

St. Xavier's College (Autonomous), Ahmedabad-9
Syllabus under Autonomous system for BSc. Electronics

Semester-1
Electronics
Course Code: EL-1501
No. of Credits: 04
Learning Hours: 60 hrs

ELECTRONICS – EL-1501 (Basics of Electronics-1)

UNIT 1:

Passive Circuit element and Measuring Instrument:

Resistors, nonlinear resistors, inductors, types of inductors, capacitors, classification of capacitors, different type of capacitors. Switch, types of switches, fuses, circuit breaker, relay, PCB.

Text Book: A Text Book of Applied Electronics By R S Sedha; S. Chand & Company.

Articles: 13.1 to 13.48, 14.1 to 14.14

Ref Book: (1) A monograph on Electronics Design Principle, By Goyal and Khetan,
Khanna Publisher

(2) Basic Electronics (Solid State) by B. L. Theraja S. Chand & Co.

DC ammeters, DC voltmeters, Voltmeter sensitivity , series type ohmmeter, shunt type ohmmeter, multimeter, Rectifier type instruments(AC voltmeter), Typical multimeter circuit.

Surface Mount Devices

Text Book: Modern Electronics instrumentation and measurement techniques

By Helfric and Cooper, PHI 11th Reprint

Articles: 4.4 to 4.9, 4.11.2, 4.11.3

Ref Book: Electronic Instrumentation by H. S. Kalsi TMH India

UNIT 2:

Diodes and their Applications:

Load line analysis of a diode circuit, clipping circuit, positive and negative clipper, biased clipper clipper, some other biased clipper, combination clipper, two level slicer, clamping circuit, biased clampers, practical clamper circuits, application of clamping circuits, voltage multiplier, voltage doublers, voltage tripler and quadrupler.

Special purpose diodes: varactor diode, varactor diode specifications and applications, LED, LED voltage drop and current, LED applications, multicolour LEDs, LCDs, photodiodes, photoconductive cells, photo voltaic cells, LASER diodes and applications.

Text Books: Electronic Devices and Circuits by Allen Mottershead (Article: 2.1)

A text book of electronic circuits R. S. Sedha, S. Chand

Articles: 6.1 to 6.14., 7.12 to 7.14, 7.21 to 7.24, 7.27 to 7.31, 7.33 to 7.35.-7.25

Ref Book: (1) Electronic Devices and Circuit By Boylestead and Namensky

(2) Electronic Principles By Malvino and Bates

UNIT 3:

General amplifier characteristics:

Concept of amplification, amplifier notation, current, voltage and power gain, amplifier input resistance and output resistance, maximum power transfer, conversion efficiency, classes of amplifier, harmonic distortion , three point method of calculating distortion, Measurement of harmonic distortion, other type of amplifier distortion

Decibels, other equation for decibel computation, zero decibel reference level, use of a voltmeter as a decibel indicator, voltmeter range correction factor, frequency response, amplifier band width, phase relationship in amplifier, square wave testing

Text Book: Electronics devices and circuit By Allen Mottershead, PHI

Article: 7.1 to 7.12, 7.15, 7.16. 8.1 to 8.8 and 8.11

UNIT 4:

Number systems and codes:

Introduction, number system, inter conversion of number, signed binary number, floating point representation of number, binary arithmetic, complement binary arithmetic, arithmetic overflow, codes (BCD, 2-4-2-1 code, 4-bit BCD and 5-bit BCD, Biquinary code, excess 3, gray code, 7-segment code, alpha numeric codes, error detecting, error correcting code, hamming code.

Text Book: Digital electronics By G. K. Kharate, Oxford University Press

Articles: 2.1 to 2.9

Ref Book: (1) Digital Design By Moriss Mano, PHI

(2) Digital Principles By Malvino and Leach McGraw Hill

(3) Digital Fundamentals By Floyd , Pearson

ELECTRONICS – 1502 L (Electronics lab-1)

GROUP A

1. Identification and testing of electronics active and passive components.
2. To familiarize with various laboratory instrument.
3. To design and test the multirange AC / DC voltmeter.
4. To determine dielectric constant of given material.
5. To study voltage doubler circuit.
6. To study voltage multiplier circuit.
7. I-V characteristics of different colored LED.

GROUP B

1. To study load characteristics, internal resistance and ripple factor of a Half wave rectifier (with and without 'C' filter).
2. To study load characteristics, internal resistance and ripple factor of a Full wave rectifier (with and without 'C' filter).
3. To study Zener diode as shunt voltage regulator.
4. To find resonance frequency, bandwidth and Q of a given series resonant circuit by varying frequency of ac source
5. To study Wien bridge as a frequency selective network.
6. CE Amplifier (load variation).
7. Study of AND, OR, NOT, NOR , NAND and Ex- OR gate using IC 7400.

Examination scheme: Total 100 Marks: Internal 30 marks; External 70 Marks

Student has to perform total two experiments during practical exam. From each group, student has to perform one experiment.

Marks for Section A: 35 Marks

Marks for Section B: 35 Marks

Total Time duration for practical exam: 4 hour

Practical batch size: Maximum 15 students

F Y B Sc (SEM - II)

ELECTRONICS – EL-2501 (Basics of Electronics-2)

UNIT 1:

Bipolar junction Transistor: Operation of NPN transistor, Operation of PNP transistor, CE configuration, Break down in Transistor, EBSE-MOLL model, Bias stability, Thermal run away, Stability factor, Method of Transistor Biasing, Fixed Bias method, Emitter feedback bias, collector to Base bias, collector emitter feedback bias, Voltage divider bias, Bias compensation, Thermistor and bias compensation

Text Book : Electronics Devices and Circuits By S Salivahanan, N Suresh kumar , McGrawHill
Articles: 6.4,6.5,6.6,6.9,to 6.13

Ref Book : (1) Electronics Devices & circuits by A. Mottershead, PHI

(2) Electronic Devices and Circuit Theory By Robert Boylestad Louis Nashelsky, PHI

UNIT 2:

Mid Band Analysis of small signal Amplifier: Two port devices and Network Parameters, Z, Y and h parameters, Hybrid model for two port network, Analysis of transistor amplifier circuits using h parameters, Simplified CE hybrid model, The ' r_e ' model of transistor, small signal analysis of single stage BJT amplifier, CE amplifier with unbypassed emitter resistance, CE amplifier with voltage divider bias, MILLER's theorem and its dual, Design of single stage RC coupled amplifier using BJT

Text Book : Electronics Devices and Circuits By S Salivahanan, N Suresh kumar , McGrawHill
Articles: 9.2 to 9.5, 9.9, 9.12, 9.14, 9.15

Ref Book : (1) Electronics Devices & circuits by A. Mottershead, PHI

(2) Electronic Devices and Circuit Theory By Robert Boylestad Louis Nashelsky, PHI

UNIT 3:

Network Theorem and Resonance Circuit: Reduction of complicated network, conversion between T and π sections, bridge T network, the lattice network, superposition theorem, the reciprocity theorem, Thevenin's theorem, Norton theorem, maximum power transfer theorem, compensation theorem.

