Veer Narmad South Gujarat University, Surat

(With effect from June 2017)

Syllabus for: F Y B Sc (Electronics) Semester- 1

PAPER I: Basic Electrical Circuits

Unit I: Passive circuit elements

Resistors, resistor types, power ratings, resistor colour code, resistor in series and in parallel, potentiometer variable resistor, Temperature coefficient, NTC & PTC

Inductors, comparison of different core, inductance of an inductor, energy stored in magnetic field, inductors in series and in parallel

Capacitors, capacitor connected to a battery, capacitance, variable capacitance, leakage resistance, capacitors in series and parallel, energy stored in a capacitor

Mutual inductance and Transformer, Construction and working, Introduction to transformer core materials

Unit II: Basic Laws of Electrical Science

Kirchhoff's Voltage Law, Kirchhoff's Current Law, determination of algebraic sign of voltage, assumed direction of current, applications of KVL, KCL, voltage division rule, current division rule, Super position theorem, concept of ideal voltage source and constant current source, Thevenin's Theorem, Norton's theorem, Maximum power transfer theorem

Unit III: Basic Semiconductors Theory

Energy bands in solids, Valance band and conduction band, Insulator, Conductor and Semiconductor

Chemical bonds in semiconductors, effect of temperature on semiconductors, crystal structure, types of semiconductors, intrinsic semiconductor, Fermi level in intrinsic semiconductor, electrons and holes as charge carriers in semiconductors, extrinsic semiconductor, P-type and N-type semiconductor, majority and minority carriers

Unit IV: P-N Junction

P-N Junction, formation of charge depletion layer, potential barrier and width of depletion region across the junction, energy band diagram of PN Junction, forward bias and reverse bias conditions, V   I characteristics of diode, diode equation.

Breakdown in diodes, Avalanche breakdown, Zener breakdown

Reference Books:

1. Fundamentals of Electrical Engg and Electronics by B L Theraja,
2. Basic Electronics by Grob
3. Fundamentals of Electric Circuits by Sammuel Oppenheime
4. Electronic Components and Materials by S M DHIR

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PAPER II: Digital Electronics

Unit I: Number systems and codes

Introduction to number systems, Decimal, Binary, Octal and Hexadecimal number systems, inter conversion, binary and hexadecimal arithmetic (Add and Subtract in Binary and Hexadecimal only), Representation of negative numbers in binary(1's and 2's complement; Add and Subtract), Binary codes; 8421, BCD (BCD arithmetic 9' and 10's complement; Add and Subtract), Excess 3, Gray code (encoding and decoding Binary-to-Gray and vice-versa), ASCII code, Concept of error detecting (parity bit, check sum) and error detecting and correcting (Hamming code) method.

Unit II: Boolean algebra and Logic Gates

Boolean algebra: Postulates and theorems, logic functions, minimization of Boolean functions using algebra and Karnaugh map methods (upto 4 variables)

Definition of logic gate, Basic logic Gates: AND, OR, NOT, truth table, NAND & NOR gates, De- Morgan's Theorem, NAND & NOR as universal logic gates

Special logic gates like XOR and XNOR its logic and truth table

Unit III : Application of Logic Gates

Construction/Realization of Logic diagram/circuit from expression and vice versa using basic and universal logic gates. Need/Importance of simplified/reduced Boolean expression for better digital circuit.

Design and realization of Half adder, full adder, half subtractor, full subtractor, Construction and working concept of multiplexer and demultiplexer (8-to-1 and 1-to-8 lines)

Applications of XOR gates: Code converter, Controlled   inverter,   parity   chequer, parity (odd, even) generator, word comparator

Unit IV: Logic Families

Introduction to logic families, characterisation of TTL logic family, Characterisation of CMOS family

Reference Books:

1. Fundamentals of Digital Circuits by A Anand Kumar, PHI
2. Principles of Digital Electronics by K Meena, PHI
3. Digital Systems: Principles and Application, by Tocci and Widmer, PHI
4. Digital Computer Electronics by Malvino and Brown
5. Digital Electronics by Malvino and Leach

