

COLLEGE OF S/N HATED

COURSE OUTLINE

COURSE TITLE Radio Frequency Communication DEPT./NUMBER 362
 UNITS OF CREDIT 4 LEC. HOURS/WEEK 3 COURSE LENGTH Semester
 DEGREE APPLICABLE X LAB. HOURS/WEEK _____
 NON-DEGREE APPLICABLE _____ OTHER HOURS/WEEK _____

1. CATALOG DESCRIPTION RADIO-FREQUENCY COMMUNICATION (4). Three lecture hours, three lab hours per week. Prerequisite: E.T.302 with grade C or better, or equivalent qualification. Study of radio frequency microwave transmission and reception principles and techniques, including transmission lines and antennas.

2. CLASS SCHEDULE DESCRIPTION (125 characters) RADIO-FREQUENCY COMMUNICATION. Study of R-F & Microwave transmission & reception principles & techniques, including transmission lines & antennae. Must provide personal tools, extra supplies reqd. for Section AA, Register in "A" session & one "C" session.

3. PREREQUISITES AND COMPETENCY LEVELS REQUIRED (Title 5 Plan, p. 19)
 ELECT. 300/302.

4. COURSE OBJECTIVES (Must include objective(s) which involve "critical thinking," Title 5 Plan, p. 20.)
 See attached.


5. RECOMMENDED TEXT MATERIALS
 Kellejian, APPLIED ELECTRONIC COMMUNICATION, SRA, 1980/1984.
 Kellejian, ELECTRONICS 362 STUDY GUIDE, Pea. 1987

6. SUPPLIES NEEDED
 Electronics cables, hardware.

7. SCOPE OF THE COURSE (Attach topical outline)
 See attached.

8. EVALUATION (Include examinations, skills demonstrations, writing assignments, and other measures of ability to apply critical analysis. Include standards of evaluation where appropriate. Examples to be on file in Division Office.)

PREPARED BY



LEARNING OBJECTIVES

Upon completing this chapter, including the problem set, you should be able to:

1. Understand the concepts of lumped and distributed constants in high-frequency components and transmission lines.
2. Understand the concepts of signal propagation along a two-conductor transmission line.
3. Understand and compute voltage, current, and power transfer relationships.
4. Understand the concepts of reflected voltage, current, and power.
5. Understand the relationship of incident and reflected signals, standing waves, and wavelengths.
6. Understand and compute the power transfer characteristics of VSWR, reflection coefficient, mismatch loss, and return loss.
7. Understand the structure and applications of the Smith chart.
8. Use the Smith chart to determine transmission line and network characteristics.
9. Understand the concepts and application of impedance-matching techniques.
10. Compute component and network requirements for impedance matching used both lumped- and distributed-constant components.

LEARNING OBJECTIVES

Upon completing this chapter, including the problem set, you should be able to:

1. Understand the concepts of TEM transmission and be able to compute Z_0 , L , C and the dimensions for two-wire, coaxial, and strip transmission lines.
2. Relate practical TEM transmission-line characteristics to the theoretical principles of Z_0 and propagation constant advanced in Chapter 11.
3. Understand the operation and construction techniques of R , L , and C components in transmission-line form.
4. Compute the characteristics and dimensions for the fabrication of simple electrical networks in transmission-line form.
5. Have knowledge of popular TEM transmission lines, RF connector pairs, and special (including microwave) elements.
6. Understand the concepts of TE-TM propagation in waveguide lines and elements, and compute dimensions for waveguide and the characteristics of waveguide signals.
7. Understand the operation and construction techniques for achieving R , L , and C components in waveguide form.
8. Compute the characteristics and dimensions for the fabrication of simple electrical networks in waveguide form.
9. Have knowledge of microwave waveguide components used in communications systems.
10. Have knowledge of and apply high-frequency measurement techniques to waveguide and microwave components and signals.

LEARNING OBJECTIVES

Upon completing this chapter, including the problem set, you should be able to:

1. Have knowledge of the operational characteristics and power supply requirements for klystrons, magnetrons, CFA's, TWT's, and BWO's.
2. Understand S -parameters as they are applied to active microwave devices, and apply the Smith chart to S -parameter analysis.
3. Have knowledge of the operational characteristics and bias requirements of bipolar and GaAs field-effect transistors as used in microwave circuits.
4. Understand and compute circuit conditions and component values required to apply transistors as amplifiers and oscillators at microwave frequencies.
5. Have knowledge of the operational characteristics of varactor and step-recovery diodes as used in microwave signal sources and amplifiers.
6. Have knowledge of the operational characteristics of point-contact, hot-carrier, and Schottky-barrier diodes as used in microwave mixers and detectors.
7. Have knowledge of the operational characteristics of tunnel, Gunn, impatt, and trapatt diodes as used in microwave signal sources and amplifiers.
8. Have knowledge of the operational characteristics of pin and small-signal diodes as used in microwave attenuators and switches.
9. Understand the operation and applications of microwave ferrite devices, including isolators, circulators, attenuators, and yig filters.
10. Have knowledge of the operational characteristics and bias requirements of yig-tuned and varactor-tuned active microwave devices.

LEARNING OBJECTIVES

Upon completing this chapter, including the problem set, you should be able to:

1. Understand the principles of electromagnetic radiation as applied to antennas and the media through which radio waves propagate.
2. Understand the basic *electrical* properties of antennas, including radiation and loss resistances, and gain and propagation patterns.
3. Identify the general characteristics of various popular antenna types and the applications in which they are deployed.
4. Compute the dimensions and matching/loading networks required for the efficient operation of popular antennas.
5. Specify and interpret the significant electrical measurements that are applied to evaluate antenna performance.
6. Understand the relationship of the frequency of propagated signals to optical performance, or "wave behavior," in various media.
7. Recognize the atmospheric, geographic, and environmental boundary conditions imposed on the propagation of radio waves.
8. Understand and specify sight-path and field-intensity propagation pattern measurements, and predict conditions for successful radioelectric communications.