

NORTH MAHARASHTRA UNIVERSITY, JALGAON

F.Y.B.SC. ELECTRONICS (PAPER - I)

ELE-111- ELCTRONIC COMPONENTS AND NETWORK THEORMS

Unit 1. Resistors: Definition, need & unit, types- fixed resistors & variable resistors.

Fixed resistors: symbol, types- construction, features & applications of Carbon composition, metal film, & wire wound resistors, color coding & standard values of resistors.

Specifications: Tolerance, wattage, maximum operating temperature, maximum operating voltage.

Variable resistors: Linear & logarithmic potentiometers, construction, specifications & applications of wire wound pot, preset & rheostat.

Non-linear resistors: construction, symbol, features & applications of thermistors, varistors & light dependent resistors. **(8P, 10M)**

Unit 2. Capacitors: Definition, need & unit, charging & discharging of capacitor, types - fixed capacitors & variable capacitors.

Fixed capacitors: Symbol, concept of electrolyte & non- electrolyte capacitors.

Non-electrolyte capacitors: construction, specifications & applications of paper, ceramic & polystyrene film capacitors.

Electrolytic capacitors: construction, specifications & applications of Aluminum & Tantalum electrolytic capacitors.

Specifications of capacitors: Voltage rating, tolerance, power factor, frequency range.

Variable capacitors: symbol, gang & trimmer. **(8P, 8M)**

Unit 3. Inductors & Transformers:

Inductors: Definition, inductance of coil, Q factor, types - air core, iron core (Choke) & ferrite core inductors, frequency response.

Transformers: Operating principle, basic relationships - turn ratio, voltage ratio (concept of step up & step down transformers), current ratio, impedance ratio & efficiency, types- power transformer, autotransformer & isolation transformer. **(8P, 8M)**

Unit 4. Relays: symbol, types (List only), construction, specifications & applications of general purpose electromagnetic relay & dry reed relay, concept of switch, concept of pole & throw, relay as a switch. **(4P, 4M)**

Unit -5 Circuit laws & network theorems: Concept of ideal voltage & current sources, Thevenin's theorem, Norton's theorem, maximum power transfer theorem & superposition theorem & Millman's theorem (DC analysis for resistive networks only).

(12P, 10M)

ELE – 112 - BASIC DIGITAL ELECTRONICS – I

Unit 1. Number system: Concept of radix (base), format of a number systems, decimal, binary, octal & hexadecimal number system and their interconversions, BCD code (8421 code), gray code, excess three code, ASCII code. **(10P, 10M)**

Unit 2. Logic Gates: Concept of positive and negative logic, symbols, truth table and logic equation of OR, AND & NOT gate. Construction and working of OR & AND gate using diodes and resistors and NOT gate using transistor, symbol, truth table and logic equation for derived logic gates - NOR, NAND, XOR and XNOR gates. Use of XOR gate for bit comparison controlled inverter, Parity - even parity, odd parity, parity checker, parity generation (even and odd) & application of parity generation of checker. **(8P, 8M)**

Unit 3. Boolean algebra and binary arithmetic: Basic laws of Boolean algebra (commutative, associative and distributive law), Boolean relation about OR & AND operations, Demorgan's theorems-statements and verifications NAND and NOR gates as universal building block elements, use of Boolean law and theorems for simplification of Boolean equation (up to 3 variables), logic diagrams for Boolean equations. Basic rule of binary addition, subtraction and multiplication, addition, subtraction and multiplication of two 4 bit binary numbers, 1's compliment 2's compliments, half adder and full adder. **(12P, 12M)**

Unit 4. Data processing circuits: Idea of multiplexing and demultiplexing, multiplexer 2 to 1 line, 4 to 1 line, 8 to 1 line, demultiplexers- 1 of 2, 1 of 4, 1 of 8 decoder, BCD to decimal, encoder - decimal to BCD using OR gate. **(10 P, 10M)**

ELE -121 - ELECTRONIC ACTIVE COMPONENTS

Unit 1. PN junction: Intrinsic & extrinsic semiconductors, (P & N type semiconductors), formation of pn junction (Junction diode), depletion layer, barrier potential, forward & reverse biasing of diode, IV characteristics (knee voltage & breakdown voltage), diode parameters, zener diode, photodiode & LED (Symbol, operating principle & applications), optocoupler. **(10P, 10M)**

Unit 2. Rectifier circuits: Half wave, full wave & bridge rectifier circuits, efficiency of circuits, idea of ripple factor (Calculation of ripple factors are not expected), comparison of rectifiers, filter circuits capacitor filter, choke input filter. **(8P, 8M)**

