In order to give exposure of industry, research institutes and higher learning in the field of electronics industrial visits may be arranged. It is expected that students of B.Sc.(Electronics Science) semester 5 & 6 must visit industry / research institute / institute of higher learning. College can also offer (student can also select) subject elective course from the subject electives of Physics semester 5 & 6.
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Ele-301: **Linear analog circuits and Voltage Regulators**

(4 Credit: 4 hrs/week)

**Unit – 1**

Opamp Theory

Differential amp., Transfer characteristics, Low frequency small signal analysis of differential amplifier, Circuits for improving CMRR, Basics of amplifier applications.

Article no 2.4.1 to 2.4.4, 4.2


**Unit -2**

Opamp applications

Voltage to current converter, opamp circuits using diodes, log and antilog amplifier, multiplier and divider, differentiator and integrator circuits, electronic analog computation.

Article no 4.5,4.6,4.8,4.9,4.10,4.11,4.12


**Unit -3**

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 reg, 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,

Article no.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 4

Switching regulators

Introduction, circuit scheme basic switching regulators, minimum load current and filter inductance, input and output power, control circuit consideration in a bulk switching regulator, free running switching regulators, switch mode operation using linear voltage regulators, switching regulators using 3 terminal linear regulators, positive switching regulators using LM105, LM205 OR LM 305 Article no. 3.1 to 3.3, 3.3.1, 3.3.5, 3.5, 3.5.2.1, 3.5.2.2

Ele-302: Digital Electronics and Microprocessor:

(4 Credit: 4 hrs/week)

Unit: 1

Ch: 10 Counters
10.1 Asynchronous Counters: Ripple Counters, The 54/7493A
10.2 Decoding Gates
10.3 Synchronous Counters: The 54/74193A
10.4 Changing the Counter Modulus: A mode- 3 Counter, A mode- 6 Counter
10.5 Decade Counters: A mode- 5 Counter, A mode- 10 Counter

Ch: 11 Design of Sequential Circuit:
11.1 Model Selection
11.3 State Synthesis Table: state Assignment, State Synthesis Table, Moore Model, Mealy Model.
11.4 Design Equations and Circuit Diagram: Moore Model, Mealy Model

Reference Book: Digital Electronics by Subrata Ghoshal Publisher: Cengage Learning

Unit: 2

Ch: 4 8085 Microprocessor Architecture and memory Interfacing
4.1 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
4.2 Example of an 8085 based microcomputer: Opcode Fetch Machine Cycle, Memory Read Machine Cycle, How to recognize Machine Cycle
4.3 Memory interfacing: Memory Structure and Its Requirements, Basic Concepts In Memory Interfacing, Address Decoding, Interfacing Circuit, Address Decoding and Memory Addresses

Unit: 3

Ch: 5 Interfacing I/O devices.
5.1 Basic interfacing concepts: Peripheral I/O Instructions, I/O Execution, Device Selection and Data transfer, Absolute vs. Partial Decoding, Input Interfacing, Interfacing I/O Using Decoders.
5.2 Interfacing output Displays: Illustration : LED Display for Binary Data, Illustration : Seven Segment LED Display as an Output
5.3 Interfacing Input devices: Illustration : Data Input from DIP Switches, Hardware, Interfacing Circuit, Multiple Port Addresses, Instructions to Read Input Port
5.4 Memory mapped I/O devices: Execution of Memory-Related Data Transfer Review of Important Concepts.

**Ch-6 Introduction to 8085 instructions.**

6.1 Data transfer (Copy) operations: Addressing Modes, Illustrative Program: Data Transfer From Register to Output Port, Illustrative Program: Data Transfer to Control Output Devices


6.3 Logic Operations: Logic AND, Illustrative Program: Data Masking with Logic AND, OR, Exclusive-OR, and NOT, Setting and Resetting Specific Bits, Illustrative Program: ORing Data from Two Input Ports


6.5 Writing assembly language programming: Getting Started, Illustrative Program: Microprocessor-Controlled Manufacturing Process

**Unit:4**

**Ch-7 Programming techniques with additional instructions**

7.1 Programming techniques looping, counting and indexing: Continuous Loop, Conditional Loop.

7.2 Additional data transfer and 16 bit arithmetic instructions: 16-Bit Data Transfer to Register Pairs (LXI), Data Transfer (Copy) from Memory to Microprocessor, Data Transfer (Copy) from Microprocessor to Memory or Directly into Memory, Arithmetic Operations Related to 16 Bits or Register Pairs, Illustrative Program: Block Transfer of Data Bytes

7.3 Arithmetic operations related to memory: Instructions, Illustrative Program: Addition with Carry, Instructions, Illustrative Program: Checking Sign with Rotate Instructions.


