Fourth ($4^{th}$)Year
Semesters 07/08

COMMUNICATION Option

Course Title: EE313 NETWORK ANALYSIS
Lec.\Rec.\Lab.: 03\00\03 Hours per a week
Class:EO7

## -COURSE OUTLINE-

1-INTRODUCTION

-Source and passive elements

2-LAPLACE TRANSFORM,POLES AND ZEROS OF A TRANSFER FUNCTION

3-FUNDAMENTAL PROPERTIES OF A TOW-PORT AND MULTIPORT NETWORKS
- 3-1-Z,Y,h,g and ABCD parameters
- 3-2-Synthesis of lossless tow-port networks
- 3-3 -Electric Filters and network interstaging

4-NUMERICAL ANALYSIS OF LINEAR NETWORKS

5-TIME-DOMAIN ANALYSIS OF LINEAR NETWORKS

6- ANALYSIS AND DESIGN BY S-PARAMETERS

7-NON-LINEAR NETWORK ANALYSIS

8-USE OF SPICE SIMULATOR FOR NETWORK SIMULATION

SPICE is a Simulator Progrm with Integrated Circuits Emphasis

## LABORATORY EXPERIMENTS

1-Graph theory.
2-Inductance and Capacitance.
3-Steady state Response of Second-order systems
4-Transient Response of second-order systems.
5-Poles & Zeros of passive networks.
6-Quality Factor.
7-Tranfer functions
8-Tow-port networks.
9-Multiport feedback and Biquad Active Filters.
10-Butherworth and Chebyshev active Filters.
11-Circuits Analysis using SPICE simulator.

Course title: *EE322 Digital Systems II*
Lec./Rec./Lab.: *3/0/3 Hours per week*
Class: *E06.*

## Course Outline

### 1- TIMING CIRCUITS
- 1.1- Importance of timing circuits
- 1.2- The 555 internal configuration
- 1.3- The 555 as a monostable
- 1.4- The 555 as an astable: -with DC 50-100%, -with DC 0-100%
- 1.5- The 74121 TTL one-shot
- 1.6- The Schmitt trigger

### 2- MSI COUNTERS & APPLICATIONS
- 2.1- Unidirectional counters
- 2.2- Programmable bi-directional counters
- 2.3- Design of modulo-N counter using Ics.
- 2.4- Applications

### 3- MSI REGISTERS & APPLICATIONS
- 3.1- Design of shift registers: -SISO, -SIPO, -PISO, -PIPO
- 3.2- The bi-directional shift register.
- 3.3- The universal shift register
- 3.4- Applications

### 4- STANDARD COMBINATIONAL MODULES
- 4.1- Binary decoders
- 4.2- Binary encoders
- 4.3- Priority encoders
- 4.4- Multiplexers and Vector Multiplexers
- 4.5- Demultiplexers and Vector Demultiplexers
- 4.6- ROMs
- 4.7- PALs
- 4.8- PLAs
- 4.9- Implementation of Boolean expressions using: -Decoders, -Multiplexers, -ROMs, PALs, PLAs
- 4.10- Comparison of different approaches
- 4.11- Arbitrary waveform generation
- 4.12- Keyboard encoding

### 5- SEMICONDUCTOR MEMORIES
- 5.1- Tri-state devices and principle
- 5.2- Definitions
- 5.3- A 1-bit memory cell: -Static, - dynamic.
- 5.4- Ram architecture:
- 5.5- ROM: -PROM, -EPROM, -EEPROM
- 5.6- Applications:

### 6- OPTOELECTRONIC DISPLAYS & CHARACTER GENERATOR
- 6.1- Numerical displays
- 6.2- Ripple blanking
- 6.3- Alphanumeric displays
- 6.4- Applications

## 7- SYNCHRONOUS SEQUENTIAL SYSTEMS

7.1- Sequential systems specifications
7.2- State diagram
7.3- Mealy and Moore architecture model
7.4- Analysis of synchronous sequential systems
7.5- Design of synchronous sequential systems
7.6- Distinguishable and equivalent states
7.7- State minimization procedure

## 8- DAC & ADC CONVERTERS

8.1- Amplitude quantization
8.2- Time quantization ( Sampling )
8.3- Digital-to-Analog Converter
8.4- Analog-to-Digital Converter

