DEPARTMENT OF ELECTRONICS

I B.Sc. ELECTRONICS

SEMESTER – I, THEORY PAPER

CIRCUIT ANALYSIS

UNIT -I

AC Fundamentals: The sine wave -average and RMS values – The J Operator - Polar and Rectangular forms of complex numbers – Phasor diagram -Complex impedance and admittance.

Kirchhoff's Current and Voltage Laws**:** Concept of Voltage and current sources-KVL and KCL-application to simple circuits *(*AC and DC) consisting of resistors and sources – Node voltage analysis and Mesh analysis.

UNIT – II

Network Theorems (DC and AC): Superposition Theorem Thevenin's Theorem, Norton's Theorem, Maximum power transfer Theorem, Reciprocity Theorem, Milliman's Theorem, Application to simple Networks.

UNIT-III

RC and RL Circuits: Transient Response of RL and RC Circuits with step input, Time constants. Frequency response of RC and RL circuits. Types of filters – Low pass filter and High pass filter-frequency response, passive differentiating circuit and passive integrating circuit.

UNIT-IV

Resonance: RLC Series and parallel resonance circuits -Resonant frequency –Q Factor-Bandwidth-Selectivity.

Cathode Ray Oscilloscope: Cathode Ray Tube (CRT) and its working, electron gun focusing, deflection sensitivity, florescent screen. Measurement of Time period, Frequency, Phase and amplitude.

Text Books:

1) Basic Electronics-Grob 10th edition (TMH)

2) Circuit Analysis-P. Gnanaswam pearson Education.

3) Circuit and Networks-A. Sudhakar & S. Pallri (TMH)

4) Pulse, digital & switching waveforms-Milliman &Taub.

5) Networks, Lines and Fields-John Ryder (PHI)

I B.Sc. SEMSTER-I

Paper-1, Circuit Analysis Lab

1. Measurement of peak voltage, frequency using CRO.
2. Measurement of phase using CRO

. 3. Thevenin's theorem and Norton's theorem – verification.

4. Maximum power transfer theorem - verification.

5. CR circuit – Frequency response - (Low pass and High pass)

.6. CR and LR circuits – Differentiation and integration - tracing of waveforms.

7. LCR - Series resonance circuit – frequency response - Determination of fo, Q and band Width

8. Simulation: i) verification of KVL and KCL. ii) study of network theorems. iii) study of frequency response (LR).

Note: Student has to perform minimum of Six experiments**.**

Reference Books:

1) Lab manual for Electronic Devices and Circuits – 4th Edition.
2) Basic Electronics - A Text Lab Manual —Zbar, Malvino, Miller.

I B.Sc. ELECTRONICS
SEMESTER – II, THEORY PAPER-II
ELECTRONIC DEVICES

UNIT-I

PN Junction: Formation of PN junction, Depletion region, Junction capacitance, Diode equation (no derivation) Effect of temperature on reverse saturation current, V-I characteristics and simple applications of i) Junction diode, ii) Zener diode, iii) Tunnel diode and iv) Varactor diode.

UNIT-II

Bipolar Junction Transistor (BJT): PNP and NPN transistors, current components in BJT, BJT static characteristics (Input and Output), Early effect, CB, CC, CE configurations of transistor and bias conditions (cut off, active, and saturation regions), CE configuration as two port networks, h - parameter model and its equivalent circuit. Determination of h - parameters from the characteristics. Load line analysis (AC and DC). Transistor Biasing – Fixed and self bias.

UNIT-III

Field Effect Transistor (FET): Construction and working of JFET, output and transfer characteristics of FET, Determination of FET parameters. Application of FET as Voltage variable resistor. Advantages of FET over BJT.

MOSFET: construction and working of enhancement and depletion modes, output and transfer characteristics Application of MOSFET as a switch.

Uni Junction Transistor (UJT): Construction and working of UJT and its Characteristics. Application of UJT as a relaxation oscillator.

