

Gujarat University
Ahmedabad

B.Sc. Semester – III
Electronics Theory & Practical
(Effective from June 2018)

| Unit | Electronics Theory ELE – 201 4 Credit Total 100 Marks Internal : 30 Marks External : 70 Marks | Electronics Theory ELE – 202 4 Credit Total 100 Marks Internal : 30 Marks External : 70 Marks | Electronics Practical ELE – 203 2.5 Credit Total 100 Marks Internal : 30 Marks External : 70 Marks |
|-------------|--|--|---|
| Unit – I | LF-HF ANALYSIS | IMPEDANCE TRANSFORMATION | A, B & C three groups : Each group consists of 06 experiments. |
| Unit - II | FEED BACK AMPLIFIERS | PASSIVE FILTERS LINEAR WAVE SHAPING CIRCUIT | Total 18 experiments. External Examination: 70 |
| Unit - III | FET AND MOSFET | DIGITAL | Marks Group A : 23 Marks Group B : 23 Marks Group C : 24 Marks |
| Unit - IV | FILTERS AND REGULATORS | MICROPROCESSOR | Practical batch size: Maximum 15 students. |

In order to give exposure of Industry, Research Institute and Higher Learning in the field of Electronics, Industrial/ Institutional visit may be arrange. It is expected that students of B.Sc. Sem III or IV with Electronics as one of the subject must visit the Industry/ Research Institute/ Institute of Higher Learning during either III or IV semester.

GUJARAT UNIVERSITY
B.Sc. (Electronics) Semester – III (Effective from June 2018)
ELECTRONICS : ELE – 201
(4 Credit)

Unit - I:

Low-Frequency Response of the Transistor Amplifier: Effect of an emitter bypass capacitor on low frequency response, effect of a coupling capacitor on low frequency response, cascading of CE stages, mid-frequency gains, low-frequency response of cascaded stages, amplifier low-frequency response of a square wave, Transformer coupled transistor amplifier, low-frequency responses of a transformer coupled transistor amplifier, low-frequency responses of a transformer coupled amplifier, step response of a transformer coupled amplifier.

High-Frequency Response of the Transistor Amplifier: High frequency model for the CE amplifier, Approximate CE High-frequency model with a resistive load, CE short-circuit current gain, high-frequency current gain with resistive load, high-frequency response of cascaded CE stages, amplifier high-frequency responses to a square wave, high-frequency response of a transformer-coupled amplifier.

Text Book: Electronic Devices and circuits by Allen Mottershead 15.1 to 15.8 and 16.1 to 16.7

Ref. Book: Electronic Devices and Circuits by S Salivahanan.
Electronic Devices and Circuits by Sanjeev Gupta.

Unit - II:

Feedback Amplifiers: Feedback Amplifiers, Principle of Feedback Amplifiers, Advantages of Negative Feedback, Gain Stability, Decreased Distortion, Increased Bandwidth, Forms of Negative Feedback, Shunt-derived Series-fed Voltage Feedback, Current-series Feedback Amplifier, Voltage-shunt Negative Feedback Amplifier, Current-shunt Negative Feedback Amplifier.

Text Book: Basic Electronics Solid State by B.L. Theraja 25.1 to 25.11

Unit - III:

Field Effect Transistors Amplifier: What is FET?; JFET: Basic Construction, Theory of Operation; Static Characteristics of a JFET: Drain characteristic & Transfer characteristic; JFET Drain Characteristic with $V_{GS}=0$: Ohmic Region, Pinch-off Region, Breakdown Region; JFET Characteristic with External Bias; Transfer Characteristic; Small Signal JFET Parameters; DC Biasing of a JFET; DC Load Line for JFET; Common Source JFET Amplifier; JFET on an IC Chip; Advantages and Disadvantages of FETs.

MOSFET: Depletion MOSFET, Enhancement MOSFET, DE MOSFET: Construction & Working, Schematic Symbols for a DE MOSFET, Static Characteristics of a DE MOSFET, Enhancement-only N-Channel MOSFET, Transfer Characteristic, FETs as Switches, FET Applications, MOSFET Handling.

Text Book: Basic Electronics Solid State by B.L. Theraja 26.1 to 26.12 and 26.13 to 26.21

Unit - IV:

Filters: Filters, Series Inductor Filter, Shunt Capacitor Filter, Effect of Increasing Filter Capacitance, LC Filter, Ripple factor in LC filter, CLC or π Filter, Bleeder Resistor.