## LAB. EXPERIMENTS

1- Counters
2- Shift registers
3- Encoders/decoders, mux/demux
4- Timing circuits
5- Memory devices
6- A/D and D/A conversion

*Course Title : EE402 Linear systems II: Discrete-time Signals and Systems*
*Lec. / Rec. / Lab. : 03 / 00 / 00 Hours per week*
*Class:E07*

## Course Outline

**Chapter 1: Discrete-time Signals and systems**

1.1: Review of the properties of discrete time signals
1.2: Basic discrete-time signals
1.3: Brief Review of the properties of continuous time Linear time- invariant systems

**Chapter 2: Discrete -time Linear time-invariant systems**

2.1: Representation of signals in terms of impulses
2.2: Discrete-time LTI systems: The convolution Sum
2.3: Properties of the convolution operator
2.4: Properties of Linear Time-Invariant Systems:
- Impulse response and step response
- Causality, stability, and interconnections of discrete- time LTI systems

2.5: Discrete- time systems described by constant coefficients Difference equations:
2.6: Poles and zeros of discrete-time LTI systems
2.8: Determination of the complete response of LTI systems to given input signals: Methods of solving linear constant coefficients Difference equations
2.9: Block-Diagram Representations of LTI systems Described by linear constant coefficients difference equations

**Chapter 3: Fourier Analysis for discrete-time signals and systems**

3.1: Response of discrete-time LTI systems to complex exponentials
3.2: Discrete-time Fourier series representation of periodic signals
3.3: Discrete-time Fourier transform of aperiodic signals
3.4: Discrete-time Fourier transform of periodic signals
3.5: Properties of the Discrete -time Fourier Transform and the inverse Fourier Transform
3.6: Polar representation of Discrete-time Fourier transform
3.7: The frequency response of systems characterised by linear constant-coefficient difference equations
3.8: First-Order and Second-Order systems
3.9: Determination of the Transfer function, the impulse response, and steady state response from the frequency response

**Chapter 4: The Z-Transform**

4.1: Definition of the Z-transform of a discrete-time signal
4.2: The region of convergence of the Z-transform
4.3: The Inverse Z-transform
4.4: Geometric evaluation of the Fourier Transform from the Pole-Zero Plot
4.5: Properties of the Z-Transform
4.6: Analysis and characterisation of LTI systems using Z-transform
4.7: The unilateral Z-transform

## - LAB EXPERIMENT -

1. Spectrum analysers.

2. AM spectra

3. Amplitude modulation.

4. Amplitude demodulation.

5. Radio receiver.

6. FM spectra.

7. Frequency modulation.

8. FM demodulation.

9. Pulse modulation.

*COURSE TITLE* :*EE411 COMMUNICATION I*
Lec / Rec/ Lab : 03 / 00 / 03 hours per a week
Class : EO7

## - COURSE OUTLINE -

1. INTRODUCTION TO SIGNALS.
   - 1.1- Classes of signals.
   - 1.2- The phasor.
   - 1.3- Periodic signals & fourier series
   - 1.4- The fourier transform.
   - 1.5- Linear time invariant systems
   - 1.6- Single sided spectra & Analytic signals.

2. CONTINOUS WAVE MODULATION.
   - 2.1- General introduction to modulation
   - 2.2- Linear modulation
   - 2.3- AM
   - 2.4- DSB-SC
   - 2.5- SSB
   - 2.6- VSB
   - 2.7- Exponential modulation.
   - 2.8- FM & PM

3. PULSE MODULATION
   - 3.1- The sampling theorem.
   - 3.2- PAM
   - 3.3- PDM.
   - 3.4- PPM.
   - 3.5- PCM & Signal to noise ratio

4. INTERFERENCES IN CW & PULSE MODULATION.

5. EXAMPLES OF SOME COMMUNICATION SYSTEMS.
   - 5.1- Compatible stereo FM.
   - 5.2- The T.V. signal.

**Course title:** ***EE421 Computer Architecture***
**Lec./Rec./Lab.:** ***3/0/0 Hours per a week***
**Class:** ***E07.***

## Course Outline

1-BASIC COMP UTER ARCHITECTURE
- 1.1-Introduction to assembly language
- 1.2-Introduction to computer architecture
- 1.3-Basic building blocks of computer design
- 1.4-Bus structures
- 1.5-Data representation: - data types, - floating-point arithmetic