UNIT-IV

Silicon Controlled Rectifier (SCR): Construction and working of SCR. Two transistor representation, Characteristics of SCR. Application of SCR for power control.

Photo electronic Devices: Construction and Characteristics of Light Dependent Resistor

(LDR), Photo voltaic Cell, Photo diode, Photo transistor and Light Emitting Diode (LED).

Books Recommended:

1) Electronic Devices and circuits-Millman and Halkias, (TMH)
2) Principles of Electronics-V. K. Mehta & Roh Mehta
3) Electronic Devices and Circuits-Allen Molte shed (PHI)
4) Basic Electronics and Linear Circuits-Bhar hava U
5) Electronic Devices and C cuits-Y.N.Bapat
6) Electronic Devices and Circuits-Mithal.
7) Experiments in Electronics-S.V.Subramanyam.

I B.Sc. SEMSTER-II
Paper-II, Electronic Devices Lab

1. To draw volt- ampere characteristics of Junction diode and determine the cut - in voltage, forward and reverse resistances.
2. Zener diode V - I Characteristics - Determination of Zener breakdown voltage.
3. Voltage regulator (line and load) using Zener diode.
4. BJT input and output characteristics (CE configuration) and determination of 'h' parameters.
5. FET – Characteristics and determination of FET parameters.
6. UJT characteristics - determination of intrinsic standoff ratio.
7. UJT as relaxation oscillator.

8 Characteristics of LDR/Photo diode/Photo transistor/Solar cell.

II B.Sc. ELECTRONICS

SEMESTER – III, THEORY PAPER-III

ANALOG CIRCUITS

UNIT – I

Rectifiers and filters: Rectifiers: Half-wave, full-wave and bridge rectifiers, Efficiency, Ripple factor, regulation, harmonic components in rectified output.

Filters: Choke input (inductor) filter, Shunt capacitor filter, L-section and π-section filters.

UNIT – II

Regulated Power Supplies: Block diagram of regulated power supply, Series and shunt transistor regulated power supplies, three terminal IC regulators (78XX and 79XX), Principle and working of switch mode power supply (SMPS). UPS – Principle and working.

UNIT – III

Transistor amplifier: Classification of amplifiers (Based on type of coupling and frequency range), Hybrid π-model of a transistor, RC-coupled CE amplifier – frequency response, analysis.

Feedback in amplifiers: Positive and negative feedback, Effect of negative feedback on gain, bandwidth, noise, input and output impedances. Emitter follower, Darlington pair and its advantages.

UNIT – IV

Oscillators: Barkhausen criterion for sustained oscillations, RC oscillators: RC phase shift and Wien's bridge oscillators and derivation for frequency oscillations, LC oscillators: Hartley and Colpits Oscillators, derivation for frequency oscillation.

Multivibrators: Astable, Monostable and Bistable multivibrators – Qualitative treatment.

Suggested Books:

1. Electronic Devices and Circuits-Millman and Halkias (TMH)
2. Basic Electronics and linear circuits - Bhargava, Kulshreshta& Gupta TMH
3. A first course in Electronics-AA Khan and KK Dey-PHI
4. Electronic Devices and Circuit Theory-Robert L Boylestad & Louis Nashelsky.
5. Pulse, Digital and Switching circuits - Milliman and Taub

B.Sc. ELECTRONICS II Year
SEMESTER – III

PAPER – III: ANALOG CIRCUITS PRACTICALS

1. Study of Half-wave, full-wave and bridge rectifier and determination of ripple factor.

2. Series inductor, shunt capacitor, L-section and π-section filters: Determination of ripple factor using Full wave Rectifier.