Unit 3. Bipolar junction transistor (BJT): Construction, principle of operation (NPN & PNP transistors), CB, CE & CC configurations, input & output characteristics of CE configuration, relation between α & β , need of biasing, stability factor for CE, thermal runaway, fixed bias, collector to base bias & voltage divider bias. **(12P, 12M)**

Unit 4. Amplifier circuits: Concept of amplifier, single stage CE amplifier, frequency response, ac & dc load lines, operating point, classification of amplifiers according to use, frequency range coupling methods & mode of operation. **(4P, 4M)**

Unit 5. Unijunction transistor (UJT): Construction, symbol, bias principle of operation, equivalent circuit & characteristics, UJT as switch & relaxation oscillator. **(6P, 6M)**

Reference Books:

- 1. Basic Electronics: D.C.Tayal**
- 2. Basic Electronics: B.L. Thereja**
- 3. Basic Electronics: Sadasiva Bisawal (Atlantic publisher & Distributors)**
- 4. Electronic components & materials: Madhuri Joshi**
- 5. Basic Electronics: Grob**
- 6. Basic Electronics & Linear Circuits: N.N.Bhargava, D.C.Kulshreshtha, S.C.Gupta (Tata McGraw Hill publication)**
- 7. Principles of Electronics: V.K.Mehta**
- 8. Electronics Principles: A.P.Malvino**

F.Y.B.SC. ELECTRONICS (PAPER - II)

ELE – 122 - BASIC DIGITAL ELECTRONICS – II

Unit 1. Flip- flops: Logic circuit, truth table, working and symbols for R-s flip flop (using gates), clocked R-S flip-flop, clocked D flip-flop, T Flip Flop & J-K Flip flop idea of edge triggering flip - flop, symbol for positive and negative edge triggering flip flop, race round condition J-K master- slave flip flop, concept of preset and clear inputs. **(12P, 12M)**

Unit 2. Shift registers: type of registers, serial in - serial out, serial in - parallel out, parallel in - serial out, parallel in - parallel out (4 bit) enlist applications of resistors, ring counter. **(10 P, 10M)**

Unit 3. Semiconductor memories: Advantages of semiconductor memories, types of semiconductor memories - depending on access rights, read/write operation, data retention properties, memory organization, sequential access memory, ROM, types of ROM- PROM, EPROM, EAPROM, EEPROM, diode matrix ROM, RAM, bipolar SRAM dynamic RM Cell (simple circuit). **(12P, 12M)**

Unit 4. Study of logic families: types of different logic families, definitions and performance parameters such as supply voltage, propagation delay time, fan in, fan out and noise margin, c-mos inverter. **(6P, 6M)**

REFERANCES

- 1. Digital Principle and Application - Malvio and Leach.**
- 2. Digital Techniques and applications - Y.G.Yangalwar**
- 3. Modern Digital Electronics - RP Jain**
- 4. Digital Electronics - W.H.Gothman**
- 5. Integrated circuit - KR Botkar**
- 6. Digital Principle - Morris Mano**

F.Y.B.SC. ELECTRONICS (PAPER - III)
ELE – 103 – ELECTRONICS PRACTICALS

Section – I

1. Compulsory Experiment

- A. Use of analog and digital multimeter for measurement of resistances, ac & dc voltages & currents.
- B. Use of CRO for the measurement of dc voltage, amplitude & frequency of a ac signals (sine & square wave).

2. Any Six experiments from the following:

- C. Verification of Thevenin's & Norton's Theorems.
- D. Verification of maximum power transfer theorem.
- E. Study of RC/RL high pass filter & low pass filter (frequency response and cut off frequency).
- F. Study of zener diode as voltage regulator (load/line regulation).
- G. Study of half & full wave rectifier circuit (with and without filter).
- H. Characteristics of BJT (CB/CE).
- I. Characteristics of UJT.
- J. Characteristics of FET as VVR.
- K. Study of optocoupler using LDR and LED.
- L. Study of photo relay using LDR and transistor.
- M. charging & discharging of capacitor.

Section – II

1. Compulsory experiments

- A. Study of logic gates (OR,AND,NOT using discrete components).
- B. Study of logic gates using ICs (7400,7402,7404,7408,7432,7486).

2. Any six experiments from the following.

- C. Verification of Demorgan's theorem.
- D. Study of clocked R-S flip flop using gates.
- E. Study of half and full adder using logic gates.
- F. Study of 4 – to 1 line multiplexer / 1 to 4 line demultiplexer.
- G. Study of shift register using IC 7495 (left & right operation).
- H. Study of decimal BCD encoder using diode matrix.
- I. Study of parity generator / checker using IC 7486.
- J. Study of static display using IC 7446 / IC 7447 & seven segment display.
- K. Study of BCD to decimal decoder.
- L. Study of T- flip flop.
- M. Study of UJT as a relaxation oscillator.