NORTH MAHARASHTRA UNIVERSITY

F.Y. B. Sc. Electronics

Syllabus

Wieth effect from june2015

NORTH MAHARASHTRA UNIVERSITY

F.Y. B. Sc. Electronics
Paper- I, Semester – I
ELE-111: Analog Electronics – I

Unit- I:Introduction to Basic Circuit Components

Definition and unit, Circuit Symbol, Working Principle, Classification in Brief, Specifications and Applications (List Only).

Resistor	–	Fixed Resistor (Carbon Composition)
		Variable Resistor (Wire Wound Potentiometer)
		Non-Linear (Thermister)
Capacitor	-	Fixed Electrolyte (Tantalum)
		Non-Electrolyte (Paper Capacitor)
		Variable –Gang Capacitor and Trimmer
Inductor	–	Air Core Inductor and Iron –Core Inductor
Transformer	–	Step –up and Step down Transformer, Turn-Ratio, Voltage & Current Ratio
Relays & Switches	-	Electromagnetic Relay, Relay as Switch , Concept of pole and Throw, Types –SPST,SPDT,DPST & DPDT

Unit-II :Resistive Circuits

Series Circuit, Characteristics of Series circuit, 'Open & Short' in Series Circuit, Law of parallel circuits, Series – Parallel circuits, 'Opens & Shorts' in Series –Parallel circuits.

Unit –III: Network Theorems

Superposition Theorems ,Thevenins Theorems Maximum Power Transfer Theorems (Numerical Problems-DC Circuits only)

Unit-IV: Semiconductor Devices

Energy Bands in Solids, Classification of Solids, Semiconductors, Intrinsic semiconductors, concept of doping, Extrinsic semiconductors, Formation of p-n junction, Barrier potential, junction capacitance, forward and reverse biasing of p-n junction, I-V characteristics, Zener diode, Break down mechanism (Zener & avalanche), I-V characteristics, LED & Photo diode (working and applications only).

References:

1) **"A Text Book of Electrical Technology", B. L. Thereja; S Chand & Company, New Delhi**
2) **"Priciple of Electronics", V. K. Mehta, S Chand & Company, New Delhi**
3) **"Electronic Principles", Malvino, Tata McGra Hill, India**
4) **"Electronic Devices and Circuits", Motorshed A, Prentice Hall of India**
5) **" Basic Electronics", Bernod Grob,**
6) **"Applied Electonbics", R. S. Sedha; S Chand and Company, New Delhi**

NORTH MAHARASHTRA UNIVERSITY
F.Y. B. Sc. Electronics
Paper- I, Semester – II
ELE 121: Analog Electronics – II

Unit 1: Semiconductor Devices   (10P, 14M)
 Energy Bands in Solids, Classification of Solids, Semiconductors, Intrinsic semiconductors, concept of doping, Extrinsic semiconductors, Formation of p-n junction, Barrier potential, junction capacitance, forward and reverse biasing of p-n junction, I-V characteristics, Zener diode, Break down mechanism (Zener & avalanche), I-V characteristics, LED & Photo diode (working and applications only).

Unit 2: Basic Circuits using Active Devices   (12P, 16M)
Diode circuits – Rectifiers [Half wave, Full wave, and Bridge , (Calculations of ripple factor & efficiency expected)], Peak Inverse Voltage , steady and pulsating DC Voltages, Comparison of Half wave , Full wave and Bridge Rectifiers, Capacitor Filter, Clipping Circuits [unbiased, biased(positive and negative), combination clippers], Clamping circuits(positive and negative clampers).

Unit 3: Transistor   (12P, 10M)
 Bipolar Junction Transistor- n-p-n & p-n-p [Construction and operation] CB, CE and CC configuration, characteristics of CE configuration, Comparison   CE, CB and CC configurations, relation between α and β, (Numerical examples are expected). Need of biasing, & types of biasing (list only) ,thermal run away, stability factor of CE configuration, Potential divider biasing of BJT, , transistor as a switch .

