



**Anil Neerukonda Institute of Technology & Sciences (Autonomous)**

(Affiliated to AU, Approved by AICTE & Accredited by NBA & NAAC with 'A' Grade)

Sangivalasa-531 162, Bheemunipatnam Mandal, Visakhapatnam District

Phone: 08933-225083/84/87

Fax: 226395

Website: [www.anits.edu.in](http://www.anits.edu.in)

email: [principal@anits.edu.in](mailto:principal@anits.edu.in)

**DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING**

**B.TECH-EEE (HONORS)**

**REGULATION-R20**

**2020-2021**

**The students who are eligible and opted for Honors degree shall have to select any one of the following courses in Second year second semester**

<b>S. No</b>	<b>POOL 1 (2-2)</b>
1	Advanced Network Theory
2	Advanced Digital Logic Design
3	Electronic Measurement
4	Electrical Engineering Materials

# Second Year Semester-2

<b>ADVANCED NETWORK THEORY</b>	
<b>EEE</b>	<b>Credits : 4</b>
<b>Instruction : 3 Periods &amp; 1 Tut/Week</b>	<b>Sessional Marks : 40</b>
<b>End Exam : 3 Hours</b>	<b>End Exam Marks : 60</b>

## SYLLABUS

### **UNIT-I** **[12 Periods]**

#### **Fourier Transforms**

Definitions and properties, Transforms and simple time domain Functions, Transforms of General Periodic Time Functions, Convolution and Response in Time domain, Response in Frequency domain, Relationship between Fourier and Laplace Transforms.

### **UNIT-II** **[12 Periods]**

#### **Network Functions**

Calculation of Network Functions for Ladder and General Networks, Poles and Zeroes, Restriction of Poles and Zeroes for Driving point and Transfer functions, Time domain behaviour from Pole Zero plot, Transfer functions in terms of Y and Z functions.

### **UNIT-III** **[12periods]**

#### **Positive Real Functions**

Positive Real Function and other properties, Hurwitz's polynomials, Computation of Residues, Even and Odd functions, Test for Positive Real Functions.

### **UNIT-IV** **[12 Periods]**

#### **RC, RL & LC Network Synthesis**

Elementary Synthesis Operation, LC Network Synthesis, Properties of RC Network Functions, Foster and Cauer Forms of RC and RL Networks.

### **UNIT-V** **[10 Periods]**

#### **RLC Network Synthesis**

Minimum Positive Real Functions, Brune's method of RLC Synthesis, Realization of RLC Difficulties.

#### **Text books:**

1. M. E. Vanvalkunberg, Network synthesis, 3<sup>rd</sup> edition, prentice Hall of India 1974.
2. M. E. Van valkunberg, Modern Network Analysis.

#### **References:**

1. C K Alexander & M. N. O. Sadiku, Fundamentals of Electric Circuits, 5<sup>th</sup> Edition, Published by McGraw-Hill.
2. Engineering Network Analysis & Filter Design by GOPAL.G. BHISE, Umesh Publications, publishers of science and technical books.

<b>ADVANCED DIGITAL LOGIC DESIGN</b>	
<b>EEE</b>	<b>Credits : 4</b>
<b>Instruction : 3 Periods &amp; 1 Tut/Week</b>	<b>Sessional Marks : 40</b>
<b>End Exam : 3 Hours</b>	<b>End Exam Marks : 60</b>

### **SYLLABUS**

#### **UNIT I** **[12 Periods]**

**Introduction to Verilog HDL** : Digital Logic Families -comparison of RTL, DTL, TTL, ECL and MOS families -operation, characteristics of digital logic family. Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Functional Verification, System Tasks, Programming Language Interface (PLI), Module, Simulation and Synthesis Tools.

#### **UNIT II** **[12 Periods]**

**Language Constructs and Conventions:** Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Operators.

#### **UNIT III** **[12 Periods]**

**Gate Level Modelling:** Introduction, AND Gate Primitive, Module Structure, Other Gate Primitives, Illustrative Examples, Tri-State Gates, Array of Instances of Primitives, Design of Flip-flops with Gate Primitives, Delays, Strengths and Construction Resolution, Net Types, Design of Basic Circuits.