3. Study of voltage regulator using ICs: 78XX & 79XX.

4. Colpitt's oscillator – determination of frequency.

5. RC Phase shift oscillator - determination of frequency

6. Astable multivibrator – determination of time period and duty cycle.

7. RC-coupled amplifier – Study of frequency response

8. Simulation experiments:

i) Rectifiers

ii) RC-coupled amplifier

iii) Wein's bridge oscillator

iv) Colpitt's oscillator

v) RC phase shift oscillator

vi) Astable multivibrator

Note: Student has to perform minimum of six experiments

Suggested Books:

1) Lab manual for Electronic Devices and Circuits – David A Bell, 4th Edition, PHI
2) Basic Electronics – A Text Lab Manual – Zbar, Malvino, Miller.

II B.Sc. ELECTRONICS
SEMESTER – IV, THEORY PAPER-IV

LINEAR INTEGRATED CIRCUITS & BASICS OF COMMUNICATION:

UNIT – I

Operational Amplifiers (Op-Amp): Emitter Coupled Differential amplifier, Block diagram of Op Amp, Characteristics of Op-Amp, Op-Amp Parameters: Input resistance, Output resistance, Common mode rejection ratio (CMMR), Slew rate, offset voltages, Input bias current, Basic Op-Amp circuits: Inverting Op-Amp, Virtual ground, Non-inverting Op-Amp, Frequency response of Op-Amp, Op-Amp as: summing amplifier, subtractor, comparator, voltage follower, integrator and differentiator.

UNIT – II

Applications of Op-Amps: Logarithmic amplifier, Sine wave (Wien Bridge) generator and square wave (Astable) generator, Triangular wave generator, Monostable multivibrator, Solving of simple second order differential equations, Basic Op-Amp series regulator and shunt regulator, IC 555 Timer (Block diagram and its working), IC 555 as monostable and astable multivibrator.

UNIT – III

Modulation: Need for modulation- Types of modulation- Amplitude, Frequency and Phase modulation. **Amplitude modulation**: Analysis of Amplitude modulation, side bands, modulation index, AM modulator, Balanced modulator, Demodulation – diode detector.

UNIT – IV

Frequency modulation: Analysis of FM**.** Working of simple frequency modulator, detection of FM waves: FM Discriminator, Advantages of frequency modulation, AM and FM Transmitters and radio receivers (Block diagram approach), Introduction to PAM, PPM, PWM, PCM, Delta modulation.

Suggested Books:

1. Op amps and linear Integrated Circuits – Ramakant Gayakwad, PHI
2. Linear Integrated Circuits - Coughlin and Driscoll
3. Linear Integrated Circuits - D Roy Choudhury and Shail B Jain

4. Electronic Communication Systems-George Kennedy & Bernard Davis
5. Principles of Electronic Communication Systems-Louis E Freznel, TMH

II B.Sc. ELECTRONICS
SEMESTER – IV

LINEAR INTEGRATED CIRCUITS & BASICS OF COMMUNICATION PRACTICALS

Using IC 741 Op-Amp and IC 555 Timer:

1. Op amp as inverting Amplifier- Determination of Gain (With AC and DC)
2. Op amp as non-inverting Amplifier- Determination of Gain (With AC and DC)
3. OP Amp as Summing amplifier and comparator (Zero crossing detector)
4. Astable multivibrator – determination of time period and duty cycle.
5. Monostable multivibrator- determination of gate width.
6. Integrator/ Differentiator – study of wave forms.
7. Astable multivibrator using IC 555
8. Monostable multivibrator using IC 555.
9. AM modulator and detector
10. FM modulator and detector

Simulation of all the above experiments:

1. Inverting and Non inverting amplifiers and comparator
2. Integrator/ Differentiator using op amp
3. Wein's bridge oscillator
4. Astable multivibrator using Op Amp
5. Astable multivibrator using IC 555

Suggested Books:

1) Lab manual for Electronic Devices and Circuits – 4th Edition. By David A Bell – PHI

2) Basic Electronics – A Text Lab Manual –Zbar, Malvino, Miller.

