

॥ अंतरी पेटद् ज्ञानज्योत ॥



**NORTH MAHARASHTRA UNIVERSITY,
JALGAON.**

Syllabus for F.Y.B.Sc.

ELECTRONICS.

(W.e.f. Acd. Yr. 2002 - 2003)

NORTH MAHARASHTRA UNIVERSITY, JALGAON.

Syllabus for T.Y.B.Sc. Electronics.
(With effect from Acad. Yr. 2002-2003)

Paper- I : BASIC ELECTRONICS.

Chapter-1. Circuit Laws and Network Theorems:-

Ohm's law, Kirchhoff's laws (current and voltage) Thevenin's theorem, Norton's theorem, Maximum Power transfer theorem, Superposition theorem. (Problem solving on various theorems is expected).

(11p, 12 m)

Chapter- 2. Components:-

Resistors- Definition, need and unit Types of resistors- Fixed and variable resistors

Fixed resistors- Symbol, Types-carbon composition, carbon film, metal film, wire wound resistors.

Variable resistors- Symbol, Types - potentiometer. (Linear and logarithmic) preset, rheostat

Coding of Resistors- Types of coding - using colour band (4 and 5 band system.) using characters.

Characteristics of Resistors: - Size, power handling capacity, stability and accuracy (tolerance), maximum operating temperature.

(5p, 6m)

[Note: - Study of fixed and variable resistors should be as regards to concept, speciality and application. Fabrication details are not expected.]

Capacitors: - Definition, need and unit. Types of capacitors: - Fixed and variable capacitors

Fixed capacitors- Symbol, concept of non-electrolytic and electrolytic capacitors.

Non-electrolytic capacitors - paper, ceramic, polystyrene capacitors.

Electrolytic capacitors - Aluminum & tantalum capacitors.

Variable capacitors- Symbol, gang and trimmer capacitors.

(5p, 6m)

[Note: - Study of fixed and variable capacitors should be as regards to Concept, speciality and application. Fabrication details are not expected.]

Inductors and transformers:-

Inductors : - Definition, need and unit.

Types of inductors : - air core, iron core (choke) ferrite core.

Transformers : - Principle of Operation. Types of transformers: -Idea of turns ratio, voltage ratio (concept of step up and step down), current ratio and transformer efficiency.

Autotransformer, Isolation transformer.

(6p, 6m)

Switches and Relays:-

Switches: - Idea of SPST, SPDT, DPDT switches. Types of switches: - Toggle, rotary, rocker, dumbwheel, micro, push button. Relays: - Electromagnetic relay, Thermal relay.

(4p, 6m)

Chapter- 3. Printed circuit board :-

Idea of PCB, steps and rules in making PCB, mention different types of PCBs.

(4p, 4m)

Chapter- 4. PN Junction :-

Idea of semiconductor, conductor and insulator on the basis of energy band diagram, intrinsic and extrinsic semiconductor (formation of P type and N type semiconductors), formation of PN junction (junction diode), depletion layer, barrier potential, forward & reverse biasing of diode, V characteristics (knee voltage, breakdown voltage), study of zener diode, varactor diode, photodiode. LED with regard to symbol biasing and working.

(10p, 10m)

Cont..2

Chapter- 5. Rectifier circuits :-

Half wave, full wave, bridge rectifier circuits, efficiency of rectifier circuits, idea of ripple factor (Calculations of ripple factor are not expected). Filters- Shunt capacitor, choke input, LC filter, π filter. Zener diode as voltage regulator.

(7p, 8m)

Chapter- 6. Bipolar Junction Transistor :-

Construction, principle of operation, (PNP, NPN) CB, CE, CC configuration, input and output characteristics for CE configuration, Relation between Alpha & Beta.

(7p, 8m)

Chapter- 7. Transistor Biasing methods :-

Need of biasing, stability factor for CE, thermal runaway, fixed bias, collector to base bias, voltage divider bias.