#### **UNIT IV** **[12 Periods]**

**Dataflow Level Modelling:** Introduction, Continuous Assignment Structure, Delays and Continuous Assignments, Assignment to Vectors, Operators.

#### **UNIT V** **[12 Periods]**

**Asynchronous Sequential Logic** :Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduction of state and Flow Tables, Race-Free state Assignment Hazards, Design Example.

#### **Text Books:**

1. T.R. Padmanabhan, B. Bala Tripura Sundari , Design through Verilog HDL, Wiley, 2009.
2. Zainalabdien Navabi, Verilog Digital System Design, TMH, 2<sup>nd</sup> Edition.

#### **Reference Books:**

1. Fundamentals of Logic Design with Verilog Design– Stephen. Brown and Zvonko Vranesic, TMH, 2<sup>nd</sup> Edition 2010.
2. Advanced Digital Logic Design using Verilog, State Machine & Synthesis for FPGA – Sunggu Lee, CengageLearning , 2012.
3. Verilog HDL – Samir Palnitkar, 2nd Edition, Pearson Education, 2009.
4. Advanced Digital Design with Verilog HDL – Michael D. Ciletti, PHI, 2009.

<b>ELECTRONIC MEASUREMENTS</b>	
<b>EEE</b>	<b>Credits : 4</b>
<b>Instruction : 3 Periods &amp; 1 Tut/Week</b>	<b>Sessional Marks : 40</b>
<b>End Exam : 3 Hours</b>	<b>End Exam Marks : 60</b>

## **SYLLABUS**

### **UNIT-I** **[12 Periods]**

**Electronic Instruments for Measuring Basic Parameters:** Amplified DC meter, AC Voltmeter, True-RMS responding Voltmeter, Electronic multi-meter, Digital voltmeter, Vector Voltmeter.

### **UNIT-II** **[12 Periods]**

**Oscilloscopes:** Cathode Ray Tube(CRT), Electron gun, electrostatic focusing, Vertical and Horizontal Deflection Systems, Delay lines, Probes and Transducers, Specification of an Oscilloscope, Screen for CRT, Special purpose oscilloscopes, Multiple beam oscilloscopes, Impulse waveform oscilloscopes, Sampling oscilloscopes, Storage type oscilloscope, Signal Generators: Standard signal generators, Square wave generators. Function Generators.

### **UNIT-III** **[12 Periods]**

**Active and passive transducers:** Resistance, capacitance, inductance, strain gauges, LVDT, piezo electric transducers, resistance thermometers, thermocouples, thermistors and sensistors, Basic Hall Effect sensors.

### **UNIT-IV** **[12 Periods]**

**Signal Analysis:** Wave Analyzer, Spectrum Analyzer.  
**Frequency Counters:** Simple Frequency Counter; Measurement errors; extending frequency range of counters

### **UNIT-V** **[12 Periods]**

**Digital Frequency meter:** Principal of operation, Basic circuit, Start and stop gate, Circuit for measurement of frequency, Simplified composite circuit of a Digital Frequency Meter, High frequency measurements, Period Measurement.

#### **Text Books:**

1. Modern Electronics Instrumentation on & Measurement Techniques, by Albert D. Helstrick and William D. Cooper, Pearson Education. Selected portion from Ch.1,5-13.
2. Elements of Electronics Instrumentation and Measurement -3rd Edition by Joseph
3. J. Carr, Pearson Education.
4. Electronic Instrumentation by H.S. Kalsi, Tata McGraw hill 2004, 2/e

#### **Reference Books:**

1. Electronic Instrumentation & Measurements - David A. Bell, PHI, 2003, 2/e.
2. Electronic Test Instruments, Analog and Digital Measurements - Robert A. Witte, Pearson Education, 2004.
3. Electrical and Electronics Measurements by A.K. Sawhney

<b>ELECTRICAL ENGINEERING MATERIALS</b>	
<b>EEE</b>	<b>Credits : 4</b>
<b>Instruction : 2 Periods &amp; 1 Tut/Week</b>	<b>Sessional Marks : 40</b>
<b>End Exam : 3 Hours</b>	<b>End Exam Marks : 60</b>

## SYLLABUS

### **UNIT-I** **[12 Periods]**

**Conducting Materials for Electrical Equipments:** Introduction & material Classifications; resistance and its factors affecting it such as alloying & temperature, low resistivity & high resistivity materials; Copper, aluminum, Steel, manganin, Nichrome, mercury and tungsten etc. - resistivity, temperature coefficient, density, corrosion, contact resistance; copper alloys: Brass, Bronze, Silver, Gold, Platinum, superconductors and their applications; Semi-conducting Materials and their properties, silicon, germanium, Silicon Carbide (SiC), Gallium Nitride (GaN) devices.