Resonance : Definition of Q, the figure of merit, series resonance, Bandwidth of the series resonant circuit, parallel resonance or antiresonance, current in antiresonant circuits, Bandwidth of antiresonant

Text Book: Network, Lines and Field by John D Ryder

Ref Book : (1) Handbook of Electronics By Kumar and Gupta, Pragati Prakashan
(2) Introductory Circuit Analysis by Robert Boylestad, 10th Edition

UNIT 4:

BOOLEAN ALGEBRA : Basic Laws of Boolean algebra, over view of logic circuit, DeMorgan's theorem, standard representation for Logical function, MINTERM and MAXTERM, Simplification of Boolean expression, Karnaugh Map simplification, simplification of SUM OF PRODUCT, Simplification of PRODUCT OF SUM, Don't care condition, Quine-McCluskey method, Design procedure for combinational Logic circuit, Half Adder, Full adder, N bit parallel adder, Subtractor, N bit parallel subtractor

Text Book: Digital Electronics By G K Kharate , OXFORD university Press .

Articles: 3.2 to 3.10, 3.12, 4.2,4.3,4.4

Ref Book : (1) Digital Design By Moriss and Mano, PHI

(2) Digital Principles By Malvino and Leach, McGraw Hill Publication

GROUP A:

8. To verify the Thevenin's theorem
9. To verify the maximum transfer theorem
10. Conversion of a given network in to T- network and π - network
11. RC high pass filter
12. RC low pass filter
13. To find resonance frequency, bandwidth and Q of a given parallel resonant circuit by varying frequency of ac source
14. I-V characteristics of a photodiode

GROUP B:

8. To study load characteristics and ripple factor of a Bridge rectifier (with and without 'C' filter)
9. To determine 'h' parameters of a transistor (CE configuration)
10. Study of CE amplifier (frequency response , input and output resistance of amplifier)
11. Study of two, three and four input Ex-OR gate. Ex-OR gate as a parity checker and inverter.
12. Study of Half adder and full adder using Ex OR and NAND gates
13. Study of Half subtractor and full subtractor using Ex OR and NAND gates
14. To study the conversion of Binary to Gray code and Gray to Binary code

Examination scheme: Total 100 Marks: Internal 30 marks, External 70 Marks

Student has to perform total two experiments during practical exam. From each section student has to perform one experiment.

Marks for Section A: 35 Marks

Marks for Section B: 35 Marks

Total Time duration for practical exam: 4 hour

Practical batch size: Maximum 15 students

S. Y. B. Sc. Sem - III (ELECTRONICS)

PAPER NO: EL-3501(Basic Analog Electronics-1)

UNIT –I

Frequency Response of Amplifiers:

General shape of frequency response of amplifier, General frequency consideration, Low frequency response of transistor amplifier, Effect of Bypass capacitor on low frequency response, Effect of coupling capacitor on low frequency response, High frequency π model for a transistor, Hybrid π capacitance, CE short circuit current gain, β cut off frequency, α cut off frequency, High frequency current gain with resistive load

Multi stage Amplifiers:

Different coupling scheme used in amplifier, Two stage RC coupled amplifier, Transformer coupled amplifier.

Text Book: Electronics Devices and Circuit (3rd edition) by S Salivahanan, Suresh kumar

McGraw Hill Publication

(Articles: 11.4,11.5,11.7, 11.8, 11.9, 11.9.2,11.9.3 to 11.9.7, 10.2, 10.5,10.6)

UNIT – II

Negative Feedback in transistor amplifier:

General theory of feedback, reasons for negative feedback, loop gain, types of negative feedback in transistor circuits

Transistor Oscillators:

Introduction, Effect of positive feedback, requirements for oscillations, the phase shift oscillator, Wien bridge oscillator, LC oscillators, Colpitt's and Hartley oscillators with analysis.

Text Book: (i) Electronic Devices and circuits – An introduction by Allen Mottershead

(Article Nos.: 17.1 to 17.4, 18.1 to 18.7)

(ii) Hand Book of Electronics by Gupta and Kumar, Pragati
Prakashan

(Article Nos.: 22.4, 22.5)

UNIT – III

Field Effect Transistor:

Construction of N-channel JFET, Operation of N-channel JFET, characteristics parameters of the JFET, Expression for saturation drain current, Slope of transfer characteristic at I_{DSS} , Comparison of JFET and BJT.

Common source AC amplifier, Source follower, the common gate FET amplifier, Frequency response of FET Amplifier

MOSFET:

The depletion MOSFET, The enhancement MOSFET, difference between JFET's and MOSFET's, 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

Text Book:(i) Electronics Devices and Circuit (3rd edition) by S Salivahanan, Suresh kumar

McGraw Hill Publication (Articles: 7.2 to 7.7)

(ii)) Electronic Devices and circuits – An introduction by Allen Mottershead

(Article Nos.: 21.9,21.11,21.12,21.13,22.1 to 22.7,22.9,22.10)

UNIT – IV

Filters:

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.

Ref. Book: A monograph on Electronics Design, by Goyal & Khatan, Khanna publisher

S. Y. B. Sc. Sem - III (Signals and digital electronics)

PAPER NO: EL-3502

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.