2- REGISTER TRANSFER LANGUAGE

3- ESSENTIALS OF COMPUTER SOFTWARE
- 3.1-Instruction format
- 3.2-VAX instruction format
- 3.3-Addressing modes
- 3.4-Example programs

4- CPU STRUCTURE
- 4.1-Basic CPU architecture
- 4.2-CPU operation
- 4.3-Implementing complete instructions
- 4.4-RISC

5- THE ALU STRUCTURE AND OPERATION
- 5.1-Computer addition and subtraction
- 5.2-Multiplication and division
- 5.3-Shift instructions
- 5.4-Bit manipulation

6- MICROPROGRAMMING
- 6.1-What is microprogramming ?
- 6.2-Microprogramming examples
- 6.3-Microprogram branching

7- MEMORY STRUCTURE
- 7.1-Memory devices
- 7.2-Memory organization: - bank, - interleaved
- 7.3-Cache memory
- 7.4-Mapping functions: - direct mapping, - associative mapping, - block-set associative mapping
- 7.5-Virtual memory

8- THE I/O SYSTEM
- 8.1-Addressing I/O devices
- 8.2-Data transfer: - Program-controlled I/O, - DMA, - I/O channel
- 8.3-Interrupt-driven I/O
- 8.4-Queue I/O
- 8.5-Advanced I/O devices: - disk drives, -tapes

## 9- MICROPROCESSORS

- 9.1- Microprocessors characteristics
- 9.2- General microprocessor architecture
- 9.3- The Motorola family
- 9.4- The Intel family

## 10- LARGE SYSTEM ARCHITECTURE

- 10.1- Architecture classification:
- 10.2- Pipeline structures
- 10.3- Array structures
- 10.4- Multiprocessors

## 11- FAULT-TOLERANT COMPUTER ARCHITECTURE

- 11.1- Reliability measures
- 11.2- Hardware redundancy
- 11.3- Static, dynamic, hybrid

Course title : EE462 *ELECTROMAGNETIC FIELDS II*
Lec./ Rec./ Lab : 03 Hours / 00H / 00 hour per a week.
Recommanded textbook: " Electromagnetic wave & Radiating systems" -JORDAN-
Class : EO7

- COURSE OUTLINE -

1- BOUNDARY CONDITIONS

2- WAVE PROPAGATION AND ENERGY FLOW

3- REFLECTION & REFRACTION OF PLANE WAVES

4- GUIDED WAVES

5- TRANSMISSION LINES

6- SMITH CHART

7- RECTANGULAR WAVE GUIDES

8- RADIATIONS.

**Course title** : EE412 Antennas & Radio waves propagation
**Lec.\Rec.\Lab.** : 03h \ 00h \ 00hours Per a week
**Class : EO8**

## - COURSE OUTLINE -

1- INTRODUCTION

2- BASIC ANTENNA AND CONCEPTS
- **2.1.** Definitions
    - **2.2.** Antenna parameters
    - **2.2.1.** Basic parameters
    - **2.2.2.** Patterns
    - **2.2.3.** Beam area
    - **2.2.4.** Radiation intensity
    - **2.2.5.** Beam efficiency
    - **2.2.6.** Directivity
    - **2.2.7.** Directivity and gain
    - **2.2.8.** Directivity and resolution
- **2.3.** Aperture parameters
    - **2.3.1.** Aperture concept
    - **2.3.2.** Effective apperture
    - **2.3.3.** Scattring aperture
    - **2.3.4.** Loss aperture
    - **2.3.5.** Collecting aperture
    - **2.3.6.** Aperture effeciency
    - **2.3.7.** Effective height
    - **2.3.8.** Effective aperture and Directivity
- **2.4.** FRIIS Transmission formula
- **2.5.** Sources of Radiation
    - **2.5.1.** Radiation results from accelerated charge
    - **2.5.2.** Fields from oscillating dipole
- **2.6.** Wave polarization

