Course Objective
To study the theory of signals and system. To study the interaction of signals with physical system. To study the properties of Fourier transform, Laplace transform, signal transform through linear system, relation between convolution and correlation of signals, sampling theorem and techniques, and transform analysis of LTI systems.

Module I

Module II

Module III

Module IV

References
1 Alan V. Oppenheim and Alan Willsky, Signals and Systems, PHI, 2/e, 2009.
5 B P. Lathi, Priciples of Signal Processing & Linear systems, Oxford University Press, 2010.
8 Anand Kumar, Signals and Systems, PHI, 3/e, 2013.

Structure of the Question Paper
The question paper shall consist of two parts. Part A is to cover the entire syllabus and carries 20 marks. This shall contain 10 compulsory questions of 2 marks each. Part B is to cover 4 modules and carries 80 marks. There shall be 2 questions from each module (20 marks each) out of which one is to be answered.

(Question paper should contain minimum 60% and maximum 80% Problems and Analysis)

Course outcome
After completion of the course students will have a good knowledge in signals, system and applications.
13.303 NETWORK ANALYSIS (AT)

L-T-P: 3-1-0 Credits: 4

**Course objectives** To make the students capable of analyzing any given electrical network. To study the transient response of series and parallel A.C. Circuits. To study the concept of coupled circuits and two port networks. To make the students learn how to synthesize an electrical network from a given impedance / admittance function.

**Module I**
Solution methods: Mesh and node analysis, Star-Delta transformation.
Network theorems: Thevenin’s theorem, Norton’s theorem, Superposition theorem, Reciprocity theorem, Millman’s theorem, Maximum Power Transfer theorem.
Signal representation - Impulse, step, pulse and ramp function, waveform synthesis.

**Module II**
S-Domain analysis: The concept of complex frequency, Network functions for the one port and two port - Poles and Zeros of network functions, Significance of Poles and Zeros, properties of driving point and transfer functions, Time domain response from pole zero plot.

**Module III**
Parameters of two-port network: impedance, admittance, transmission and hybrid parameters, Reciprocal and Symmetrical two ports. Characteristic impedance, Image Impedance and propagation constant.
Resonance: Series resonance, bandwidth, Q factor and Selectivity, Parallel resonance. Coupled circuits: single tuned and double tuned circuits, dot convention, coefficient of coupling, analysis of coupled circuits.

**Module IV**

**References**

**Structure of the Question Paper**
The question paper shall consist of two parts. Part A is to cover the entire syllabus and carries 20 marks. This shall contain 10 compulsory questions of 2 marks each. Part B is to cover 4 modules and carries 80 marks. There shall be 2 questions from each module (20 marks each) out of which one is to be answered. (*Question paper should contain minimum 60% and maximum 80% Problems and Analysis*)

**Course outcome**
At the end of the course students will be able analyze the electrical circuits and synthesis the electrical circuits.
Course Objectives
To study the concepts and types modulation schemes. To study different types of radio transmitters and receivers. To study the principles of wired telephone system. Understand the basic principles of digital communication.

Module I
Amplitude Modulation – Principle of AM, wave forms and analysis, Amplitude modulator circuit, Demodulator circuit. AM Transmitters, Non sinusoidal modulation.
DSBSC Modulation- Principles, Balanced modulator.

Module II
AM Receivers-Super heterodyne receiver, Tuning Range, Tracking, Sensitivity and Gain, Image Rejection, Double Conversion, Adjacent Channel Rejection, Automatic Gain Control.

Module III
Angle Modulation- Principles of Frequency Modulation, Wave forms and analysis, Comparison between AM and FM.
Phase modulation – Equivalence between PM and FM. Sinusoidal phase modulation.
Frequency Modulator Circuits – Basic Reactance modulator, Varactor diode modulator, FM Transmitters – Direct and Indirect methods.

Module IV
Pulse modulation-PAM, PWM, PPM, PCM, companding.

References

Structure of the Question Paper
The question paper shall consist of two parts. Part A is to cover the entire syllabus and carries 20 marks. This shall contain 10 compulsory questions of 2 marks each. Part B is to cover 4 modules and carries 80 marks. There shall be 2 questions from each module (20 marks each) out of which one is to be answered.

(Question paper should contain Minimum 40% and maximum 60% Problems and Analysis)

Course outcome: At the end of the course the students will be familiar with the modulation schemes. They are well versed with types of radio receivers. The students will be able to explain the working of wired telephone system and conventional telephone exchange.
Course Objectives
To study the working of various electronic circuits and their equivalent circuit. To analyze the different circuits and design the circuits using discrete components. as per the specifications.

Module I
RC Circuits: Differentiator, Integrator. Diode Circuits: clippers, clamplers, multiple diode circuits
DC analysis of BJT's - Transistor Biasing circuits, Load line, BJT as switch, BJT as amplifier, RC Coupled amplifier and its Frequency response. Small signal hybrid π equivalent circuit model. Small signal analysis of CE, CB, CC configurations using Small signal hybrid π model (gain, input and output impedance).
High frequency equivalent circuits of BJT's, Analysis of high frequency response of CE, CB, CC Amplifiers.

Module II
MOSFET: small signal equivalent circuits. Biasing of MOSFETs amplifiers
Analysis of Single stage discrete MOSFET amplifiers – small signal voltage and current gain, input and output impedance of CS, CG, CD amplifiers, MOSFET Current Source Circuits
MOS differential amplifiers: de transfer characteristics Small signal equivalent circuit analysis, CMRR, Active load, cascode active load, current mirror circuits.