Text Books: Networks, Lines and Fields by J. D. Ryder (3.1 to 3.12)

Roy Chaudhuri, Del-Toro

UNIT – II

Network Analysis using Laplace Transformation:

The 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. Book: Network Analysis M. E. Van Valkenberug

Digital Signal Processing S Salivahanan, A Vallavaraj, C Gnanapriya

UNIT – III

Data processing circuits:

Multiplexers, Demultiplexers, 1-of-16 decoder, BCD-to-decimal decoders, seven segment decoders, encoders, Priority encoder, Exclusive-OR gate, parity generators and checkers, read only memory.

Text Book: Digital Principles and applications 6th Edition Malvino Leach and Saha

(Articles: 4.1 to 4.8, 4.10)

Ref. Books: Digital Fundamentals by Floyd, Pearson

Digital Design Morris and Mano PHI publication

Clock and 555 Timer:

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

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

Text Book:(1) Linear Integrated Circuits 4th Edition by Chaudhary and Jain, New Age International Publishers.

(Articles: 8.1 to 8.4)

(2) Digital principles and applications by Malvino , Leach and Saha 6th Edition, TMH

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

UNIT – IV

Microprocessor - I:

Microprocessor, Instruction set and computer language,

Microprocessor Architecture and Microcomputer Systems:

Microprocessor Architecture and its operations, Memory, Logic devices for interfacing.

Text Book: Microprocessor Architecture, programming and application with 8085, 5th Edition: Ramesh Gaonkar , Penram Int. pub Pvt. Ltd.

(Articles: 1.1 , 1.2, 3.1,3.2.3.5)

**St. XAVIER's COLLEGE, AHMEDABAD
(AUTONOMOUS)**

S. Y. B. Sc. Sem - III (Electronics Lab-3)

PAPER NO:EL- EL-3503L

SECTION: A

1. Two stage RC coupled amplifier
2. Voltage series Negative feedback Amplifier (frequency response, i/p and o/p resistance of amplifier)
3. Current series feedback Amplifier (frequency response, i/p and o/p resistance of amplifier)
4. Common collector amplifier (frequency response, i/p and o/p resistance of amplifier)
5. Common source FET amplifier
6. Study of clipping and clamping circuit using diode
7. To design and construct the series voltage regulator
8. To design and construct electronics voltage regulator using error amplifier
9. To design and construct the constant current source using transistor

SECTION: B

1. RC phase shift oscillator using transistor
2. Wien Bridge oscillator using transistor
3. Study of Lissajous figures and measurement of phase difference using CRO
4. 4-bit adder- subtractor using IC 7483, 7486
5. Study of 16:1 multiplexer (74150) and its application for designing combinational logic circuits.
6. 3- 8 decoder(74138) and and its application for designing combinational logic circuits.

7. Study of decimal to BCD encoder (priority encoder 74147) and driving seven segment display using BCD to seven segment decoder IC (7447) and Liquid Crystal Display

8. Design of logic circuit using Karnaugh map (SOP method)

9. a) Study of 1:4 and 1:8 demultiplexer using IC 74155

b) BCD to decimal decoder (7445)

Examination scheme: Total 100 Marks: Internal 30 marks, External 70 Marks

Student has to perform total two experiments during practical exam. From each section student has to perform one experiment.

Marks for Section A: 35 Marks

Marks for Section B: 35 Marks

Total Time duration for practical exam: 6 hour

Practical batch size: Maximum 15 students

**St. XAVIER's COLLEGE, AHMEDABAD
(AUTONOMOUS)**

S. Y. B. Sc. Sem - IV (OPERATIONAL AMPLIFIER)

PAPER NO:EL-4501

UNIT – I

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 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, N.Suresh Kumar, TMH.

UNIT – II

Operational Amplifier - I:

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. (Articles: 2.1, 2.2, 2.3, 3.1, 3.2, 3.3.4, 3.4)

UNIT – III

Fabrication of IC

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)

Reference: Integrated Circuit by Bodkar

UNIT – IV

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 Edition.

(Articles: 14.1 to 14.4)

Multivibrators

Collector coupled Astable multivibrator, Monostable multivibrator, Bistable multivibrator,

Schmitt trigger

Text Book: Electronic Devices and circuit, S Salivahanan, N Suresh Kumar 3rd Edition

McGraw Hill Publication (Articles: 16.6.1,16.6.2,16.6.3,16.8)

**St. XAVIER's COLLEGE, AHMEDABAD
(AUTONOMOUS)**

S.Y.B. Sc.Sem - IV(Digital Electronics & Microprocessor)

PAPER NO:EL-4502

UNIT – I

Fourier Integral and Fourier Transform:

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
(Articles: 16.1 to 16.6)

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

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, Behavior of the characteristic impedance, the constant K low pass filter, the constant K high pass filter.

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

Ref Book: Network Analysis By G. K. Mithal, Khanna Publishers

UNIT – II

TTL and CMOS Logic Family:

Switching circuit, 7400TTL, TTL parameters, TTL overview, OPEN collector gates, Three state TTL device, External drive for TTL loads, 74C00 CMOS, CMOS characteristics, TTL-TO-CMOS interface, CMOS-TO- TTL interface

Text book: Digital Principles and Applications; 6th Edition By Leach, Malvino and Saha, TMH;(Articles: 14.1 to 14.12.)

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, Various representation of flip-flops, Analysis of sequential circuits.

Shift Registers:

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, 6th Edition, By Leach Malvino and Saha; TMH (Articles: 8.1 to 8.10 and 9.1 to 9.6.)

Ref Book: Digital Fundamentals by Floyd , Pearson Publication;

Digital Design Morris and Mano, PHI publication

UNIT – IV

Microprocessor – II

8085 Microprocessor Architecture and memory Interfacing:

The 8085 MPU : The 8085 Microprocessor, Microprocessor communication and Bus timings,

De multiplexing the Bus AD7-AD0, Generating Control Signals, A Detailed look at the 8085 MPU

and its Architecture, Decoding and Executing an Instruction

Example of an 8085 based microcomputer: Opcode Fetch Machine Cycle, Memory Read

Machine Cycle, How to recognize Machine Cycle, Memory interfacing:

Memory Structure and Its Requirements, Basic Concepts In Memory

Interfacing, Address Decoding, Interfacing Circuit, Address Decoding and Memory Addresses

Text Book : Microprocessor, Architecture, Programming and Application with the 8085, (5th Edition).