5-THE ELECTRIC DIPOLE AND THIN LINEAR ANTENNAS

5.1. The short dipole

5.1.1. Definition

5.1.2. Vector and scalar potentials

5.1.3. The fields of a short dipole

5.1.4. The average poynting vector and power radiation

5.2. Thin linear antenna

5.3. Radiation resistance of (LANDA/2) antenna

5.4. Radiation resistance at a point which is not a current Max

* Exercices & problems

6-REFLECTION ANTENNAS

6.1. Concept

6.2. The parabola - General properties.

* Exercices & problems

7- PROPAGATION OF RADIO WAVES

**Course title:** *EE 413 Digital Signal Processing*
**Lec./Rec./Lab. :** *3/0/0 Hours per a week*
**Class:** *E08*

## Course Outline

1-GENERALITIES ABOUT SIGNALS

2-SEQUENCES AND SYSTEMS
- 2.1-Fourier Transform
- 2.2 -The Sampling Theorem

3-THE Z- TRANSFORM
- 3.1-Definitions & general properties
- 3.2-System Function
- 3.3-Geometric Evaluation of Fourier Transform
- 3.4-Digital Resonator
- 3.5-Digital Oscillator
- 3.6-Basic Filters

4-PROPERTIES OF ANALOG FILTERS
- 4.1-Ideal Frequency-Domain Filter Models
- 4.2-General Approaches
- 4.3-Butterworth Approximation
- 4.4-Chebyshev Approximation
- 4.5-Low-Pass to Band-Pass Transformation
- 4.6-Low-Pass to Band-Rejection Transformation
- 4.7-Low-Pass to High-Pass Transformation.

5-SIGNAL FLOW GRAPHS AND IMPLEMENTATION
- 5.1-Generalities about Digital Filter Structure
- 5.2-The Signal Flow Graph
- 5.3-Matrix representation and Analysis
- 5.4-State Space Representation of Digital Filters
- 5.5-Some Particular Structures (Direct Form I, II, Canonic, Cascade, ....)
- 5.6-Finite Impulse Response (FIR) Filters Structures
  - -The linear Phase FIR Filter
  - - Polynomial Interpolation Structures
  - - Frequency Sampling Structures
- 5.7-Implementation of Digital Filters
  - -Software Implementation ( Vax/Basic & Vax/Fortran )
  - -Hardware Implementation
- 5.8-Effect of the Parameter Quantization on Filter Performance

## 6-DESIGN OF DIGITAL FILTERS

6.1-General Problem of Design

6.2-An Introduction to Approximation (Least square, Min-Max, ....)

6.3-Infinite Impulse Response (IIR) Filter Design

-The Mapping of Analog Designs ( Impulse Invariance, Bilinear Transform,...)

-Direct Design ( Inverse Least Square Design)

-Examples of Design

## 7-DISCRETE AND FAST FOURIER TRANSFORMS

7.1-Forms of the Fourier Transform

7.2- Discrete Fourier transform (DFT)

7.3- Fast Fourier transform (FFT)

## 8-A-PPLICATIONS OF THE DISCRETE FOURIER TRANSFORM

8.1-Approximation of Continuos-Time Transforms with DFT

8.2-Selection of DFT or FFT Parameters

8.3-Convolution with the FFT

8.4-Power Spectrum

## 9- APPLICATIONS OF DIGITAL SIGNAL PROCESSORS

E422 Microprocessors System Design

Textbook: The Z-80 Microprocesor
Ramesh S. Gaonkar, 3rd Edition.

Lec./Lab./Credit Hours: (3, 3, 4)

Topics

1. Introduction to Microprocessors
   - Microprocessor History and Evolution
   - Microcomputers and Large Frame Systems
   - Microprocessor-Based Systems Architecture

2. Microprocessor Architecture
   - General computer architecture
   - The MPU
   - Input/Output
   - A Comparison of Typical Microprocessors

3. The Z-80 Microprocessor
   - MPU Signal Description
   - Programming Model
   - Memory and I/O Interfacing

4. Z-80 Assembly Language Programming
   - Instruction Set and Machine Language Programming
   - Addressing Modes
   - Introduction to Z-80 Assembly Language and Programming
   - Assemblers and Software Development Tools
   - Stacks and Subroutines
   - Programming Examples

5. Memory Interfacing
   - MPU Timing Diagrams
   - Timing Considerations of Memory Devices
   - Memory Organization and Address Decoding
   - Memory Expansion
   - MT-80AZ Memory Map

6. I/O Interfacing
   - Interrupt Handling Techniques
   - Simple Input/Output Devices
   - I/O Device selection
   - Programmable Interface Devices:
     - Intel PPI 8255
     - Zilog Parallel Input Output (PIO)
     - Zilog Counter Timer Circuit (CTC)