Regulators: Voltage Regulation, Zener Diode Shunt Regulator, Transistor Series Voltage Regulator, Controlled Transistor Series Regulator, Transistor Shunt Voltage Regulator, Transistor Current Regulator.

Text Book: Basic Electronics Solid State by B.L. Theraja 17.9 to 17.15 and 17.16 to 17.21

GUJARAT UNIVERSITY
B.Sc. (ELECTRONICS) Semester – III (Effective from June 2018)
ELECTRONICS : ELE – 202
(4 Credit)

Unit – I:

Impedance Transformation and Coupled Circuits: Transformation impedance with tapped resonant circuits, Reactance L sections for impedance transformation, Image impedances; reactance matching, Reactance T networks for impedance transformation, Coupled circuits, Mutual inductance, Coefficient of coupling, Equivalent T network for magnetically coupled circuit, Iron-core transformer; the ideal transformer, Singly tuned air-core transformers, Doubly-tuned air-core transformer, Effects of overcoupling; selectivity curves, Design of overcoupled circuits.

Text Book: Networks, Lines and Fields by J.D. Ryder 3.1 to 3.14

Unit – II:

Wave Shaping Circuit: High pass RC circuit (for sinusoidal and square wave i/p), High pass RC circuit as differentiator, Low pass RC circuit (for sinusoidal and square wave i/p), Low pass RC circuit as an integrator.

Filters: The neper; the decibel, Characteristics impedance of symmetrical network, Current and Voltage ratio as exponentials; the propagation constant, Properties of symmetrical networks, Filter fundamentals; pass and stop bands, Behaviour of the characteristic impedance, The constant-k low-pass filter, The constant-k high-pass filter.

Text Book: Hand book of Electronics by Kumar & Gupta and Pragati Prak. 35th ed. 17.1 to 17.4

Text Book: Networks, Lines and Fields by J.D. Ryder 4.1 to 4.3 and 4.5 to 4.9

Unit – III:

Digital: Arithmetic building blocks, The Adder-Subtractor, Arithmetic logic unit.

The 555 Timer, The 555 as a Monostable Multivibrator, Monostable Multivibrator Applications: Frequency divider and Pulse Stretcher, The 555 as a Astable Multivibrator, Astable Multivibrator Applications: Square-wave oscillator and Free-running ramp generator, Schmitt Trigger.

Text Book: Digital principles and applications by Malvino & Leach 6th Ed. 6.7,6.8, 6.10 and 9.1 to 9.2

Text Book: Op-Amps and Linear Integrated Circuits by R.A. Gayakwad 3rd Ed. 10-4.1 to 10-4.4 and 9-4

Unit – IV:

Microprocessor, Microprocessor Instruction set and computer language, From large computer to single chip microcontroller.

The 8085 programming model, instruction classification, instruction data format and storage, how to write assemble and execute a simple program, overview of 8085 instruction set.

Text Book: Microprocessor, Architecture, Programming and Application with the 8085, (5th Edition). Remesh Gaonkar, Penram International Publishing Private Limited.

Articles: 1.1 to 1.3, 2.1 to 2.5

GUJARAT UNIVERSITY
B.Sc. (ELECTRONICS) Semester – III (Effective from June 2018)
ELECTRONICS : ELE – 203
(2.5 Credit)
(Effective from: June' 2018)

Group – A:

1. FET Characteristics
2. JFET Common Source Amplifier
3. Transformer Coupled Amplifier
4. Voltage series negative feedback amplifier
5. Common-Collector Amplifier (Bandwidth, I/P and O/P resistance)
6. To study band pass/ band rejection RC filter

Group - B:

1. Transistor series voltage regulator. (load and line regulation)
2. Electronics voltage regulator with error amplifier. (load regulation and line regulation)
3. Measurement of ripple factor of C filter using CRO at different load.
4. Study of Lissajous figures and Measurement of frequency and phase difference using C.R.O. (for RC network)
5. Transistor constant current regulator.
6. Load regulation characteristics of shunt voltage regulator.

Group - C:

1. Arithmetic circuit: Half adder, Full adder, (Using EX-OR and NAND gates)
2. Half subtractor, Full subtractor (Using EX-OR and NAND gates)
3. 4-bit adder subtractor using IC 7483, 7486
4. Study of 8:1 multiplexer (74151) and Study of 1:4 and 1:8 demultiplexer using IC 74155
5. Monostable Multivibrator using IC 555
6. To find the frequency of Astable multivibrator using IC 555

A, B & C three groups: (Total 100 Marks : Internal 30 marks , External 70 Marks)

Each group consists of 06 experiments.