Ramesh Gaonkar, Penram International Publishing Private Limited. (Articles: 4.1,4.2, 4.3)

St. XAVIER's COLLEGE, AHMEDABAD (AUTONOMOUS)

S. Y. B. Sc. Sem -IV (Electronics Lab-4)

PAPER NO: 4503L

SECTION A

1. Study of OPAMP parameters
2. OPAMP as an inverting Amplifier
3. OPAMP as non inverting Amplifier
4. OPAMP as voltage to current
5. OPAMP as current to voltage converter
6. Constant K type low pass and high pass filters
7. Hartely oscillator using transistor
8. Colpitt's oscillator using transistor

SECTION B

1. Astable multivibrator using transistor
2. Astable multivibrator using IC 555
3. Bistable multivibrator using transistor
4. Monostable multivibrator using IC 555
5. (a) RS flip-flop using NOR and NAND gates (b) J-K, D and T Flip flop using IC.
6. Study of TTL characteristics
7. Study of shift registers and Johnson counter using IC 7495
8. Conversion of Flip Flop (RS flip flop to D, T and J-K flip flop)

Project work (only for internal assessment):

To design and construct variable voltage regulated power supply and mobile charger using IC LM 317/ Some of the instruments used in lab.

**Examination scheme: Total 100 Marks: Internal 30 marks;
External 70 Marks**

Student has to perform total two experiments during practical exam. From each section student has to perform one experiment. Marks for Section A: 35 Marks; Marks for Section B: 35 Marks; Time duration for practical exam: 6 hour; Practical batch size: Maximum 15 students

St. XAVIER'S COLLEGE, AHMEDABAD (AUTONOMOUS)

T. Y. B. Sc. Sem - V (ELECTRONICS)

PAPER NO: EL-5501 (OPAMP applications and Semiconductor Physics)

UNIT – I

Operational Amplifier – II

Operational amplifier internal circuit, Differential amplifier, Transfer characteristics, Low frequency small signal analysis of Differential amplifier, circuit for improving CMRR, constant current source, input resistance

OPAMP Application – I

Scale changer, inverting and non inverting summing amplifier, subtractor.

Text Book: Linear Integrated circuit 4th edition, By Roy Choudhury and Jain, New Age International

Articles: 2.4, 2.4.1 to 2.4.4, 4.2

UNIT – II

OPAMP Application – II

Instrumentation amplifier, AC amplifier, V to I and I to V converter, OPAMP circuit using diodes (HW rectifier, FW rectifier, clipper and clamper circuit), sample and Hold circuit, Log and antilog amplifier, multiplier and divider, Differentiator, Integrator, Electronics analog computation

Text Book: Linear Integrated circuit 4th edition, By Roy Choudhury and Jain, New Age International

Articles: 4.3 to 4.12

UNIT - III

IC voltage regulator

Internal circuit arrangement, Zener reference regulation protection , error amp, series pass transistor, 3 terminal positive voltage regulators, 3 terminal negative voltage regulators, 3 and four terminal adjustable voltage regulators, 4 terminal positive voltage regulators, 4 terminal negative voltage regulators, dual non tracking voltage reg, dual tracking voltage regulator, precision multi terminal regulators

Positive regulators using IC 723 , fold back current limiting of positive regulators, using IC 723, negative voltage regulators using IC 723 ,electronic shut down of a positive regulators ,current regulators, open loop current regulators, constant current regulators using 3 terminal regulators, current regulators using IC 723

Text Book: Modern Power Electronics by P.C. Sen. 2nd Edition.

Articles: 2.4.1, 2.4.2, 2.4.4, 2.4.5, 2.4.6, 2.5.1, 2.6, 2.7, 2.7.1, 2.8, 2.9, 2.10.1, 2.10.2, 2.12, 2.12.1, 2.12.3, 2.13, 2.14.1, 2.15., 2.15.1, 2.15.5, 2.15.5.1

UNIT – IV

Semiconductor Physics:

Bonding forces and Energy Bands in solids

Bonding forces in solids, Energy Bands, Metals, Semiconductors and Insulators, Direct and Indirect Semiconductors, Variation of Energy bands with alloy composition.

Charge carriers in Semiconductors

Electrons and Holes, Effective mass, intrinsic material, extrinsic material, Electrons and Holes in Quantum wells.

Carrier Concentrations

The Fermi level, Electron hole concentration at Equilibrium, Temperature dependence of Carrier Concentration, Compensation and Space charge Neutrality

Drift of carriers in Electric and Magnetic fields

Conductivity and Mobility, Drift and Resistance, Effect of Temperature and doping on mobility, High field Effects, The Hall Effect, Invariance of the Fermi level at equilibrium

Text book: Solid State Electronics Devices By Ben G. Streetman

Prentice Hall of India Private Limited

Articles: 3.1 to, 3.1.5, 3.2, 3.2.1 to 3.2.5, 3.3 to 3.3.4, 3.4 3.4.1 to, 3.4.5, 3.5

Reference Books:

1. Electronic Devices and Circuits G N Garud and L C Jain Tata Mcgraw Hill Publishing Limited
2. Physics of Semiconductor Devices (4th Edition), S. M. Sze and Kwok. K. Ng., John Wiely & Co. (India)
3. Semiconductor Physics and Devices: Basic Principle (3rd Edition), Donald Neauman, Tata McGraw Hill.

St. XAVIER's COLLEGE, AHMEDABAD (AUTONOMOUS)

T. Y. B. Sc. Sem - V (ELECTRONICS)

PAPER NO: EL-5502 (Digital Design and Microprocessor)

UNIT - I

Counters

Asynchronous Counters, Decoding Gates, Synchronous Counters, Changing the Counter Modulus, Decade Counters, counter design as a synthesis problem

Design of Sequential Circuit:

Model Selection, State Transition Diagram: State Definitions: Moore Model, State Transition diagram: Moore

Model, State Definitions: Mealy Model, State Transition diagram, State Synthesis Table, Design Equations and Circuit Diagram Moore Model, Mealy Model

Text Book: Digital Principles and Applications 6th edition by Donald P. Leach, Albert Paul Malvino and Gautam Saha Publisher: McGraw-Hill Companies

Article Nos. 10.1 to 10.5, 10.7, 11.1 to 11.4

UNIT- II

Basic Interfacing Concepts, Peripheral I/O Instructions; I/O Execution; Device selection and Data Transfer Absolute v/s Partial Decoding; Input Interfacing

Interfacing Output Displays, LED Displays for Binary Data; Seven Segment LED Display

Interfacing Input Devices, Data Input from DIP switches; Hardware; Interfacing Circuit; multiple ports addresses

The 8255A Programmable Peripheral Interface, Block Diagram of the 8255A; Mode 0: Simple Input or Output Port

DAC Specifications; DAC 0800; DAC Interfacing.

