers.
2. Use simulators and down load the programs in Hardware kit.
3. Interface LED, LCD stepper motor etc. to 8051.

List of Experiments:

Note: Assembly Language Programming to be done using standard IDE simulator

1. Arithmetic& Logical operations using 8085.
2. Data transfer & Exchange using 8085.
3. Interface Stepper motor using 8051.
4. Interface DAC using 8051.
5. Interfacing of LCD (2X16).
6. Interfacing of stepper motor and Rotating stepper motor by N steps clockwise/anticlockwise with speed control.
7. Interface ADC & DAC using 8085.
8. Arithmetic & Logical operations using 8051.

Note- At Least 06 Experiments Should be performed by Each Student from this Lab.