7. Direct Memory Access
   - DMA Concepts
   - The Z-80 DMA Structure

8.. Microprocessor-Based Communications
   - Introduction to Digital Communication
   - Serial Communication Interface Adapter: The MC6850
   - RS232 C Interface Standard
   - Modems

9. Designing Microprocessor-Based Systems
   - Application Examples

10. Trends in Microprocessors Technology

LAB. EXPERIMENTS

1- Getting Familiar with the MT-80AZ Microcomputer
2- Arithmetic Operations
3- Data Conversion and Manipulations
4- Event Counting and Interrupt Handling
5- I/O Interfacing through the 8255 PPI
6- Waveform Generation (DACs Interfacing)
7- Data Acquisition (ADC Interfacing)

*COURSE TITLE* : *EE441 COMMUNICATION CIRCUITS*
**Lec./ Rec./Lab.** : 03 / 00 / 03 *hours per a week*
**Class** : EO8

- <u>COURSE OUTLINE</u> -

1. BRIEF REVIEW OF ACTIVE DEVICES.

2. RLC CIRCUITS AND PASSIVE COUPLING NETWORKS.
    - 2.1- General series // Impedance transformation.
    - 2.2- Transformers.
    - 2.3- Transformer like networks

3. NON LINEAR CONTROLLED CURRENT SOURCES
    - 3.1- Piece noise linear characteristic
        - * Different classes
    - 3.2- Exponential characteristic.
    - 3.3- Square law characteristic
    - 3.4- Series resistor with exponential.
    - 3.5- Clamp biased square law.
    - 3.6- Differential pair.
    - 3.7- Resistively biased exponential.

4. OSCILLATORS. (SINUSOIDAL)
    - 4.1- Basic differential equation.
    - 4.2- The Barkhansen condition.
    - 4.3- LC type of oscillator.
      (Describing function type of analysis)
    - 4.4- Bridge oscillators.
    - 4.5- Frequency stability.
        - * Direct
        - * Indirect.

5- THE SUPERHETERODYNE RECEIVER.
    - 5.1- Generalities.
    - 5.2- The mixer.
    - 5.3- Diode mixers.
    - 5.4- Active device mixers.
    - 5.5- R.F & IF amplifier.
    - 5.6- Need for small signal analysis.
    - 5.7- Noise analysis of R.F amplifier.
    - 5.8- Distorsion analysis (3rd order IMD)

## - LABORATORY EXPERIMENTS -

1. Low frequency and wide band Transistor
2. Wien bridge oscillators.
3. L.C. oscillators.
4. Crystal oscillators.
5. Mixer circuits.
6. Transmitter circuits.

COURSE TITLE: *EE511 SIGNAL TRANSMISSION* (Digital communications)
Lec/Rec/Lab. : 03 / 00 / 00 hours per a week.
Class:EO9

## - COURSE OUTLINE-

**1.REVIEW OF PROBABILITY.**

1.1- Sample space and basic axioms.
1.2- Bayes rule. The MAP concept
1.3- The random variable.
A communication example (ML)
1.4- Stochastic processes.
1.5- General definitions.
1.6- 2nd order statistics.
Power spectrum density.

**2. BASEBAND DIGITAL COMMUNICATION.**

2.1- General distorsionless transmission.
2.2- Signal to noise ratio.
2.3- Wideband pulse transmission
The matched filter.
2.4- Bandlimited transmission.
Nyquist criteria.

**3.DIGITAL MODULATION TECHNIQUES.**

3.1- Digital modulation Spectra.
ASK, PSK, FSK.
3.2- Probability of error for
ASK, PSK, FSK. in coherent and non coherent receivers

**4.INFORMATION THEORY AND CODING.**

4.1- Basic definition.
4.2- Noisy channel theorem.
4.3- General definition about codes.
4.4- Linear codes
syndrome decoding.

Fifth ($5^{th}$) Year
Semesters 09/10

COMMUNICATION Option

**Course title** : EE512 *MICROWAVE COMMUNICATIONS*
**Lec. / Rec. / Lab.**: 03 / 00 / 03 hours . Per week
**Recommanded book:** - Microwave Communications"
- Diogeries J. Angelakos
- Thomas E. Everhart.

Class : EO9

COURSE OUTLINE

1- THE SYSTEM'S CONCEPT
1.1- Introductio
1.2- A general Communication System
1.3- Specific systems
1.4- The Frequency Spectrum.