Text Book: Microprocessor Architecture, Programming and Applications with 8085
5th edition by Ramesh Gaonkar

Articles: 5.1, 5.1.1, 5.1.2, 5.1.3, 5.1.4, 5.1.5, 5.2, 5.2.1, 5.2.2, 5.3, 5.3.1, 5.3.2, 5.3.3, 15.1, 15.1.1, 15.1.2

Text Book: 8 Bit Microprocessor—V.J. Vibhute and P.B. Borole

Articles: 16.5, 16.7, 16.8

UNIT-III

Data Transfer Operations; Arithmetic Operations; Logic Operations

Programming techniques: Looping, Counting and Indexing;

Additional data Transfer and 16-Bit Arithmetic Instructions; Arithmetic Operations related To Memory; Logic Operations: Rotate; Logic Operations: Compare

Text Book: Microprocessor Architecture, Programming and Applications with 8085
5th edition by Ramesh Gaonkar

Articles: 6.1, 6.2, 6.3, 7.1, 7.2, 7.4, 7.5

UNIT-IV

Time Delay Using One Register; Time Delay Using a Register pair; Time Delay Using a Loop Within a Loop Technique; Counter Design with Time Delay; Hexadecimal Counter;

Modulo Ten Counter; Generating Pulse Waveforms.

Stack; Subroutine; Restart, Conditional Call and Return Instructions; Advanced Subroutine Concepts.

Text Book: Microprocessor Architecture, Programming and Applications with 8085
5th edition by Ramesh Gaonkar

Articles: 8.1.1, 8.1.2, 8.1.5, 8.2, 8.3, 8.4, 9.1, 9.2, 9.3, 9.4

St. XAVIER's COLLEGE, AHMEDABAD (AUTONOMOUS)

T. Y. B. Sc. Sem - V (ELECTRONICS)

PAPER NO: EL-5503 (Electronic Instrumentation and Transducer)

UNIT-I

Electronics meter

Transistor voltmeter, Chopper type DC amplifier voltmeter, solid state voltmeter, AC voltmeter using rectifier, AC voltmeter using half wave and full wave rectifier, average responding voltmeter, peak responding voltmeter, True RMS voltmeter

Digital voltmeter

Introduction, Ramp technique, Dual slope integrating type DVM, Integrating type DVM, Successive approximation type DVM, Resolution and sensitivity of Digital meters

Text Book: Electronics Instrumentation By H S Kalsi, TMH edition

Articles: 4.7, 4.8, 4.9, 4.12 to 4.18, 5.1 to 5.9

UNIT-II

Digital Instruments

Digital frequency meter, Digital measurement of time, Digital tachometer, Digital phase meter, Digital capacitance meter

Cathode Ray Oscilloscope

Basic principle, CRT feature, Basic principle of signal display, Block diagram of oscilloscope, Simple CRO, vertical amplifier, Horizontal deflection system, Triggered sweep CRO, Delayline in trigger sweep, Typical CRT connection, Dual trace oscilloscope, Measurement of frequency by Lissajous method, use of Lissajous figures for phase measurement

Text Book: Electronics Instrumentation By H S Kalsi, TMH edition

Articles: 6.3, 6.4, 6.9, 6.12, 6.13, 7.2 to 7.8, 7.10, 7.12, 7.14, 7.20, 7.26

UNIT-III

Signal Generators:

Introduction, fixed frequency oscillator, variable oscillator, Basic standard signal generator, standard signal generator, Modern laboratory signal generator, AF sine and square wave generator, function generator, square and pulse generator, sweep generator

Wave Analyser and Harmonic Distortion:

Basic wave analyser, frequency selective analyser, Heterodyne wave analyser, spectrum analyser

Text Book: Electronics Instrumentation By H S Kalsi, TMH edition

Articles: 8.1 to 8.9, 8.11, 9.1 to 9.6

UNIT-IV

Transducers

Electrical transducer, selecting a transducer, resistive transducer, strain gauges, resistance thermometer, thermistor, inductive transducer, linear variable differential transducer, capacitive transducer, piezo electric transducer, photoelectric transducer, photo voltaic cell, semiconductor photo diode, photo transistor, thermoelectric transducer.

Text Book: Electronics Instrumentation By H S Kalsi, TMH edition

Articles Nos. 13.2 to 13.5,13.6.1, 13.7, 13.8,13.9, 13.11, 13.13, 13.15 to 13.20

St. XAVIER's COLLEGE, AHMEDABAD (AUTONOMOUS)

T. Y. B. Sc. Sem - V (ELECTRONICS)

PAPER NO: EL-5504 (Electronic Communication and Optical fibre)

UNIT – I

Amplitude modulation:

Elements of analog communication, Amplitude modulation technique, Time domain representation of AM wave, power relation in AM wave, current relation in AM wave, modulation by several sine wave, Double sideband suppressed technique, single sideband technique, vestigial sideband modulation technique, Generation of AM signal

Text Book: Kennedy's Electronic communication systems by Kennedy, Davis & Prasanna(5th ed)

Article Nos. 3.1, 3.2,3.3.1

Reference Book: Electronics communication By Roddy and Coolen, 4th edition

UNIT – II

Angle modulation:

Frequency modulation, phase modulation, comparison of frequency and phase modulation, frequency spectrum of FM wave, Narrow band and Wideband FM, comparison of FM and AM wave, Generation of FM, Direct methods

Basic FM demodulators, slope detection, Balanced slope detector, phase discriminator, ratio detector