Unit 4: UJT   (04P, 10M)
 Construction and Working principle of UJT, equivalent circuit, Characteristics, Applications (List), Relaxation Oscillator using UJT.

Unit 5: FET   (08P, 12M)
 Construction, Working principle and Characteristics of FET, FET as Voltage Variable Resistor, FET amplifier, MOSFET (Enhancement and Depletion)

Unit 6: SCR   (06P,08M)
Construction, Working of SCR, equivalent circuit of SCR, Important terms related to SCR (break over voltage, holding current, forward current rating) V-I Characteristics , SCR as Switch.

Reference Books:

1) Jacob Milman & Chrstes S Halkias, "Electronic devices and circuits", MGH, International Edition.
2) Motorshed A , "Electronic Devices and circuits ", Prentice Hall of India.
3) R. S. Sedha, "Applied Electronics", S. Chand & Co.
4) N. N. Bhargava, D. C. Kurukshetra, s.C. Gupta " Basic Electronics and circuits. TMH
5) V.K. Mehta, "Principals of Electronics", S. Chand and Co.
6) Robert Boylsted, Louis Nashisky, "Electronic devices and circuit theory", Pearson Education.

NORTH MAHARASHTRA UNIVERSITY
F.Y. B. Sc. Electronics Paper - II, Semester – I
ELE – 112 - Digital Electronics – I

Unit 1. Number systems   **(10P, 10M)**   Concept of radix (base), format of number systems, decimal, binary, octal & hexadecimal number systems and their inter conversions, BCD code (8421 code),gray code.

Unit 2. Logic Gates   **(14P, 18M)**
Concept of positive and negative logic, symbols, truth table and logic equation of OR, AND & NOT gate. Construction and working of OR & AND gates using diodes and resistors and NOT gate using transistor, symbol, truth table and logic equation for derived logic gates - NOR, NAND, XOR. 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 & checker.

Unit 3. Boolean algebra and binary arithmetic   **(12P, 18M)**
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 laws and theorems for simplification of Boolean equation (up to 3variables), logic diagrams for Boolean equations. Basic rules of binary addition & subtraction. Addition & subtraction of two 4 bit binary numbers, 1's compliment 2' s compliment, subtraction using 1's compliment & 2's compliment.   Half adder & full adder.

Unit 4. K-Map   **(12P, 14M)**
Methods of simplification of Boolean expression, Representation of logic functions (SOP), K-Map representation of logic functions, representation of truth table on K Map. Representation of Canonical SOP & POS on K-Map. Conversion of noncanonical to canonical form, Simplification of function using K-Map,Minimization of SOP form, Don't care conditions, Design examples of Halfsubtractor & full subtractor.

Reference Books:
1. "Digital Principles and Applications", A.P.Malvino & D.P.Leach ; 4/e, Tata
McGraw Hill Publishing Co. Ltd.
2. "Digital Electronics" , W.H. Gothmann ; Prentice Hall of India Private Limited
3. "Modern Digital Electronics", R.P. Jain ; 2/e, Tata McGraw Hill Publishing Co.
Ltd., New Delhi.
4. "Digital electronics, Principles and applications", R. L. Tokheim ; 6th Edition,
Tata McGraw Hill Edition
5. "Digital Techniques and applications", Y.G.Yangalwar, Nirali Publication
6. "Digital Principles and System Design", A.P.Godse, D.A. Godse ; TechnicalPublications

NORTH MAHARASHTRA UNIVERSITY
F.Y. B. Sc. Electronics
Paper - II, Semester – II
ELE – 122 - Digital Electronics – II

Unit 1. Data processing circuits   **(12 P, 12M)**
Idea of multiplexing and demultiplexing, multiplexer- 2:1 line, 4:1 line, 8:1 line,   demultiplexer- 1:2, 1:4, 1:8, Decoder- BCD to decimal, Encoder-decimal to BCD using OR gates.