7.5 Logic Operations: Compare

Text Book: Microprocessor Architecture, Programming and Applications with 8085 5th edition by Ramesh Gaonkar
Publisher: Penram International Publishing. (India) Pvt. Ltd.

Reference Book: The 8085 Microprocessor Architecture, Programming and Interfacing by K. Udaya Kumar and B.S.Umashankar
Publisher: Pearson
Ele-303: **ELECTRONIC INSTRUMENTATION**

(4 Credit: 4 hrs/week)

**Unit-1**

Electronic Volt meter

- 4.7 Transistor voltmeter (TVM),
- 4.8 Chopper type DC Amp. Voltmeter,
- 4.9 Solid state Voltmeter,
- 4.10 Differential Voltmeter,
- 4.11 DC standard /Difference Voltmeter,
- 4.12 AC voltmeter using Rectifiers,
- 4.13 AC voltmeter using Half wave rectifier,
- 4.14 AC voltmeter full wave rectifier,
- 4.15 Multirange AC voltmeter,
- 4.16 Avg. Responding voltmeter,
- 4.17 Peak responding voltmeter,
- 4.18 True RMS voltmeter,
- 4.20 Consideration in choosing an analog voltmeter,
- 4.21 Ohmmeter (series type Ohmmeter),
- 4.22 Shunt type Ohmmeter,
- 4.25 Multimeter,
- 4.26 Multimeter operating Instructions.

Articles no.4.7 to 4.18,4.20,4.21,4.22,4.25,4.26.

Book:- Electronic instrumentation by H. S. Kalsi (3rd Edition)

**Unit-2**

Digital voltmeter.

Ch5.1 Introduction,5.2 Ramp technique,5.3 Dual slope integrating type DVM,

- 5.4 Integrating type DVM,
- 5.5 Most commonly used principle of ADC,
- 5.6 Successive approximation,
- 5.8 Resolution and sensitivity of digital meters,
- 5.10 General specifications of a DVM.

Articles no.5.1 to 5.6,5.8 to 5.10

Book: Electronic Instrumentation by H.S. Kalsi, 2nd Edn.

**Unit-3**

C.R.O.

7.1 Introduction,7.2 Oscilloscope Block-Diagram,7.3.1 Early CRT,
- 7.3.3 Post deflection Acceleration,
- 7.3.4 Screens for CRTs,
- 7.3.5 Graticules,
- 7.5 Vertical Deflection system,
- 7.6 Delay line, Function of delay line,
- 7.8 Horizontal deflection system,
- 7.10 Oscilloscope Techniques.

Articles no. 7.1 to 7.2,7.3.1, 7.3.3 to 7.3.5, 7.5,7.6,7.8,7.10.

Book: Helfric and Cooper.

**Unit-4**

Signal Generator.

8.1 Introduction,8.2 The sine wave generator,
- 8.7 Pulse and Square wave Generator,
- 8.7.1 Pulse characteristic and Terminology,
- 8.7.2 Astable Multivibrator,
- 8.7.3 Laboratory square and pulse generator.

Articles no. 8.1 to 8.2, 8.7,8.7.1 to 8.7.3.

Book: Helfric and Cooper. PHI publications.
Ele-304: Electronics Communication :

(4 Credit:4 hrs/week)

Unit-1.

Amplitude Modulation and Demodulation

8.1 Introduction

8.2 Amplitude modulation

8.3 Amplitude Modulation Index.

8.4 Modulation index for sinusoidal AM.

8.5 Frequency spectrum for sinusoidal AM.

8.6 Average power sinusoidal AM.

8.7 Effective voltage and current for sine AM.

8.11 Amplitude demodulation circuit.

Diagonal peak clipping and negative peak clipping.

Articles no. 8.1 to 8.7 and 8.11.


Unit-2

Frequency Modulation.

10.1 Introduction.

10.2 Frequency Modulation.

10.3 Sinusoidal Frequency Modulation.

10.4 Frequency spectrum for sinusoidal FM.

10.5 Average power in sine FM.
10.8 Phase modulation.

10.9 Equivalence between PM and FM.

Articles no. 10.1 to 10.5 and 10.8 and 10.9.