Text Book: Kennedy's Electronic communication systems by Kennedy, Davis & Prasanna(5th ed)

Article Nos. 4.1.1, 4.1.2, 4.1.3, 4.2.1, 4.2.2, 4.3.1, 7.5.3, 7.5.4

Reference Book: Electronics communication By Roddy and Coolen, 4th edition

UNIT- III

Fiber-optic communication:

Principle of light transmission in a fiber, fiber index profile, Losses in fiber, Rayleigh scattering losses, Absorption losses, Leaky modes, Mode coupling losses, Bending losses, Dispersion, Effect of dispersion on pulse transmission, inter modal dispersion, material dispersion, Light sources for fiber optics, Light emitting diode, semiconductor LASER, Photo detectors, pn photodiode, pin photodiode, Avalanche photodiode, connector and splices, Fiber communication link

Text Book: Electronics communication By Roddy and Coolen, 4th edition

Article Nos. 20.1 to 20.8

UNIT IV:

Noise:

External noise, internal noise, Thermal agitation noise, shot noise, transit time noise, noise calculation, Addition of noise due to several sources, noise figure, signal to noise ratio, definition of noise figure, calculation of noise figure, noise temperature

Satellite communication:

Satellite system, fixed satellite service, satellite communication Earth station, Antenna for satellite communication, advantages of cassegrain antenna, Antenna feed, Antenna structure

Text Book: Kennedy's Electronic communication systems by Kennedy, Davis & Prasanna(5th ed)

Article nos. 2.1, 2.2, 2.3.1, 2.4.1 to 2.4.3, 2.5

Reference book: Electronics communication By Roddy and Coolen, 4th edition

Text Book: Electronics and Radio Engineering

Article no. 44.1, 44.2, 44.3, 44.11 to 44.14

St. XAVIER's COLLEGE, AHMEDABAD (AUTONOMOUS)

T. Y. B. Sc. Sem - V (ELECTRONICS)

PAPER NO: EL-5505 (Elective)

'C' Programming

UNIT-1

Numerical Integration

Graphical Interpretation, Integration with Lagrange's Interpolation, Trapezoidal rule, Simpson rule, Newton's three-eight rule, Weddle rule, Monte Carlo method, Numerical double integration.

UNIT 2

C Language Programming

Decision making with if statements, simple if statement, if-else statement, nesting of if-else statements, else if ladder, switch statement, conditional operator, go to statement, While

statement, do statement, do while, for statement, jumps in loops – continue and break statements. One dimensional arrays, declaration and initialization of arrays, two dimensional and multi dimensional array

UNIT 3

C Language Programming

Declaring and initializing string variables, reading and writing strings, arithmetic operations on characters, concatenation, comparing, copying and finding length of strings, string handling functions, table of strings. Need for user defined functions, the form of C functions, return values and their types, calling a function, category of functions, non-integer functions, nesting of functions, recursion, functions with arrays, scope visibility and lifetime of variables, ANSI C functions

Text book and reference book for Numerical methods:

1. Computer Application in Physics with FORTRAN, Basic and C
Suresh Chandra, Mohit kumar Sharma: Narosa Publishing House

Text book and reference book for Programming in -C :

1. Balagurusamy E: Programminng in ANSI-C (IInd.Ed.)TMHpub.
2. P.Day and M.Ghosh. Programming in C, Oxford University press,2007
3. Gottfried B.S. Programming with C
4. Kenetker Y. Let us C, BPB pub.
5. Kernighan B.W and Ritchie D.K C programming language, PH pub.

St. XAVIER's COLLEGE, AHMEDABAD (AUTONOMOUS)

T. Y. B. Sc. Sem - VI (ELECTRONICS)

PAPER NO: EL-6501 (OPAMP Application and Power Electronics)

UNIT- I:

OPAMP Application- III

Differentiator, Integrator, electronics analog computation, comparator, Application of comparator, Schmitt trigger, square wave generator, Triangle wave generator

Text Book: Linear Integrated circuit 4th edition, By Roy Choudhury and Jain, New Age International

Articles: 4.10, 4.11, 4.12, 5.2, 5.2.1, 5.3, 5.4, 5.6

UNIT-II:

Phase Locked Loop

Introduction, Basic principles, Phase Detector and comparator, voltage controlled oscillator (VCO), low pass filter, monolithic phase locked loop, PLL applications, frequency Multiplication/division, frequency translation, AM detection, FM demodulation, FSK demodulator

Text Book: Linear Integrated circuit 4th edition, By Roy Choudhury and Jain, New Age International

Articles: 9.1 to 9.7

UNIT -III

Switching Regulators

Introduction, circuit scheme, Basic switching regulator, minimum load and critical inductance, Determination of filter inductance, determination of filter capacitor, input and output power, losses and efficiency (only definition), Design consideration of Buck switching regulator, control circuit consideration in buck switching regulator, Boost switching regulator, selection of inductor, selection of filter capacitor, transistor rating, control Boost regulator

Text Book: Modern Power Electronics By P C Sen, S Chand & company

Articles: 3.1 to 3.3, 3.5, 3.10

UNIT – IV

Thyristor

SCR, Working of SCR, equivalent circuit of SCR, Important terms, V-I characteristics of SCR, SCR in normal operation, SCR as a switch, SCR switching , SCR H.W. rectifier, SCR F.W. rectifier, Applications of SCR

TRIAC, TRIAC construction, TRIAC operation, TRIAC characteristic, Application of TRIAC, the DIAC, Application of DIAC ,UJT as relaxation oscillator and over voltage detector .

Text Book: Principles of electronics by V.K Mehta 10th Edition S Chand & Co.