Unit 2. Flip- flops   **(12P, 16M)**
Logic circuit, truth table, working and symbols for R-S flip flop (using NAND &NOR gates), clocked R-S flip-flop, D flip-flop, T Flip Flop & J-K Flip flop, race-around, idea of edge triggering flip - flop, symbol for positive and negative edge triggering flip flop, J-K master- slave flip flop, concept of preset and clear inputs.

Unit 3. Shift registers And Semiconductor memories   **(12 P, 18M)**
Type of registers, serial in - serial out, serial in - parallel out, parallel in - serial out,   parallel in - parallel out (4 bit)Shift register, Semiconductor Memories, Types of Semiconductor Memories depending on access right, read write operation, Types of ROM (PROM, EPROM, EAPROM, EEPROM), Types of RAM- Static & Dynamic, Advantages of Semiconductor Memoryies.

Unit 4. Counters   **(12P, 14M)**
Asynchronous counter (3 bit), modulus of counter: mod-3, mod-5 & mod-10 (decade counter), Synchronous counter (3 bit), up-down counter (3 bit), ringcounter.

Reference Books:
1. "Digital Principles and Applications", A.P.Malvino & D.P.Leach ; 4/e, Tata McGraw Hill Publishing Co. Ltd.
2. "Digital Electronics" , W.H. Gothmann ; Prentice Hall of India Private Limited
3. "Modern Digital Electronics", R.P. Jain ; 2/e, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
4. "Digital electronics, Principles and applications", R. L. Tokheim ; 6th Edition, Tata McGraw Hill Edition, 2003
5. "Digital Techniques and applications", Y.G.Yangalwar, Nirali Publication
6. "Digital Principles and System Design", A.P.Godse, D.A. Godse ; Technical Publications, 2008
7. "Digital Electronics & Logic Design", N. G. Palan. Technova Publication

F.Y. B. Sc. Electronics, Paper-III
ELE-113: Practical Course

Group A (Any four):

1. Verification of Thevenin's Theorem.
2. Verification of Norton's Theorem
3. Verification of Superposition Theorem
4. Verification of Maximum Power Transfer theorem.
5. Design, build and test Low pass RC filters.
6. Design, build and test High pass RC filters.
7. Study of low voltage Half-wave, Full-wave rectifier circuits.
8. Study of low voltage Bridge rectifier circuits
9. Study of characteristics of photodiode
10. Study of characteristics of sine wave.

Group B (Any Four):

1. Study of forward bias characteristics of PN Junction Diode.
2. Study of reverse characteristics of Zener diode.
3. Study of output characteristics of BJT in CE mode.
4. Study of output characteristics of BJT in CB mode.
5. Study of characteristics of UJT.
6. UJT as relaxation oscillator.
7. Study of characteristics of FET.
8. Study of FET as VVR.
9. Study of clipping circuit.
10. Study of clamping circuit.
11. Study of optocoupler using LED and Photodiode.

F.Y. B. Sc. Electronics,
Paper-III (Proposed Syllabus)
ELE-113: Practical Course

Group A (Any Four):
1. Study of logic gates using discrete components.
2. Study of logic gates using any four ICs (7400, 7402, 7404, 7408, 7432, and 7486).
3. Verification of Demorgan's theorems.
4. Study of parity generator / checker using IC 7486.
5. Study of IC tester (ICs 7400, 7404, 7408, 7432, 7447, 7490).
6. Use of K-Map (4 variables).
7. Study of NAND & NOR gates as Universal Gate.
8. 4-bit 2's complement subtractor circuit.
9. Study of half adder and full adder using logic gates.
10. Verify commutative, associative and distributive law using Boolean algebra.

Group B (Any Four):
1. Study of clocked R-S flip flop using gates.
2. Study of 4:1 line multiplexer.
3. 1:4 line demultiplexer.
4. Study of shift register using IC 7495 (left & right operation).
5. Study of BCD to decimal decoder.
6. Study of decimal to BCD encoder.
7. Study of T- flips flop.
8. Study of D- flips flop.
9. Study of decade counter using IC7490
10. Study of Diode Matrix ROM