Unit-3

Antenna.

Ch.25 Antenna.

Introduction. Basic antenna principles, fundamental antenna, resonance in half wave dipole, antenna parameters, directivity of a resonant half wave dipole, the folded dipole, the effect of ground on radiation of energy, parasitic elements, Yagi antenna, simple Vertical Aerial, Loop Aerial, ferrite rod Aerial.

Articles no. 25.1 to 25.9, and 25.20 and 25.31.


Unit-4

Satellite communication. Introduction, Satellite system, fixed satellite service, satellite telecommunication Earth station, Indian Domestic satellite INSAT, television.

Articles no. 37.1 to 37.4, 37.16, 37.19

Ele-305: Consumer Electronics (Subject Elective Course)

(2 Credit: 3 hrs/week)

Unit-I

Audio systems

- PA system – Microphone,
- Amplifier, Loudspeakers, Radio receivers – AM/FM
- Audio recording and reproduction – Cassettes, CD and MP3

Unit-II

Landline and Mobile telephony

- Basic landline equipment – CLI, Cordless Telephone.
- Intercom/ EPABX system
- Mobile phones, GPRS, Bluetooth, GPS Navigation system

Unit-III

Office Equipments

- Scanners – Barcode / Flat bed,
- Printers
- Xerox
- Multifunction units (Print, Scan, fax, copy)

Unit-IV

Electronic Gadgets and Domestic Appliances

- Digital clock,
- Digital camera,
- Handi-cam,
- Home security system,
- CCTV
- Air conditioners,
- Refrigerators,
- Washing Machine/Dish Washer,
- Microwave oven,
- Vacuum cleaners

**Recommended Books:**


OR

College can also offer (Student can also select) subject elective course from the subject electives of Physics Sem 5 and 6
Ele-306: **Electronics Practicals:**

(5 Credit:12 hrs/week)

**List of Practicals**

**Group A**

1. Op-amp as Adder and Subtractor.
2. Op-amp as Integrator and Differentiator.
3. Op-amp as current amplifier.
5. Active filter using Op-amp (First order, high pass, low pass).

**Group B**

6. Monostable Multivibrator by IC-74121.
8. UJT as a relaxation oscillator.

**Group C**

12. Low voltage regulator using IC-723.
13. PWM with IC-555.
14. Microprocessor-1 (List given below*).
15. Variable Microprocessor-2 (List given below).

**Group D**

PROJECT : Voluntary Arbitrary Projects to be decided. (Student has to submit the project report and give a project presentation and project viva-voce)
* Microprocessor-1 (List of Experiments of Microprocessor practical Programs):

1. Write the program to interchange the data byte between two location.
2. Write the program to exchange the data byte stored in register D with register H and data byte stored in register E with register L.
3. Sixteen bytes of data are stored in memory location starting from the address location C050H to C05FH.
   Transfer the entire block of data to new memory location starting from C070H.
4. Write a program to add N 8 bit binary numbers considering possible overflow.
5. To sort ten bytes of data initially stored in memory location starting from C100H onwards in the ascending/descending order.

Note:
Total:200 Marks Internal 60 Marks External 140 Marks
There are A,B,C and D four groups. A,B and C group are practicals and D group is project group.

Group A : One Practical:35 Marks:3 Hours
Group B : One Practical:35 Marks:3 Hours
Group C : One Practical:35 Marks:3 Hours
Group D : Project Group:35 Marks:3 Hours

Practical Batch Size : Maximum 10 Students.

In order to give exposure of industry, research institutes and Institute of higher learning in the field of electronics industrial visits may be arranged. It is expected that students of B.Sc.(Electronics Science) semester 5 & 6 must visit industry / research institute / institute of higher learning.
Ele-307 : Non Linear Electronics and Thyristors

(4 Credit: 4 hrs/week)

Unit-1
Non-linear applications of Opamp.
Basic opamp applications, Voltage to Current and Current to Voltage converter, log and antilog amplifier, multiplier and divider, differentiator, integrator.
Article no.: 4.2, 4.5, 4.8, 4.9, 4.10, 4.11.
Book:- D. Roy Choudhury and Shali B. Jain.

Unit-2
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,
Article no. 9.1 to 9.6, 9.7.1 to 9.7.3.
Book:- D. Roy Choudhury and Shali B. Jain and co.

Unit-3
Thyristor -1
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,
Article no 23.1 to 23.11.

