

Gujarat University
Ahmedabad

B. Sc. Semester – III
Electronics Theory & Practical
(Academic Year 2012 – 13)

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	HF-LF ANALYSIS	IMPEDANCE TRANSFORMATION	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	NEGATIVE FEED BACK AMPLIFIERS	PASSIVE FILTERS LINEAR WAVE SHAPING CIRCUIT	
Unit - III	FET AND MOSFET	DIGITAL	
Unit - IV	FILTERS AND REGULATORS	MICROPROCESSOR	

In order to give exposure of industry, research institute and higher learning in the field of physics, industrial / institutional visit may be arrange. It is expected that students of S. Y. B. Sc. with Physics / 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
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 with 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.

Reference Book :

Electronic Devices and circuits by Allen Mottershead 15.1 to 15.8 and 16.1 to 16.7
Electronic Devices and Circuits S Salivahanan and others TMH Ed.
Electronic Devices and Circuits Sanjeev Gupta

Unit - II:

Negative feedback in transistor amplifiers : General theory of feedback, reasons for negative feedback, loop gain, Types of negative feedback in transistor circuits with complete analysis. The Darlington connections, biasing the Darlington amplifier with complete analysis.

Reference Book:

Electronic Devices and circuits by Allen Mottershead
Article No. 17.1 to 17.6

Unit - III:

Field effect transistor Amplifier: Advantages and disadvantages and of the FET, Basic construction of the JFET, characteristic curves of the JFET, Principle of operation of the JFET, Effect of V_{ds} on channel conductivity, channel ohmic region and pinch off region, characteristic parameters of the FET, Effect of temperature FET parameters, common source AC amplifier with complete analysis, fixed bias with self-bias, the common drain or source follower with complete analysis, frequency response of FET amplifier with complete analysis, frequency response of FET amplifier with complete analysis, other amplifier configurations.

MOSFET: The depletion MOSFET, The enhance MOSFET, difference between JFETS and MOSFETS, handling precautions for MOSFETS, Dual gate MOSFETS, Integral gate protection, Testing field effect transistor, applications of FETS in its channel ohmic region, application of FET as a VVR in voltage control attenuator, The field effect diode.

Reference Book :

Electronic Devices and circuits by Allen Mottershead
Article No.: 21.1 to 21.14, 22.1 to 22.10

Unit - IV:

Filters: Inductor Filter, C- Filter (Ripple factor, approximate method), choke input LC filter, Ripple factor in LC filter, value of critical inductance, C-L-C filter.

Text book:

Electronic Devices and circuits by Allen Mottershead

3.1 to 3.4, 3.9 to 3.11 and 3.13.

Voltage Regulators: Voltage regulation, zener diode shunt regulator, working of zener diode shunt regulator, optimum value of current limiting resistor, disadvantage of zener diode shunt regulator, transistor shunt regulator, transistor series regulator, controlled transistor series regulator, short circuit protection against overload, transistor current regulator.

Text book:

A Text Book of Electronic Circuits by R S Sedha, S. Chand & Co.

Articles: 34.1 to 34.13

GUJARAT UNIVERSITY
B. Sc. (ELECTRONICS) Semester – III
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 impedance, 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 transformer, doubly tuned air core transformer, effects of over coupling, selectivity curves design over coupled circuits.

Reference Books:

Networks, Lines and Fields by J. D. Ryder (3.1 to 3.14)

Network Analysis G K Mithal

Unit – II:

Wave Shaping Circuit : High pass R C circuit (for sinusoidal and square wave i/p) High pass RC circuit as differentiator, low pass R C circuit (for sinusoidal and square wave i/p), low pass RC circuit as a integrator,

Text Book :

Hand book of Electronics, Kumar and Gupta, Pragati Prakashan 35th ed. (14.1 to 14.4)

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 highpass filter.

Text book:

Networks, Lines and Fields by J. D. Ryder (4.1 to 4.3, 4.5 to 4.9)

Unit – III:

Arithmetic building blocks: adder, subtractor, arithmetic logic unit.

Text book:

Digital principles and applications by Malvino & Leach 6th Edition

Articles: 6.7,6.8, 6.10

Clock and 555 Timer:

Description of functional diagram, monostable operation, linear ramp generator, frequency divider, astable operation.

Text Book: Linear Integrated Circuits 4th Edition by Chaudhary and Jain, New Age International Publishers.

Articles: 8.1 to 8.4.

Ref: OPAMPs and Linear Integrated Circuits by Ramakant Gayakwad

Clock waveforms, TTL clock, Schmitt Trigger, Monostables with input logic, Pulse Forming Circuit.

Text Book: Digital principles and applications by Malvino & Leach 6th Edition

Articles: No. 7.1. to 7.3, 7.6, 7.7

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 8085 5th Ed, Ramesh Gaonkar Penram Int. pub Pvt. Ltd.

Articles: 1.1 to 1.3, 2.1 to 2.5

GUJARAT UNIVERSITY
B. Sc. (ELECTRONICS) Semester – III
ELECTRONICS : ELE – 203
(2.5 Credit)

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) To design and test transistor series voltage regulator. (load and line regulation)
- 2) To design and test 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) To design and test 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.

Gujarat University
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B. Sc. Semester – IV
Electronics Theory & Practical
(Academic Year 2012 – 13)

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 physics, industrial / institutional visit may be arrange. It is expected that students of S. Y. B. Sc. with Physics / 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
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.

Reference Book :

Electronic Devices and circuits by Allen Mottershead

Article No. 18.1 to 18.10

Handbook of electronics by kumar and gupta : Articles : chapter 11, 35th Edition

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

Reference Book :

Hand book of electronics : Kumar and Gupta, Pragati Prakashan

Articles : Chapter 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

Articles No. 19.1 to 19.7, 19.9, 19.10 to 19.13, 20.1 to 20.11

Ref : Electronics Devices and Circuits by S. Shalivahanan, N.Suresh Kumar, A.Vallavaraj, 2nd Edition, TMH.

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 and S. B. Jain New Age Int Publisher 4th Edition.

Chapter 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 and S. B. Jain New Age Int Publisher 4th Edition.

Article No: 2.1, 2.2, 2.3, 3.1, 3.2, 3.3.4, 3.4

GUJARAT UNIVERSITY
B. Sc. (ELECTRONICS) Semester – IV
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

Article No.: 6.2 to 6.14

Ref: 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 Publishers

Article No: 15.1 to 15.5, 15.7 to 15.8 and 16.1 to 16.6

Ref: 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

Article No: 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.

Reference Book :

Microproces, 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
ELECTRONICS : ELE – 206
(2.5 Credit)

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

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Group B : 23 Marks

Group C : 24 Marks

Practical batch size: Maximum 15 students.