Total 18 experiments.

External Examination: 70 Marks

Group A : 23 Marks

Group B : 23 Marks

Group C : 24 Marks

Practical batch size: Maximum 15 students.

15% of new experiments can be introduces AND / OR replaced as per the need, with the permission of the Head. Total of at least 14 Experiments is to be done from all the three groups.

Gujarat University
Ahmedabad

B.Sc. Semester – IV
Electronics Theory & Practical
(Effective from June 2018)

| Unit | Electronics Theory ELE – 204 4 Credit Total 100 Marks Internal : 30 Marks External : 70 Marks | Electronics Theory ELE – 205 4 Credit Total 100 Marks Internal : 30 Marks External : 70 Marks | Electronics Practical ELE – 206 2.5 Credit Total 100 Marks Internal : 30 Marks External : 70 Marks |
|-------------|--|--|---|
| Unit – I | OSCILLATORS MULTIVIBRATORS | LAPLACE TRANSFORM | A, B & C three groups : Each group consists of 06 experiments. Total 18 experiments. External Examination: 70 Marks Group A : 23 Marks Group B : 23 Marks Group C : 24 Marks Practical batch size: Maximum 15 students. |
| Unit - II | POWER AMPLIFIER | FOURIER ANALYSIS | |
| Unit - III | IC FABRICATION | DIGITAL | |
| Unit - IV | OPERATIONAL AMPLIFIER | MICROPROCESSOR | |

In order to give exposure of Industry, Research Institute and Higher Learning in the field of Electronics, Industrial/ Institutional visit may be arrange. It is expected that students of B.Sc. Sem III or IV with Electronics as one of the subject must visit the Industry/ Research Institute/ Institute of Higher Learning during either III or IV semester.

GUJARAT UNIVERSITY
B.Sc. (ELECTRONICS) Semester – IV (Effective from June 2018)
ELECTRONICS : ELE – 204
(4 Credit)

Unit – I:

Transistor Oscillators : Effect of positive feed back, requirement for oscillations, the phase shift oscillator with complete analysis, Wein bridge oscillator with complete analysis, resonant circuit oscillators, Hartley and Colpitt's with complete analysis, crystal oscillator.

Multivibrators : Switching characteristics of a transistor, switching time in a transistor, multivibrators, Astable multivibrator, Monostable multivibrator, Bistable multivibrator, Schmitt's trigger.

Text Book: Electronic Devices and circuits by Allen Mottershead 18.1 to 18.10

Text Book: Handbook of electronics by Kumar and Gupta, Pragati Prak. Chapter 11 and 12.

Unit – II:

Class-A Power Amplifiers: Class-A direct coupled resistive load, Transformer Coupled Resistive Load, Design Theory, Power Amplifier Design, Harmonic Distortion, Power Output, Variation of Output power with load, Output Transformer Saturation, Disadvantages of a single ended transformer coupled amplifier, Push-pull Amplifier, Description of operation of class-A push-pull Amplifier, Theory of operation of class-A push-pull Amplifier.

Class-B Power Amplifier: The class-B push-pull Amplifier, Cross Over Distortion, Class-AB push-pull Amplifier, Transistor Phase Inverter, Conversion Efficiency of Class-B Amplifier, Relation between maximum output power and load, Relation between maximum output power and Transistor dissipation, Design of class-B push-pull amplifier, Other class-B push-pull amplifiers, Complementary Symmetry, Practical complementary symmetry amplifier.

Text Book: Electronic Devices and Circuit by Allen Mottershead 19.1 to 19.7, 19.9, 19.10 to 19.13, 20.1 to 20.11

Ref. Book: Electronics Devices and Circuits by S. Shalivahanan, 2nd Ed.

Unit – III:

Integrated circuit fabrication: Classification, IC Chip size and circuit complexity, fundamental of monolithic IC technology, basic planar processes, fabrication of a typical circuit, active and passive components of ICs, fabrication of FET, thin and thick film technology, technology trends.

Text Book: Linear Integrated Circuits by Roy Chaudhary & S.B. Jain New Age Int Pub. 4th Ed. Chap. 1

Unit – IV:

Operational Amplifier: Introduction, basic information of OPAMP, The ideal operational amplifier.

Operational amplifier characteristics: D.C Characteristics: Input bias current, Input offset current, Input offset voltage, total output offset voltage, thermal drift, slew rate, analysis of data sheet.