### **UNIT-II** **[12 Periods]**

**Dielectric Materials:** Introduction, types & electrical properties - volume resistivity, surface resistance, dielectric loss, dielectric strength, dielectric constant; Thermal Properties - Heat resistance, thermal stability, thermal conductivity, Electro-thermal breakdown in solid dielectrics; Chemical Properties - chemical resistance, weather ability; Gaseous materials - Air, Hydrogen, Nitrogen, SF<sub>6</sub> materials and applications. Piezoelectric materials, pyroelectric materials, Liquid, gaseous & Nano-dielectrics materials and their application to HV power equipment with examples.

### **UNIT-III** **[12 Periods]**

**Insulating materials and applications:** Introduction – Types, electrical characteristics; Electrical & Thermal properties- solid insulating materials, Mica, Micanite, Asbestos, Bakelite, rubber, plastics & thermo-plastics, Amino & epoxy resins, polystyrene, PVC, Ceramic materials (porcelain & steatite), glass, Cotton, Silk, Paper (dry & impregnated), Rubber, Bitumen, high voltage insulated cables, fiber sleeves.

Liquid insulating materials – Mineral oils, synthetic liquids, fluorinated liquids – their electrical, thermal and chemical properties – transformer oil, effect of moisture on insulation properties. Insulating varnishes for coating and impregnation.

Gaseous insulators – classification & properties- based on dielectric strength, dielectric loss, chemical stability & their applications.

### **UNIT-IV** **[12 Periods]**

**Magnetic Materials :** Introduction - ferromagnetic materials and permeability, B-H curve, magnetic saturation, hysteresis loop (including) coercive force and residual magnetism, concept of eddy current and hysteresis loss, Curie temperature, magneto-striction effect, ageing of magnets, factors effecting permeability and hysteresis. Cast & cermet permanent magnets.

Soft & Hard Magnetic Materials- Alloyed steels with silicon, alloy steel for transformers, low silicon alloy steel for electric rotating machines. Cold rolled grain oriented steels for transformer, Nickel-iron alloys, and Soft Ferrites; hard magnetic materials- hard ferrites and cobalt steel & their applications.

### **UNIT-V** **[12 Periods]**

**Special Purpose Materials:** Stranded conductors, bimetallic fuses, soft soldering and hard soldering materials, electric carbon materials, thermo couple, Galvanization and Impregnation of materials. Materials for capacitors, lighting systems (like LCD, LED bulb surface, CFL, fluorescent etc.) and their properties.

**Text Books:**

1. Electrical and Electronic Engineering Materials by SK Bhattacharya, Khanna Publishers, New Delhi Edition-2012.
2. A Course In Electrical Engineering Materials, by S. P. Seth, 3/E, 2011, Dhanpat Rai publications (2011).
3. Materials Science for Electrical and Electronic Engineers, by Ian Jones, Oxford University Press; Fourth Impression edition (22 May2007).
4. Electrical Engineering Material, by Adrianus J. Dekker, Prentice Hall India Learning Private Limited; 1<sup>st</sup>Edition (1970).
5. Electrical Engineering Materials, by R. K. Shukla, McGraw Hill Education, 2017.
6. Electrical Engineering Materials, by R K Rajput, Laxmi Publications, 2<sup>nd</sup> Edition, 2015.
7. Electrical Engineering Materials & Electrical Components, by K.B. Raina & Bhattai; S.K. Kataria & Sons; Edition (2013).
8. Electrical Engineering Materials, by T K Basak, New Age Science Publications, Edition: 1st Rev. Reprint, Feb 2014.