Module III
Analysis of Multistage MOSFET amplifiers : Cascade and cascode configuration.
Feed back amplifiers (using BJT) : The four basic feed back topologies, Analysis of discrete circuits in each feedback topologies voltage gain, input and output impedance.
Oscillators (using BJT) : Barkhausen criterion, Analysis of RC phase shift, Wein Bridge, Hartley, Colpitts, Crystal oscillators.
Analysis of BJT tuned amplifiers, synchronous and stagger tuning.

Module IV
Linear Sweep circuits : Bootstrap sweep and current sweep circuits - analysis.
Power amplifiers: Class A, B, AB and C circuits - efficiency and distortion. Transformer less power amplifiers.

References
7. Singh and Singh, Electronic Devices and Circuits, Pearson, 2/e, 2013.

Structure of the Question Paper
The question paper shall consist of two parts. Part A is to cover the entire syllabus and carries 20 marks. This shall contain 10 compulsory questions of 2 marks each. Part B is to cover 4 modules and carries 80 marks. There shall be 2 questions from each module (20 marks each) out of which one is to be answered.

(Question paper should contain minimum 60% and maximum 80% Analysis, Design and Problems)

Course Outcome
At the end of the course it will be able to analyse the different circuits. Also the Students can design circuits using discrete electronic components.
Course Objectives
To study the concepts of number systems. To study the design of combination logic and sequential logic. To make the student familiar with internal structure of various digital logic families. To provide students the fundamentals to the design and analysis of digital circuits.

Module I
Review of Boolean algebra, Binary arithmetic and Binary codes: BCD, Gray codes, Excess-3 codes, Complement codes.
Logic function representation in Sum of product and product of sum form, Canonical forms. Logic reduction using Karnaugh map and Quine McCluskey method. Introduction to hazards and hazard free design using K-map.
Combinational circuits, Adders, Subtractors, Adder/Subtractor (4 bit) circuit, ripple carry and look ahead carry adders, BCD adder, decoders, BCD to seven-segment decoder, encoders, key board encoder, multiplexers, de-multiplexers. Function realization using MUX and DEMUX, binary comparators (2/3 bits).

Module II
Shift Registers, Shift register counters (Ring and Johnson).
Timing circuits, astable and monostable multivibrators using 555, 74121.

Module III
Mealy and Moore models, state machine notation, state diagram, state table, transition table, excitation table and equations, state equivalence, state reduction, state assignment techniques.
Analysis and design of synchronous sequential circuits.
Asynchronous sequential circuit – basic structure, equivalence and minimization, minimization of completely specified machines.

Module IV
Logic families- comparison of logic families in terms of fan-in, fan-out, speed, power, noise margin etc. Basic circuit and working of gates NOT, NAND, AND and OR in CMOS and NAND in TTL logic, interfacing of TTL and CMOS.
Memory devices- Classification, Semiconductor memories, basic circuit and working of static and dynamic RAM, ROM, PROM and EPROM, memory expansion.
Programmable logic devices- PAL, PLA, FPGA, CPLD.
Introduction to VHDL- VHDL description for basic gates, flip flops, Full adder, counters (Behavioral model only).

References
5. Thomas L Floyd, Digital Fundamentals, Pearson, 10/e, 2011.

Structure of the Question Paper
The question paper shall consist of two parts. Part A is to cover the entire syllabus and carries 20 marks. This shall contain 10 compulsory questions of 2 marks each. Part B is to cover 4 modules and carries 80 marks. There shall be 2 questions from each module (20 marks each) out of which one is to be answered. (Question paper should contain minimum 50% and maximum 60% Design and Analysis)

Course Outcome The students will be able to design various digital circuits. Also they will be familiar with different digital ICs.
Course objectives

The purpose of the course is to enable students to have the practical knowledge of different semiconductor electronic devices. To study the specifications of devices and circuits.

2. Characteristics of transistors (CE and CB).
3. Characteristics of JFET.
4. Characteristics of MOSFET.
5. Characteristics of SCR.
6. Characteristics of UJT.
7. RC integrating and differentiating circuits.
8. RC low pass and high pass filters - frequency response characteristics.
10. RC coupled CE amplifier - frequency response characteristics.
11. MOSFET amplifier (CS) - frequency response characteristics.
12. Clipping and clamping circuits.
13. Rectifiers - half wave, full wave, bridge - with and without filter - ripple factor and regulation.

Internal Marks: 50
1. Attendance - 10
2. Class work - 20
3. Practical internal test - 20

University examination Marks: 100
1. Circuit and design - 25
2. Performance (Wiring, usage of equipments and trouble shooting) - 15
3. Result - 35
4. Viva voce - 25

Practical examination to be conducted covering the entire syllabus given above. Students shall submit the duly certified record. The external examiner shall endorse the record.

Course outcome.

On successful completion of the course student will understand the working of electronic devices and their characteristics. Also the typical specifications of semiconductor devices.
Course Objectives

To study working of electronic circuits. To design the circuits as per the specifications.

1. Feedback amplifiers (current series, voltage series) - gain and frequency response.
2. Power amplifiers (transformer less) - Class B and Class AB.
3. Differential amplifier using MOSFET - Measurement of CMRR.
5. Cascode amplifier using MOSFETs - frequency response.
7. Tuned amplifier - frequency response.
8. Series voltage regulator.
10. Introduction to SPICE and simulation of experiments 4, 5, and 6 listed above using SPICE.

Internal Marks: 50

1. Attendance - 10
2. Class work - 20
3. Practical internal test - 20

University examination Marks: 100

1. Circuit and design - 25
2. Performance (Wiring, usage of equipments and trouble shooting) - 15
3. Result - 35
4. Viva voce - 25

Practical examinations to be conducted for the experiments (1–9) only.

Students shall submit the duly certified record. The external examiner shall endorse the record.

Course outcome

After successful completion of the practical student will be able to analyse and design the circuits.