Articles:

St. XAVIER's COLLEGE, AHMEDABAD (AUTONOMOUS)

T. Y. B. Sc. Sem - VI (ELECTRONICS)

PAPER NO: EL-6502(Introduction to Microcontroller)

UNIT - I

D/A Conversion and A/D Conversions

Variable Resistor Network: Binary Equivalent Weight, Resistive Divider, Binary ladders, D/A Converters: Multiple Signals, D/A Converter Testing, Available D/A Converters, D/A Accuracy and Resolution, A/D Converters-Simultaneous Conversion, A/D Converter-Counter Method, Continuous A/D Conversion, A/D Techniques: Successive Approximation, The ADC 0804, Section Counter, Dual-Slope A/D Conversion: Single Ramp A/D Converter, Dual-Slope A/D Converter, A/D Accuracy and Resolution

Text Book: Digital Principles and Applications 6th edition by Donald P. Leach, Albert Paul Malvino and Gautam Saha
Publisher: McGraw-Hill Companies

UNIT –II

Microcontroller-I

Microprocessor and microprocessor, 8-bit and 16-bit microcontroller, CISC and RISC processor, commercial microcontroller devices
MCS-51 Architecture, Registers in MCS-51, 8051 pin description, 8051 connection, 8051 parallel I/O ports, Memory organization

UNIT – III

Microcontroller-II

8051 addressing mode, MCS-51 instruction set, 8051 instruction and simple programme, using stack pointer

UNIT- IV

Microcontroller – III

Interrupts, interrupts in MCS-51, Timers and counters, serial communication
Application of MCS-51, square wave generation, pulse generation, pulse width measurement, frequency counter

**Text Book: Microcontrollers (Theory and Application) By Ajay Deshmukh
Tata McGraw- Hill Publication**

Articles: 1.2,1.5,1.6,1.8,2.1, 2.2, 2.3, 3.1 to 3.4, 4.1 to 4.4, 6.1 to 6.4, 8.1,8.2,8.4,8.8 and 8.9

**Reference Book: (i) The 8051 Microcontroller and Embedded systems By
Muhmmad Ali Mazadi**

**(ii) The 8051 Microcontroller Architecture, programming and Application
By Kenneth J Ayala**

St. XAVIER's COLLEGE, AHMEDABAD (AUTONOMOUS)

T. Y. B. Sc. Sem - VI (ELECTRONICS)

PAPER NO: EL-6503(Electronic Communication and Cell Phone Technology)

UNIT - I

Radio Receiver:

Receiver types, Tuned Radio frequency receiver, super heterodyne receiver, AM receivers, RF section and characteristics, Frequency changing and tracking, Intermediate frequency and IF amplifier, Detection and automatic gain control

Text Book: Kennedy's Electronic communication systems by Kennedy, Davis & Prasanna(5th ed)

Article nos. 7.3.1, 7.3.2, 7.4.1 to 7.4.2

Reference book: Electronics communication By Roddy and Coolen, 4th edition

UNIT – II

Television:

Introduction, General principle of image transmission, Mechanism for image pickup, characteristics of image signal, Basic characteristics of Television system, Television camera, Camera tube requirement, Television broad cast channel, Kinescope, Scanning, progressive scanning, Interlaced scanning, method of obtaining scanning, the synchronizing pulses, composite video signal, TV standards CCIR- B, Transmission of Television signal, Resolution and bandwidth in TV system, Television receiver circuit

Text Book: Electronics and Radio Engineering By M L Gupta

Article nos. 40.1 to 40.6, 40.11, 40.13 to 40.18, 40.21

Reference book: Electronics communication By Roddy and Coolen, 4th edition

UNIT – III

Pulse Modulation Technique:

Pulse amplitude modulation, pulse width modulation, pulse position modulation, pulse code modulation, Delta modulation, Differential code modulation, Demodulation of pulse digital modulated signal

Digital Modulation Technique:

Amplitude shift keying, Frequency shift keying, Phase shift keying

Text Book: Kennedy's Electronic communication systems by Kennedy, Davis & Prasanna(5th ed)

Article nos. 5.2.1 to 5.2.3, 5.3 , 6.2

Reference book: Electronics communication By Roddy and Coolen, 4th edition

UNIT – IV

Cell phone Technology:

Cellular telephone system, cellular concept, frequency allocation, multiple access, The advanced mobile phone system, typical AMPS hand set, Digital cell phone system, 2G cell phone system, Digital cell phone circuit, 2.5G cell phone system, 3G cell phone system, 4G systems, Advanced cell phone, Base station

Text Book: Principle of Electronics System By Louis Frenzel 3rd edition TMH

Articles: 20.1 , 20.2, 20.3

St. XAVIER's COLLEGE, AHMEDABAD (AUTONOMOUS)

T. Y. B. Sc. Sem - VI (ELECTRONICS)

PAPER NO: EL-6504(Electrodynamics and DSP)

UNIT- I

Electrodynamics-I

Boundary value problems in electrostatic field , poisson and laplace equation, boundary condition and uniqueness theorem , solution of laplace equation in rectangular coordinates, hysteresis, Maxwell equation, potential of electromagnetic field , plane waves in non conducting media , polarization, energy flux in a plane wave, radiation pressure and momentum.

Text Book : Electromagnetism by B.B. laud. by new age international publishers. 3rd Edition.

Article no: 3.1,3.3,3.4,5.7,5.8,5.10,6.1,6.2,6.3,6.4.

UNIT – II

Electrodynamics- II

Electromagnetic Radiation:

Retarded Potential, Radiation from an oscillating dipole, Linear Antenna, Lienaed-Wiechert Potentials, Potentials for a charge in uniform motion – Lorentz formula, Fields of an accelerated charge, Radiation from an acceleration charged particle at low velocity, Radiation when the velocity and acceleration of the particles are collinear, Radiation from a charged particle moving in a circular orbit, Elective quadrupole radiation.

Text Book: Electromagnetics by B. B. Laud, 2nd Editon, Wiley Eastern Ltd.

Article Nos.: 9.1 – 9.10

Reference Book: Introduction to Electrodynamics By Griffith

UNIT – III

Radiation and propagation of waves:

Electromagnetic radiation, fundamental of electromagnetic waves, wave propagation, Ground waves, sky waves, space waves

Antenna:

Basic consideration, electromagnetic radiation, the elementary doublet, current and voltage distribution, resonant antenna, radiation pattern and length calculation, Terms and definition, Antenna gain and effective radiator power, radiation measurement and field intensity, antenna resistance, Band width, beam width and polarization, Dipole arrays, Folded dipole and application, Loop antenna

Text Book: Kennedy's Electronic communication systems by Kennedy, Davis & Prasanna(5th ed)

Article nos.: 10.2, 11.1,11.1.1,11.1.2, 11.2.1, 11.2.2, 11.3.1 to 11.3.4, 11.6.1, 11.6.2, 11.8.5

Reference Book : Electronics and Radio Engineering By M L Gupta, Dhanpat Rai & sons

UNIT-IV**Digital Signal processing:**

Classification of signal and systems, introduction, classification of signal, singularity functions, amplitude and phase spectra , classification of system , simple manipulation of discrete time signal, representation of system.