2- ELECTROMAGNETIC FIELDS AND POWER
2.1- Introduction
2.2- Electromagnetic wave propagation
2.3- Guided Transverse Electromagnetic waves
2.4- Wave guides
2.5- Electromagnetic Energy propagation.

3- MICRO WAVE AMPLIFIERS AND OSCILLATORS
3.1- Introduction
3.2- High-Frequency limitations of conventional tubes
3.3- Induced Cirrent
3.4-Transit-Time Effects in Space-Charge controlled tubes.
3.5- Klystrons
3.6- Velocity Modulation by a Gridded Cavity Gap
3.7- The two-Cavity Klystrom
3.8- The Reflex Klystrom
3.9- Traveling-ware Tubes

4- PRINCIPLES OF SOLID- STATE MICROWAVE DEVICES.
4.1- Introduction
4.2- The tunnel diode
4.3- Parametric Amplifiers
*The Manley-Rowe relations
* Methods of Analysis.
* The parametric µp -Converter

Course tirle : E513 *RADAR & TELEVISION*
Lec. /Rec./Lab. : 03 / 00 / 03 hours. Per week.
Class : EO10

- COURSE OUTLINE -

1- T.V.. PRINCIPLES, GENERALITIES AND EXEMPLES OF THE FAULTY SECTIONS.

2- BLACK AND WHITE TV TROUBLSHOOTING
- 2-1- CRT and its auxilliary circuits
- 2-2- Power supply
  - Linear regulated power supply
  - Switched mode power supply
- 2-3- The time base
  - Horizontal synchronisation
  - Vertical synchronisation
- 2-4- The reception circuits
  - TUNER
  - IF circuit

3- COLOR SYSTEMS (PAL,SECAM,..)

4- COMPOSITE VIDEO SIGNAL

5- PICTURE CARRIER AND TV CHANNEL

6- THE COLOR TV AND FAULT DIAGNOSTIC

7- INTRODUCTION TO NUMIRICAL TELEVISION

8- STUDIES OF SPECIAL TOPICS RELATED TO THIS FIELD

-LABORATORY EXPERIMENTS-

I-Functional Analysis of Black and White T.V

II-Troublshooting of Black and White TV: **MT1-44.ENIE**

III-Demonstration on COLOR TV: **CT2.CT4.ENIE**

*COURSE TITLE: EE515 LASERS & OPTICAL FIBERS.*
*Lec. / Rec. / Lab. /* : 03 hours / 00 h / 00 hours per a week
Class:EO9

· COURSE OUTLINE ·

1. INTRODUCTION.

2. BASIC SEMICONDUCTOR PROPERTIES OF III-V COMPOUNDS USED FOR OPTOELECTRONICS DEVICES.

3. SEMICONDUCTOR HOMOJUNCTIONS (PN) AND HETEROJUNCTIONS (ISOTYPE & ANISOTYPE ).

4. OPTICAL DETECTORS:
   - 4.1- Photoconductors.
   - 4.2- Photodiode detectors
     - 4.2.1- PN junction photodiode.
     - 4.2.2- PIN photodiode.
     - 4.2.3- Avalanche photodiode.

5. OPTICAL SOURCES :
   - 5.1- Light emitting diodes (LED's)
     - 5.1.1- Basic principes.
     - 5.1.2- Light emitting diodes for optical communication.
   - 5.2- Laser diodes (LD's).
     - 5.2.1- Basic principles of laser action.
     - 5.2.2- Semiconductor lasers.
     - 5.2.3- Semiconductor lasers for optical communication systems.
   - 5.3- Receiver Amplifier.

6. OPTICAL FIBRES.
   - 6.1- Elementary discussion of propagation in dielectric waveguide
   - 6.2- Material dispersion.
   - 6.3- Total dispersion in multimode and monomode fibers.
   - 6.4- Attenuation mechanisms in optical fibers.
   - 6.5- Fabracation of fibers, cables and passive components.

7. OPTICAL COMMUNICATION SYSTEMS.

- 7.1- The regeneration of digital signals.
- 7.2- Coherent systems.
- 7.3- Unguided optical communication system.
- 7.4- Guided fibre optical communication system.

8-PRESENTATION OF SPECIAL TOPICS RELATED TO THIS COURSE.