(7p, 8m)

Chapter- 8. Amplifier circuits :-

Single stage transistor CE amplifier, AC and DC load lines, operating point. Classification of amplifiers (according to use, frequency, coupling methods, mode of operation)

(6p, 6m)

Chapter- 9. UJT:-

Construction, basic principle of operation, equivalent circuit and characteristics, UJT as a switch & Relaxation oscillator.

(6p, 8m)

Chapter- 10. FET:-

Construction, basic principle of operation, characteristics, pinch-off voltage, use of FET as VVR, construction and working of n-channel depletion and enhancement type MOS FET's and their characteristics.

(8p, 8m)

Chapter- 11. SCR :-

Construction, working, equivalent circuit, characteristics, use of SCR as a switch.

(4p, 4m)

Reference Books :-

1. Understanding of electronic components: Water
2. Electronic components & materials: Madhuri Joshi (Wheeler Publishing)
3. Electronic materials & components: K. S. Paul, Central Techno Publication, Nagpur.
4. Basic Electronics : B. Grob
5. Basic Electronics & linear circuits: N.N. Bhargava (Tata McGraw -Hill Publishing Company Ltd)
6. Electronic Principles : V.K. Mehta
7. Electronic Principles : A.P. Malvino

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Paper : II Basic Digital Electronics

CHAPTER 1 :- NUMBER SYSTEMS

Concept of radix (base). Format of number system. Decimal, Binary, Octal, Hexadecimal number systems and their inter conversions. BCD code (8421 code), Gray code, Excess-3 code, ASCII code (equivalent of alphanumeric).

(8p, 10m)

CHAPTER 2 :- LOGIC GATES

Concept of Positive and Negative logic. Symbols, Truth table and Logic equation for OR, AND, NOT gate. Construction and working of OR, AND gates using diode and resistor and NOT gate using transistor. Symbol, truth table and logic equation for derived logic gates- NOR, NAND and XOR gates. Use of XOR gate for bit comparison, controlled inverter, IC number of logic gates in 74xx family with

(7p, 8m)

CHAPTER 3 :- STUDY OF LOGIC FAMILIES

Types of different logic families. Study NAND gate using Diode-Transistor logic. Transistor-Transistor logic. Multiple emitter transistor, Totem pole and open collector output. Definition and performance parameters such as supply voltage, propagation delay time, fan-out, fan-in, noise margin. Comparison of these families.

(6p, 8m)

CHAPTER 4 :- BOOLEAN ALGEBRA AND BINARY ARITHMETIC

Basic laws of Boolean algebra (Commutative, Associative and Distributive laws). Boolean relations about OR and AND operations. DeMorgan's theorems-statement and verification. NAND and NOR gates as universal building block elements. Use of Boolean laws and theorems for simplification of Boolean equation (upto 3 variables). Logic diagrams from given Boolean equation.

Basic rules of binary addition and subtraction. Addition and subtraction of two 4-bit binary numbers. 1's complement, 2's complement, binary subtraction using 1's and 2's complements. Half adder and full adder.

(11p, 12m)

CHAPTER 5 :- FLIP-FLOPS

Logic circuit, Truth table, working and symbol for R-S flip-flop, clocked R-S flip-flop, clocked D-flip-flop, T-flip-flop, idea of edge triggering. Symbol for positive and negative edge-triggered flip-flops. J-K flip-flop, race around condition, J-K Master-Slave flip-flop. Concept of Preset and Clear inputs. (Study of all flip-flops, using gates is expected and not blocks).

(12p, 12m)

CHAPTER 6 :- DATA PROCESSING CIRCUITS

Idea of multiplexing and demultiplexing. Multiplexers- 2 to 1 line, 4 to 1 line, 8 to 1 line. Demultiplexer - 1 of 2, 1 of 4, 1 of 8. Decoders, encoders

(10p, 10m)

Cont.-1

CHAPTER-7 :- SEMICONDUCTOR MEMORIES

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 and EAPROM. Diode matrix ROM, RAM, Bipolar RAM cell, Dynamic RAM cell (Memory IC nos. and its memory capacity for few widely used SRAM and DRAM cells is expected).