Unit-4
Thyristor-2
TRIAC, TRIAC construction, TRIAC operation, TRIAC characteristic, Application of TRIAC, the DIAC, Application of DIAC, UJT as relaxation oscillator and over voltage detector.
Articles no. 24.2 to 24.8, 24.13
Ele-308: Advanced Digital Electronics and Microprocessor:
(4 Credit: 4 hrs/week)

Unit 1
Ch-12 D/A Conversion and A/D Conversions
12.1 Variable Resistor Network: Binary Equivalent Weight, Resistive Divider,
12.2 Binary ladders
12.3 D/A Converters: Multiple Signals, D/A Converter Testing, Available D/A Converters
12.4 D/A Accuracy and Resolution
12.5 A/D Converters-Simultaneous Conversion
12.6 A/D Converter-Counter Method
12.7 Continuous A/D Conversion
12.8 A/D Techniques: Successive Approximation, The ADC 0804, Section Counter
12.9 Dual-Slope A/D Conversion: Single Ramp A/D Converter, Dual-Slope A/D Converter
12.10 A/D Accuracy and Resolution

by Donald P. Leach, Albert Paul Malvino and Gautam Saha
(Special Indian Edition) Publisher: McGraw-Hill Companies
Reference Book: Digital Electronics by Subrata Ghoshal
Publisher: Cengage Learning

Unit 2
Ch-8 Counters and Time Delays.
8.1 Counters and Time Delays: Time Delay Using One Register, Time Delay Using RegisterPair,
Time Delay Using Loop within Loop Technique.
8.2 Illustrative program: Hexadecimal Counter
8.3 Illustrative Program: zero to ten (Modulo Ten) counter
8.4 Illustrative Program: Generating pulse wave forms

Unit 3
Ch-9 Stacks and Subroutines
9.1 Stack
9.2 Subroutines: Illustrative Program: Traffic Signal Controller
9.3 Restart, conditional Call and Return Instructions: Restart (RST) Instructions,

Unit 4
Ch-15 General purpose programmable Peripheral Devices.
15.1 The 8255A Programmable Peripheral Interface: Block Diagram of the 8255A
Mode 0: Simple Input and Output.
Text Book: Microprocessor Architecture, Programming and Applications with
8085 5th edition by Ramesh Gaonkar
Publisher: Penram International Publishing. (India) Pvt. Ltd.
Reference Book: The 8085 Microprocessor Architecture, Programming and Interfacing by K. Udaya Kumar and B.S. Umashankar Publisher: Pearson

Ch-19  Analog data Input and output
19.5  DAC Specifications.
19.6  Solved problems
19.7  Standard DAC chips
   19.7.1  DAC 0800
   19.7.2  DAC 0808
19.9  DAC applications
   19.9.1  Sawtooth Waveforms
   19.9.2  Reverse Sawtooth Waveforms
   19.9.3  Square Wave
   19.9.4  Triangular wave
19.10  Analog to Digital Converters, ADCS
19.16  ADC Interfacing

Book: 8 bit Microprocessor: by Late V.J. Vibhute and P.B. Borole
Publisher: Technova Publishing House
Ele-309 : Electronics communication Systems

(4 Credit:4 hrs/week)

Unit 1 -:
Fiber Optic Technology
Introduction to history of fiber optics, WHY Fiber optics?
Introduction to light: Reflection and Refraction, Dispersion, Diffraction, Absorption, Scattering.
Articles No. 18.1,18.2,18.3(18.3.1,18.3.2)
Book: Electronics Communication Systems By(4th edition MGH)

Unit 2-:
Radio Receiver
Introduction, Receiver Types: TRF Receiver, super-heterodyne receivers,
AM Receiver: RF Section and Characteristics, Frequency changing and tracking, IF and IF Amplifier, Detection and AGC.
Articles No. 6.1(6.1.1,6.1.2,),6.2(6.2.1,6.2.2,6.2.3,6.2.4)
Book: Electronics Communication Systems By(4th edition MGH)

Unit 3 –:
Television
TV Fundamentals, Requirements and standards(Introduction and Standards) Black and white transmission(Fundamentals, Beam scanning, Blanking and synchronizing pulses) Black and White reception(fundamentals, Common, video and sound circuit, synchronising circuit), color reception(introduction, Color Reception)
Articles no. 17.1(17.1.1,17.1.2), 17.3(17.3.1 to 17.3.3),17.4(17.1.1,17.1.3)
Book: Electronics Communication Systems By(4th edition MGH)

Unit 4-:
Digital Communication Digital fundamentals, The emergence of data communications systems, characteristics of datatransmission, Digital codes, Error detection and correction.
Articles no:14.1 (14.1.1),14.2(14.2.1, 14.2.2, 14.2.3,14.2.4)
Book: Electronic Communication Systems by (Kennedy, Davis)
Ele-310: Physics of Electronics

(4 Credit:4 hrs/week)

Unit-1

Sensors and Transducers:
Classification of transducers, selecting a transducer, strain gauge, displacement transducer, temp. measurement and photo sensitive device.