List of Experiments / Laboratory work for Semester-1 (Paper –I & II)

1. Plotting of electronic signals

     a. Linear $y = mx + c$
     b. Exponential $y = A * e^x$ and $y = A * e^{-x}$
     c. Sinusoidal $y = A * \sin(x)$ and $y = A * \cos(x)$

2. Study of KVL.

3. Study of KCL.

4. Verification of Norton's theorem.

5. Study of Thevenin's theorem.

6. Study of Superposition theorem.

7. Study of Basic Logic Gates

8. Study of Universal Logic Gates

9. Design , built and test Half and Full adder circuit

10. Design , built and test Half and Full Subtractor circuit

11. Study of Multiplexer and Demultiplexer.

12. XOR and XNOR Gates

13. Design, built and test Code converter

14. Diode Characteristics

15. Zener Diode Characteristics

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Syllabus for: F Y B Sc (Electronics) Semester- 2

PAPER I: Semiconductor Devices

Unit I: AC fundamentals and diode circuits

Types of AC waveforms, definitions of cycle, frequency, amplitude, time period, characteristics of sine wave, different values of sine wave, instantaneous value, peak value, peak-to-peak value, RMS value, average value, phase difference

Diode clipper circuits, clamper circuits, voltage doubler circuit

Unit II: Bipolar Junction Transistors

Construction of BJT, fundamentals of BJT operation, transistor current components, PNP and NPN devices, CE configuration transistor characteristics, transistor biasing, DC load line for CE configuration, operating point, cutoff region and saturation region, active region, transistor action,. Gain of a transistor common emitter current gain , common base current gain , their inter relationship, BJT as a switch.

Unit III: Junction Field Effect Transistors

Junction field effect transistor, Comparison of JFET and BJT, Construction Principle of operation and characteristic curve of FET, static characteristics of JFET, MOSFET construction working and characteristics

Unit IV: Opto electronics devices

Construction, principle of operation and working of Light Emitting Diode, Photo diode, photo transistor

UJT construction working and I-V characteristics

Reference Books:

1. Basic Electronics by B L Theraja
2. Electrical Engg Fundamentals by Del Toro
3. Electronic Devices and Circuits Allen Motterrshead
4. Fundamentals of Electric Circuits by Sammuel Oppenheime
5. Electronic Components and Materials by S M DHIR

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Syllabus for: F Y B Sc (Electronics) Semester- 2

PAPER II: Network Analysis and Filters

Unit I: Laplace Transforms and its applications

Laplace transform, Laplace transform of various mathematical functions and unit step function, Laplace transform of integration and differentiation inverse Laplace transform

Unit II: Sinusoidal function

Sinusoidal functions, average and effective value, average power, phasor representation, sinusoidal steady state response of R, C, L, RL and RLC circuits

Fourier theorem, Fourier series, Fourier coefficients

Unit III: Resonance

Resonance, Q factor, series resonance and bandwidth, parallel resonance and bandwidth, reactance curve, image impedance

Unit III: Filters

Filter fundamentals, cut-off frequency, pass band and stop band, high pass filters, low pass filters, band pass filters, band reject filters,

Reference Books:

1. Basic Electronics by B L Theraja
2. Electrical Engg Fundamentals by Del Toro
3. Fundamentals of Electric Ckts by Sammuel Oppenheime
4. Networks Lines and Fields by J D Ryder

List of Experiments / Laboratory work for Semester-2 (Paper –I & II)

1. Study of series resonance and its bandwidth Q.
2. Study of Parallel resonance and its bandwidth and Q.
3. Study of low pass T filter circuit.
4. Study of low pass   filter circuit.
5. Study of high pass T filter circuit.
6. Study of high pass   filter circuit.
7. Wave shaping circuits using diode
8. Charging and discharging of capacitor through RC
9. Study of characteristics curve of BJT.
10. Study of characteristics curve of FET.
11. Study of characteristics curve of Light Emitting Diode
12. Study of characteristics curve of photo diode, photo transistor and
13. Thermistor Characteristics
14. Load Line
15. UJT Characteristics