III B.Sc. ELECTRONICS
SEMESTER – V, THEORY PAPER-V

V: (A) DIGITAL ELECTRONICS & MICROPROCESSOR

UNIT-I

Number system and Logic gates: Conversion of binary, octal, decimal & hexadecimal number systems, Binary addition and subtraction (1's and 2's complement methods).
Logic gates- OR, AND, NOT, XOR, NAND, NOR gates and their truth tables, Design of basic gates using the universal gates: NAND and NOR gates, half adder, full adder and parallel adder logic circuits. Logic families and their characteristics: TTL, CMOS and ECL logic circuits.

UNIT-II (12 Hrs)
Boolean algebra and Combinational logic circuits: Boolean algebra - Laws and identities, De Morgan's Theorems, Simplification of Boolean expressions using Boolean identities, Reduction of Boolean expressions using Karnaugh Maps, Sum of Products (SOP) representation (up to four variables), Multiplexer, De-Multiplexer, Decoder (3 to 8) and Encoder (8 to 3).

UNIT-III (16 Hrs)
Sequential logic circuits: Flip-flops: SR, D, JK, T, JK and JK Master-Slave, **Registers:** Shift registers, SISO, SIPO, PISO and PIPO registers, Universal shift register (IC 7496) Shift register **counters-** Ring counter, Johnson Counter-bit Asynchronous (Ripple) counter, Modulo-N counter, Synchronous counter, Up/Down Counters - ripple counter IC 7493 - Decade counter IC 7490 - working, Truth-table and timing diagrams.
Semiconductor memories: Organization and working of ROM, types of ROM's - PROM, EPROM, EEPROM, FLASH, RAM- static and dynamic **Semiconductor memories**: Organization and working of ROM, types of ROM's - PROM, EPROM, EEPROM, FLASH, RAM- static and dynamic

UNIT-IV (16 Hrs)
Introduction to 8085 Microprocessor & its architecture: Introduction to Microcomputer, Intel 8085 Microprocessor – Architecture of 8085 microprocessor – CPU – Timing & Control Unit – Instruction cycle, Fetch Cycle, Execute cycle (Timing diagram), Machine cycle and clock states. Interrupts –
Hardware and Software, Address space partitioning – Memory mapped I/O & I/O mapped I/O.
Instruction set of 8085 microprocessors: Classification - Data transfer operations, Arithmetic operations, logical operations, Branch control operations and stack, I/O and Machine control operations. Stack and Subroutines, Addressing modes
Programming of 8085 microprocessor: Assembly language programming, addition (8 and 16 bit), 8 bit - subtraction, multiplication and division. Finding the largest and smallest number in data array
Suggested Books:
1. Digital Principles and Applications – Malvino & Leach - TMH.
2. Digital Principles and Applications - Ronald J. Tocci – Pearson Education.
3. Text book of Electronics BSc III year (Vol.III) - Telugu Akademi
5. Fundamentals of Digital Circuits – Anand Kumar – PHI
6. Digital Electronics Principles and Integrated circuits – Maini – Wiley India.
7. Digital Electronics – Gothman
8. Microprocessor Architecture and Programming – Ramesh S. Goanker – Penram. 9. Fundamentals of Microprocessors and Micro controllers – B. Ram, - Dhanpat rai & sons. 10. Introduction to Microprocessor – Aditya P. Mathur – TMH.

B.Sc. (Electronics) - III Year
Semester – V
Paper – V: (A) Digital Electronics & Microprocessor Practical's
(DSE-1: Compulsory)

1. Verification of truth tables of AND, OR, NOT, NAND, NOR, XOR Gates using IC 74XX series.
2. Construction of basic gates using NAND and NOR gates.
3. Construction of Half Adder using gates. Verification of truth table.
4. Construction of Full Adder using gates and verification of truth table.
5. Verification of truth tables of flip flops: RS, D, and JK using IC's.
6. Binary addition (8 bit and 16 bit) and subtraction (8 bit).
7. Decimal Addition (DAA).
8. Multiplication and Division (8 bit).
9. Picking of largest/Smallest number from the given data.
10. Arranging the given data in ascending/descending order.
11. Time Delay generation.