Z-transform , introduction -definition of Z transform , Definition of inverse z transform, region of conversion, properties of Z-transforms, linearity, time reversal, time shifting , differentiation, correlation, initial value theorems ,final value theorem, time delay, time advance , evaluation of inverse Z- transform , long division method.

Text Book: Digital signal processing By S. Salivahanan.

Article nos: 1.1 to 1.7 and 4.1 to 4.4.

St. XAVIER's COLLEGE, AHMEDABAD (AUTONOMOUS)

T. Y. B. Sc. Sem - VI (ELECTRONICS)

PAPER NO: EL-650x (Elective)

Major project based on analog or digital electronics or Microcontroller(Arduino)

Student has to design, assembled and test the circuit of the project. The project should be in working condition. Student has to prepare and submit the project report. The innovative idea for the project will be encouraged.

St. XAVIER's COLLEGE, AHMEDABAD (AUTONOMOUS)

T. Y. B. Sc. Sem - V (ELECTRONICS)

PAPER NO: EL-5505L (Electronics Lab-5)

Section – A

1. OPAMP as a summing amplifier

2. OPAMP as a current amplifier

3. OPAMP as a integrator and Differentiator
4. Active filter using OPAMP (First order High pass and Low Pass filter)
5. Complimentary pair Push - Pull power amplifier
6. Study of Amplitude modulator

Section – B

1. Wien Bridge oscillator using OPAMP
2. RC phase shift oscillator using OPAMP
3. Voltage regulator using IC 7805 and IC 7905
4. Current regulator using IC LM 317
5. Study of Solar cell
6. Study of Hall IC

Section – C

1. Monostable multivibrator using IC 74121
2. Asynchronous and synchronous counter using IC
3. Schmitt trigger circuit using transistor/OPAMP
4. Microprocessor Programming –I
5. Microprocessor Programming –II
6. Microprocessor Programming –III

Section – D

Minor project based on analog and digital electronics

(water level controller, cell phone charger, power amplifier, event counter, Burglar alarm, Metal detector, distance measurement etc.)

Student has to design, assembled and test the circuit of the project. The project should be in working condition. Student has to prepare and submit the project report. The innovative idea for the project will be encourage.

Simulation base experiment:

For the internal evaluation, student has to simulate the following circuits using **NI multisim** software and prepare the report file. (10 marks)

1. High pass and Low pass passive filter
2. RC coupled amplifier
3. Positive and negative clipping circuit using OPAMP
4. Positive and negative clamping circuit using OPAMP
5. Astable multivibrator using OPAMP

6. Active filter using OPAMP (second order HP filter and LP filter)

7. Binary counter and Decade counter

8. Wien bridge oscillator using OPAMP

9. Half wave and full wave rectifier using OPAMP

10. VCO using 555 timer

Examination scheme: Total 200 Marks

Total Time duration for practical exam: 12 hour

Practical batch size: Maximum 10 students

External marks – 140marks

Marks for section A: 35 marks

Marks for section B: 35 marks

Marks for section C: 35 marks

Marks for section D: Demonstration of a project, project report & project viva - 35 marks

Internal marks – 60marks

Marks for internal practical exam: 30 marks

Marks for simulation based experiments: 10 marks

Marks for presentation/seminar/ quiz based on experiments: 10 marks

Marks for journal or practical's report file: 05 marks

Marks for attendance: 05 marks

St. XAVIER's COLLEGE, AHMEDABAD (AUTONOMOUS)

T. Y. B. Sc. Sem - VI (ELECTRONICS)

PAPER NO: EL- 6505L (Electronics Lab-6)

Section – A

1. OPAMP as a comparator

2. OPAMP as a log amplifier and antilog amplifier

3. OPAMP as a voltage regulator

4. Study of D/A convertor using OPAMP (R-2R ladder and weighted resistor network)

5. Study of A/D convertor using OPAMP

6. Voltage to frequency and frequency to voltage converter using OPAMP

Section – B

1. DC characteristics of DIAC and SCR

2. DC characteristics of TRIAC

3. AC characteristics of SCR

4. AC characteristics of TRIAC
5. Voltage sweep generator using UJT
6. Measurement of acceptance angle of an optical fiber

Section – C

1. To measure threshold current of a LASER diode
2. Study of a LVDT transducer
3. Study of a strain gauge transducer
4. Characteristics of a Varactor/Varicap diode
5. Study of ultrasonic/SONAR sensor for measurement of distance
6. Study of phase locked loop using IC 565

Section - D

1. Study of DAC 0808 and ADC 0801 chip
2. Design of odd/even binary/Decade counter
3. study of 2 x 16 LCD display
4. Microprocessor Hardware interfacing experiment.
(Square wave and Triangular wave generation)
5. Microcontroller programming I
6. Microcontroller programming II

Experiments on Chip Design:

For internal evaluation student has to design and implement the following Digital circuit using Hardware Descriptive Language (**Verilog code**) on FPGA kit. Prepare a report file for the following example. (10 marks)

1. Design of a Ex- OR gate
2. Design of a 4:1 multiplexer
3. Design of a 1:4 demultiplexer
4. Design of a half adder and full adder
5. Design of a 4-bit full adder
6. Design a modulo – 8 up/down counter
7. Design of Arithmetic Logic Unit (ALU)

Examination scheme: Total 200 Marks

Total Time duration for practical exam: 12 hour

Practical batch size: Maximum 10 students

External marks – 140marks

Marks for section A: 35 marks

Marks for section B: 35 marks

Marks for section C: 35 marks

Marks for section D: 35 marks

Internal marks – 60marks

Marks for internal exam: 30 marks

Marks for report file of designing of chips using verilog code : 10 marks

Marks for presentation/seminar/ quiz based on experiments: 10 marks

Marks for journal or practical's report file: 05 marks

Marks for attendance: 05 marks