RF CIRCUIT DESIGN
(ELECTIVE-II)

Course Code:15EC2115

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Pre requisites: Electronics circuit design, Analog communications.

Course Outcomes:

CO1: Comprehend Different RF Components such as Passive components, Microstrip Transmission Line.
CO2: Elucidate Design of RF Amplifiers-High gain, Low gain Minimum Noise Amplifiers.
CO3: Design of RF Oscillators.
CO4: Design of RF Converters, Mixers.
CO5: Design of Matching networks for RF Circuits.

UNIT-I (10-Lectures)

INTRODUCTION:

Reasons for using RF Applications, RF Spectrum, Microwave bands – RF behavior of Passive components: Tuned resonant circuits, Vectors, Inductors and Capacitors - Voltage and Current in capacitor circuits – Tuned RF / IF Transformers. Micro Strip Transmission Lines- Special Termination Conditions- sourced and Loaded Transmission Lines.

UNIT-II (10-Lectures)

RF/MICROWAVE AMPLIFIERS:

Types of amplifiers-small signal amplifier design-design of different types of amplifiers-narrow band, high gain, maximum gain, low noise broad band amplifier design-Multistage small signal amplifier design, Minimum Noise Multistage amplifier design, Large signal design, High power amplifiers, Microwave power combining/dividing techniques, signal distortion due to intermodulation products, Multistage amplifiers large signal amplifiers design.

UNIT-III (10-Lectures)

RF OSCILLATORS:

RF/Microwave oscillator design-Oscillator verses amplifier design-oscillations conditions, design of transistor oscillators, fixed frequency, Frequency tunable oscillators.

UNIT-IV (10-Lectures)

RF CONVERTERS AND MIXERS:

Rectifier design- detector design Formulation, Properties of S Parameters, Smith charts, applications on distributed circuit applications, lumped element circuit applications.

Mixer design- UP conversion, down conversion, Conversion loss for SSB Mixers, SSB verses DSB Mixers conversion loss, one diode mixers, two diode mixer.

UNIT-V (10-Lectures)

RF MATCHING NETWORKS:

Design of matching networks using lumped elements, design rules for matching networks, Using distributed elements- using single stub matching Short or Open circuited stubs.

TEXT BOOKS:

1. Matthew M Radmanesh, "*Radio Frequency and Microwave electronics*", Pearson Education Asia,2001
2. Reinhold Ludwing, Pavel Bretchko, "*RF circuit design: Theory and applications*", Pearson Education Asia Publication, New Delhi 2001.

REFERENCES:

1. Carr, Joseph. *"Secrets of RF circuit design."* McGraw-Hill, Inc., 2000.
2. Sayre, Cotter W. "*Complete wireless design*". 2/e, McGraw-Hill Professional, 2001.
3. Less Besser and Rowan Gilmore, "*Practical RF Circuit Design for Modem Wireless Systems*", Artech House Publishers, 2003.