

अंतरी पेटवू ज्ञानज्योत



**NORTH MAHARASHTRA UNIVERSITY,  
JALGAON**

**SYLLABUS FOR**

**F.Y.B.Sc.  
ELECTRONICS**

(With effect from June 2007)

# NORTH MAHARASHTRA UNIVERSITY, JALGAON

## F.Y.B.Sc. ELECTRONICS ( Paper-I )

### Paper I: Electronic Components & Circuits

#### 1) **Passive Components:** Physical Understanding of Components.

**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)**

**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)**

#### **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)**

**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)**

**2) Circuit laws & network theorms:**

Concept of ideal voltage & current sources, Thevenin's theorm, Norton's Theorm, maximum power transfer theorm & superposition theorm & Millman's theorm (DC analysis for resistive networks only).

**(12P, 12M)**

**3) PN junction:**

Classification of solids on the basis of band theory, 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.

**(12P, 12M)**

**4) 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,  $\pi$  filter.

**(8P, 8M)**

**5) Bipolar junction transistor (BJT):**

Construction, principle of operation (NPN & PNP transistors), CB, CE & CC configuration, input & output characteristics of CE configuration, relation between  $\alpha$  &  $\beta$ .

**(6P, 8M)**

**6) Transistor biasing methods:**

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

**(8P, 8M)**

**7) 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.

**(6P, 6M)**

**8) Unijunction transistor (UJT):**

Construction, symbol, basic principle of operation, equivalent circuit & characteristics, UJT as switch & relaxation oscillator.

**(6P, 6M)**

**9) Field effect transistor (FET):**

Construction, symbol, basic principle of operation, characteristics (drain & transfer characteristics), comparison of FET & BJT, applications (List only), MOSFET-construction, symbol, working & characteristics of n-channel DE-MOSFET & E- MOSFET.

**(10P, 10M)**

**Reference Books:**

1. Basic Electronics- D. C. Tayal
2. Basic Electronics- B. L. Thereja
3. Basic Electronics- Sadasiva Bisawal (Atlantic Publihsers & 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

# NORTH MAHARASHTRA UNIVERSITY, JALGAON

## *F.Y.B.Sc. ELECTRONICS ( Paper-II )*

### BASIC DIGITAL ELECTRONICS

**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.

**(12p, 10m)**

**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 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 and checker.

**(8 p, 8 m)**

**3) Study of logic families:** Type of different logic families, NMOS and CMOS logic families, definitions and performance parameters such as supply voltage, propagation delay time, fan in, fan out & noise margin.

**(8p, 8m)**

**4) Boolean algebra and binary arithmetic:** Basic laws of Boolean algebra (commutative law, associative law 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 compliment, binary addition and subtraction using 1's and 2's compliments, half adder and full adder.

**(13p, 14 m)**

**5) 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.

**(11p, 12m)**

**6) 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, symbol for positive and negative edge triggering flip-flop, race round condition, J-K master-Slave Flip-flop, concept of preset and clear inputs.

**(12 p, 14m)**

**7) 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 registers, ring counter.

**(10p, 10m)**

**8) 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 RAM cell (simple circuit).

**(12p, 12m)**

**9) 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 (5x7).

**(10p, 12m)**

#### **REFERANCES–**

- 1) Digital Principle and Application –Malvio and Leach.
- 2) Digital Techniques and applications – Y.G.Yangalwar.
- 3) Modern Digital Electronics – R.P.Jain.
- 4) Digital Electronic –W.H.Gothman.
- 5) Integrated circuit –K.R. Botkar.
- 6) Digital Principle – Morris mano.

# NORTH MAHARASHTRA UNIVERSITY, JALGAON

## *F.Y.B.Sc. ELECTRONICS Practical ( Paper-III )*

### **Section-I**

#### **A) Compulsory Experiment:-**

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

#### **B) Any six experiments from the following: -**

- 3) Verification of Thevenin's & Norton's Theorems.
- 4) Verification of maximum power transfer theorem.
- 5) Study of RC/RL high pass filter & low pass filter (frequency response and cutoff frequency).
- 6) Study of zener diode as voltage regulator (load / line regulation).
- 7) Study of half & full wave rectifier circuit (with and without filter).
- 8) Characteristics of BJT (CB / CE).
- 9) Characteristics of UJT.
- 10) Characteristics of FET as VVR.
- 11) Study of optocoupler using LDR and LED.
- 12) Study of photo relay using LDR & transistor.
- 13) Charging & discharging of capacitor.

## **Section II**

### **A) Compulsory experiments: -**

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

### **B) Any six experiments from the following: -**

- 3) Verification of Demorgan's theorem.
  - 4) Study of clocked R-S flip flop using gates.
  - 5) Study of half and full adder using logic gates.
  - 6) Study of 4-to 1 line multiplexer / 1 to 4 line demultiplexer.
  - 7) Study of shift register using IC 7495 (left & right operation).
  - 8) Study of decimal to BCD encoder using diode matrix.
  - 9) Study of parity generator / checker using IC 7486.
  - 10) Study of static display using IC-7446/IC-7447 & seven segment display.
  - 11) Study of BCD to decimal decoder.
  - 12) Study of T-flip-flop.
  - 13) Study of UJT as a relaxation oscillator.
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