Text Book: Linear Integrated Circuits by Roy Chaudhary & S.B. Jain New Age Int Pub. 4th Ed. 2.1 to 2.3 & 3.1 to 3.4

GUJARAT UNIVERSITY
B.Sc. (ELECTRONICS) Semester – IV (Effective from June 2018)
ELECTRONICS : ELE – 205
(4 Credit)

Unit – I:

Laplace transformations: Inverse laplace transformation, important theorems regarding laplace transformation, application of laplace transformation in analyzing simple networks, use of partial function expansion in analysis using laplace transformation, Heaviside's partial function expansion theorem, response of series RL circuit to exponential driving voltage, response of series RC circuit to exponential driving voltage, response of series RLC circuit to exponential driving voltage, response of series RLC circuit to exponential driving current, response of series RL circuit to step sinusoidal voltage, response of series RC circuit to step sinusoidal voltage, response of series RLC circuit to step sinusoidal voltage.

Text Book: Network Analysis By G K Mithal Khanna Publishers 6.2 to 6.14

Ref. Book: Network Analysis M. E. Van Valkenberug,
Digital Signal Processing S Salivahanan, A Vallavaraj, C Gnanapriya

Unit – II:

Fourier transforms: Evaluation of fourier coefficient, use of fourier series in network analysis, waveform symmetries as related to fourier coefficients, exponential form of fourier series, steady state response to periodic signals.

Spectrum envelop for a recurring pulse, fourier integral and fourier transform, a few typical fourier transforms, the relationship of fourier and laplace transforms, application in network analysis, bandwidth and pulse duration, different pulses and their amplitude spectra.

Text Book: Network Analysis By G K Mithal Khanna Pub. 15.1 to 15.5, 15.7, 15.8 & 16.1 to 16.6

Ref. Book: Network Analysis M. E. Van Valkenberug
Digital Signal Processing S Salivahanan, A Vallavaraj, C Gnanapriya

Unit – III:

Flip-Flops : RS Flip-Flops, Gated Flip-Flops, Edge-triggered RS Flip-Flops, Edge-triggered JK Flip-Flops, Flip-Flop timing, JK master slave flip-flops, Switch contact bounce circuits, Various representation of flip-flops, Analysis of sequential circuits.

Types of Registers, serial – in- serial out, serial in-parallel out, parallel in serial out, parallel in parallel out, Application of Shift Registers.

Text Book: Digital Principles and Applications Leach Malvino and saha 8.1 to 8.10 and 9.1 to 9.6

Unit – IV:

Microprocessor Architecture and Microcomputer Systems: Microprocessor Architecture and its operations, Memory, Input and Output devices, Example of a microcomputer system, Logic devices for interfacing.

Text Book: Microprocessor, Architecture, Programming and Application with the 8085, (5th Edition). Remesh Gaonkar, Penram International Publishing Private Limited.
Articles: 3.1 to 3.5

GUJARAT UNIVERSITY
B.Sc. (ELECTRONICS) Semester – IV (Effective from June 2018)
ELECTRONICS : ELE – 206
(2.5 Credit)
(Effective from June' 2018)

Group – A:

1. OPAMP Parameters
2. Inverting Amplifier using OPAMP (Bandwidth)
3. Non inverting Amplifier using OPAMP
4. Two stage RC Coupled amplifier (Gain Bandwidth Product)
5. Complementary Symmetry Push Pull Power Amplifier without preamplifier
6. To study current to voltage and voltage to current converter using OPAMP 741

Group – B:

1. Passive integrator and differentiator
2. Clipper and clamper circuit
3. RC Phase shift oscillator
4. Astable multivibrator using transistor
5. Wein Bridge Oscillator
6. To find the frequency of Colpitt's oscillator

Group – C:

1. Schmitt's Trigger
2. Study of shift register using 7495
3. RS Flip flop using gates and JK, D and T Flip flop using IC.
4. 3- 8 decoder and BCD to decimal decoder (74138 and 7475)
5. Study of decimal to BCD encoder (priority encoder 74147) and seven segment display decoder (7447) (Display the number using both IC)
6. To study the bistable multivibrator

A, B & C three groups: (Total 100 Marks : Internal 30 marks , External 70 Marks)

Each group consists of 06 experiments.

Total 18 experiments.

External Examination: 70 Marks

Group A : 23 Marks

Group B : 23 Marks

Group C : 24 Marks

Practical batch size: Maximum 15 students.

15% of new experiments can be introduced AND / OR replaced as per the need, with the permission of the Head. Total of at least 14 Experiments is to be done from all the three groups.