Article no. 11.1 to 11.6 Book: Modern electronic instrumentation and measurement techniques.
7th edition.

Unit-2

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.

Article no :1.1 to 1.7 and 4.1 to 4.4.
Book: digital signal processing by s. salivahanan.

Unit-3

Electrodynamics

Boundary value problems in electrostatic field , poison and laplace equation , boundary conditon 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.

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

Unit-4

Semiconductor Physics

Electrical conduction in solid, formation of energy band, band theory from collective approach, conduction mechanism in solid, semiconductor conductivity. Articles no.: 1.2.6 to 1.5

Conservation and motion of charge, diffusion of carriers, current flow in semiconductors, derivation of continuity equation, application of continuity equation, current flow in single semiconductor, Einstein relationship.

Articles No: 3.1 to 3.6.

Ele-311: Modern Communication [Subject Elective Course]

(2 Credit: 3 hrs/week)

Unit I.
Telecommunication Systems:
Articles No : 18.1 and 18.2

Unit II.
Cellphone Technologies:
Articles No : 20.1, 20.2, 20.3

Unit III.
Internet Technologies:
Articles No : 15.1 to 15.3

Unit IV.
Introduction to networking and Local Area Networks:
12-1 Network Fundamentals: Types of Networks, Network topologies, LAN Applications, Client-Server and Peer-to-Peer LANs, 12-2 LAN Hardware: Cables, Connectors, Network Interface Cards and Chips, Repeaters, Hubs, Bridges, Switches, routers, Gateways, Modems 12-3, Ethernet LANs, 21-1 Wireless LAN, 21-4 WiMAX.
Articles No : 12.1, 12.2, 12.3, 21.1, 21.4
OR

College can also offer (Student can also select) subject elective course from the subject electives of Physics Sem 5 and 6.

OR

In sem 6 student can choose minor/major project under the guidance of the teaching faculty. (Student has to submit the project report and give a project presentation and project viva-voce)
Ele-312: Electronics Practicals:

(5 Credit: 12 hrs/week)
List of Practicals

Group A
1. Op-amp as comparator.
3. PLL: Lock range and capture range.
5. Fixed voltage regulator using IC-7805.

Group B
1. Microprocessor Hardware Interfacing experiment. (Square wave and Triangular wave generation).
2. Synchronous counter using IC-74193 (up/down and variable modulo) and synchronous counter using IC-7490.
3. IC-8255 to drive LED / RELAY Op-amp.
4. Microprocessor-1*
5. Microprocessor-2.*

Group C
2. Characteristic of SCR (AC/DC).
3. Characteristic of Triac (AC/ DC).
4. Study of solar cell (V to I characteristics and form factor).
5. To measure Threshold current of LASER diode. Unit – 4

Group D

PROJECT: Voluntary Arbitrary Projects decided by student. (Student has to submit the project report and give a project presentation and project viva-voce)

*List of Experiments of Microprocessor practical Programs:
1. Write a program to add two sixteen bit binary numbers.
2. Write a program to multiply two eight bit binary numbers.
3. Write a program to convert two digit BCD number into binary equivalent.
4. Write a program to set up decimal counter to count and display from 00 to 99.
Note:

Total: 200 Marks Internal 60 Marks External 140 Marks

There are A, B, C and D four groups. A, B and C group are practicals and D group is project group.

Group A : One Practical: 35 Marks: 3 Hours
Group B : One Practical: 35 Marks: 3 Hours
Group C : One Practical: 35 Marks: 3 Hours
Group D : Project Group: 35 Marks: 3 Hours

**Practical Batch Size : Maximum 10 Students.**

In order to give exposure of industry, research institutes and Institute of higher learning in the field of electronics industrial visits may be arranged. It is expected that students of B.Sc.(Electronics Science) semester 5 & 6 must visit industry / research institute / institute of higher learning.