Simulation experiments:

1. 4bit parallel adder using Full adders.
2. Decade counter using JK flip flops.
3. Up/Down counters using JK flip flops.
4. Multiplexer/De-Multiplexer.
5. Encoder.

Note: Student has to perform minimum of eight experiments

1. Lab manual for Electronic Devices and Circuits – David A Bell, 4th Edition – PHI 2. Basic Electronics – A Text Lab Manual – Zbar, Manual

B.Sc. (Electronics) - III Year
Semester – VI: Theory
Paper – VI: (A) Microcontroller & Applications

UNIT-I

Microcontroller 8051: Overview and block diagram of 8051, Architecture and pin diagram of 8051, Data types and directives, Memory Organization, Register banks and Stack Pointer, PSW Register, other special function registers, I/O port organization, Interrupts and Timer/Counter modules.

UNIT-II (14 Hrs)
Instruction set of 8051 microcontrollers: Classification: Data transfer, Arithmetic, logical, Single Bit, Jump, Loop and CALL instructions and their usage, Addressing modes: Immediate, Register,

Direct, Indirect, Absolute addressing, Relative addressing, Indexed Addressing, and accessing memory using various addressing modes.

UNIT-III (14 Hrs)

Programming examples of microcontroller 8051: Addition, Subtraction, division, picking the smallest/largest number among a given set of numbers, arranging a given a set of numbers in ascending/descending order, Subroutines, I/O Programming, Bit manipulation, Accessing a specified port terminal and generating wave forms, Timer/Counter Programming in 8051, Programming 8051 timers- basic registers of timers: Timer 0, Timer 1 registers, TMOD register, TCON register, Timer modes – Mode 1, Mode 2 programming, Counter mode programming, Program to generate time delay.

Unit – IV (14 Hrs)

Serial communications: Serial communication, Types, modes and protocols, Data transfer rates, serial communication program- SBUF and SCON registers, RS232 standards, Programming timer Interrupts, Applications of Micro controller: Displaying information on a LCD, Interfacing a keyboard, Interfacing a temperature sensor, Interfacing of DAC 0808 to microcontroller, Interfacing of ADC 0804 to microcontroller, Seven segment LED.

Suggested Books:

1) The 8051 Microcontrollers and Embedded Systems – Muhammad Ali Mazidi and Janice Gillipsie Mazidi – Pearson Education Asia, 4th Reprint, 2002.
2) Text book of Electonics Bsc III year (vol.III)- Telugu Akademi.
3) Fundamentals of Microprocessors and Microcontrollers – B. Ram.
4) The 8051 Microcontroller – Architecture, programming and applications, Kennth J. Ayala, Penram International Publishing, 1995.
5) Micro controllers -Theory and Applications- Ajay V. Deshmukh.
6) Micro-controller 8051, D. Karuna Sagar, Narosa B

B.Sc. (Electronics) - III Year
Semester – VI
Paper – VI: (A) Microcontroller & Applications Practical's

Experiments using 8051 microcontrollers:

1. Multiplication of two numbers using MUL command (later using counter method for repeated addition).
2. Division of two numbers using DIV command (later using counter method for repeated subtraction). 3. Pick out the largest/smallest number among a given set of numbers.
4. Arrange the given numbers in ascending/descending order.
5. Generate a specific time delay using timer/counter.
6. Interface ADC and a temperature sensor to measure temperature.
7. Interface DAC and generate a staircase wave form with a step duration and number of steps as variables.
8. Flash a LED connected at a specified out port terminal.
9. Interface stepper motor to rotate clock wise / anti clock wise through a given angle steps.

Experiments with Keil Software:

1. Write a program to pick out largest/smallest number among a given set of number.
2. Write a program to arrange a given set of numbers in ascending/descending order.

3. Write a program to generate a rectangular/square wave form at specified port.
4. Write a program to generate a time delay using timer registers.

Note: Student has to perform minimum of Six Experiments