(12p, 14m)

CHAPTER-8 :- DISPLAY DEVICES

Seven segment LED display, common anode, common cathode. Concept of liquid crystal liquid crystal display. Dynamic scattering mode of operation. Comparison between LED and LCD display. Dot matrix display (5 X 7).

(8p, 8m)

CHAPTER 9 :- INTRODUCTION TO COMPUTER

Block diagram of computer, function of each block, concept of bus, Definition of software, hardware, firmware, compiler, interpreter and assembler. Study of I/O devices -Magnetic disc, Floppy disc, Compact disc, Visual Display Unit(VDU),Graphic VDU ,Keyboard ,Mouse , Light pen, Digitizer, Printer (Dot matrix, Inkjet, Laser), Plotter .

(15p, 18m)

Reference Books :-

- 1) Digital principles and applications - Malvino and Leach.
- 2) Digital techniques and applications - V.G. Yangalwar
- 3) Modern digital electronics - R.P. Jain
- 4) Digital electronics - W.H. Gothman
- 5) Integrated circuits - K.R. Botkar
- 6) Digital computer fundamentals - Thomas C Bartee
- 7) Computers and common sense :- Roger Hunt, John Shelly
- 8) Introduction to computer :- N. Subramanian. (TMH)
- 9) Computer fundamentals :- P.K.Sinha
- 10) Fundamentals of computer - V. Rajaraman

Paper : III (Practicals)

Pre-requisites

- 1 Use of multimeter (analog and digital) for the measurement of resistance, AC, DC voltage and current.
 - 2 Use of signal generator, function generator (frequency and amplitude).
 - 3 Use of CRO (for measurement of frequency and amplitude).
 - 4 Use of power supply (single, dual, fixed, variable and current limit).
- (Note : - Written sheets about prerequisites are essential in practical journal.)

LIST OF EXPERIMENTS

SECTION-1

Compulsory Experiments:-

- 1 Study of resistors, capacitors and inductors with reference to types, composition, ratings and their uses.
- 2 Study of transformers switches and relays.

Any Six Experiments from the following:

- 1 Verification of Thevenin's, Norton's theorems.
- 2 Verification of Maximum power transfer theorem.
- 3 Characteristics of zener diode and its application as a voltage regulator.
- 4 Study of high pass filter and low pass filter : RL and RC.
- 5 Draw a layout for one complex electronic circuit and make PCB for one simple electronic circuit.
- 6 Study of logic gates OR, AND, NOT, NOR, NAND using IC's.
- 7 Verification of DeMorgan's theorems.
- 8 Study of flip-flops using NAND gates.(R-S, Clocked R-S and J-K flip-flops).
- 9 Study of Half adder and Full adder circuits using basic logic gates.

SECTION-2

Compulsory Experiments: -

- 1 Study of semiconductor devices – diodes, transistors, UJT, FET, SCR (use of manual is expected).
- 2 Study of logic gates (OR, AND, NOT) using discrete components. (OR and AND gates using diodes and resistors; NOT gate using transistor).

Any Six Experiments from the following:

- 1 Characteristics of BJT.
- 2 Characteristics of UJT.
- 3 Characteristics of FET.
- 4 UJT as relaxation oscillator.
- 5 Characteristics of SCR.
- 6 Study of half wave, full wave & bridge rectifier circuits with and without filter and load.
- 7 Study of frequency response of single stage RC coupled CE amplifier.
- 8 Study of 4 to 1 Multiplexer and 1 of 4 Demultiplexer.

Note : For each section every student will be examined for one short experiment from the compulsory experiments and one long experiment from the remaining experiments