COURSE TITLE : EE544 *HIGH FREQUENCY AMPLIFIERS*
Lec./Rec./Lab. : 03/00/00 *hours per a week*
*Class: EO10*

## - COURSE OUTLINE -

1. INTRODUCTION.
   - 1.1- Planar transmission lines.
   - 1.2- Electromagnetic waves and circuit analyses.
   - 1.3- MIC's and MMIC's technology

2. SOME CIRCUIT THEORY FOR WAVEGUIDING STRUCTURES.
   - 2.1- Two-port junctions.
   - 2.2- Some equivalent two port circuits.
   - 2.3- Scattering matrix formulation.
   - 2.4- Symmetry of scattering matrix.
   - 2.5- Scattering matrix for a lossless junction.
   - 2.6- Scattering matrix for a TP junction.
   - 2.7- Transmission matrix representation.
   - 2.8- Signal fow graphs.
   - 2.9- Generalized scattering matrix for power waves.

3. IMPEDANCE TRANSFORMATION AND MATCHING.
   - 3.1- Smith chart.
   - 3.2- Single stub and double stub matching.
   - 3.3- Impedance matching with lumped elements.
   - 3.4- Design of complex impedance terminations.
   - 3.5- Quarter wave transformers.

4. SOLID STATE AMPLIFIERS.
   - 4.1- BJT & FET biasing.
   - 4.2- Amplifier design using scattering parameters.
   - 4.3- Amplifier power gain.
   - 4.4- Stability criteria.
   - 4.5- Constant power gain circles.
   - 4.6- Low noise amplifier design.
   - 4.7- Constant mismatch circles.
   - 4.8- Microwave amplifier design (single stage & second stage for a two stages amplifier).

5. PARAMETRIC AMPLIFIERS.
- 5.1- PN junction dides.
- 5.2- Negative resistance parametric amplifier.
- 5.3- Noise properties of a parametric amplifier.

## PARTS TO BE ADDED TO THIS COURSE :

1. PASSIVE MICROWAVE DEVICES.
- 1.1- Terminations.
- 1.2- Attenuators.
- 1.3- Phase shifters.
- 1.4- Directional couplers.
- 1.5- Power dividers.
- 1.6- Introduction and resonators.

2. MICROWAVE FILTERS.
- 2.1- Introduction to microwave filters.
- 2.2- Image parameters, method of filter design.
- 2.3- Some low pass filters design.
- 2.4- Frequency transformation.
- 2.5- Microstrip half-wave filter.
- 2.6- Other types of filters.

3. OSCILLATORS & MIXERS.
- 3.1- Gunn oscillator.
- 3.2- Impatt diodes.
- 3.3- Transistor oscillator.
- 3.4- Oscillator circuits & design.
- 3.5- Mixers, linear & nonlinear operation.
- 3.6- Balanced mixers.
- 3.7- Mixer analysis using harmonic balancing.

ΞΕ732

Course title : *Quality Control*

Lec./Rec./Lab. :*3/0/0 Hours per week*

Class: *E10*

Course Outline

1-NATURE AND SCOPE

- 1.1-Introduction
- 1.2-Definitions
- 1.3-Quality control functions
- 1.4-Relationship to Reliability

2-ORGANIZATION

- 2.1-Purpose of Organising
- 2.2-Location within the Total Enterprise
- 2.3-Internal Organisation of the Quality Control

3-PERSONNEL

- 3.1-Introduction
- 3.2-Labor
- 3.3-Engineering and Scientific personnel
- 3.4- Supervisory and Management Personnel

4-TRAINING

- 4.1Training for Labor Positions
- 4.2-Training for Engineering and Scientific Employees
- 4.3-Training for Supervisory and Management Personnel

5-QUALITY SYSTEMS AND PROCEDURES

- 5.1-Requirements for Systems and Procedures
- 5.2-Systems and Procedures Defined
- 5.3- Systems and Procedures Analysis
- 5.4-The Quality Control Manual

5-QUALITY COSTS

- 6.1-Introduction
- 6.2-Classes Of the Firm's Costs
- 6.3-Quality Costs and Losses
- 6.4-Implementation
- 6.5-Accounting for Quality Costs and Losses

7-QUALITY MOTIVATION

- 7.1-Introduction
- 7.2-Elements of Motivation Program
- 7.3-Motivation and Quality Control