

**RF CIRCUIT DESIGN
(ELECTIVE-II)****Course Code: 13EC2115****L P C
4 0 3****Course Outcomes:**

CO1: Comprehend different RF Components such as Passive components, Microstrip Transmission Line.

CO2: Design 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**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**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**RF OSCILLATORS:**

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

UNIT-IV**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**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] Vendalin, “*Microwave Circuit Design using Linear and Nonlinear Techniques*”, 2/e, Wiley, 2010.

REFERENCES:

- [1] Joseph Carr., “*Secrets of RF Design*”, 3rd Edition, Tab Electronics.
- [2] Cotter W. Sawyer, “*Complete Wireless Design*”, 2nd Edition, McGraw Hill.
- [3] Less Besser and Rowan Gilmore, “*Practical RF Circuit Design for Modem Wireless Systems*”, Vol.2.
- [4] Reinhold Ludwing, PavelBretchko, “*RF circuit design: Theory and applications*”, Pearson Education Asia Publication, New Delhi 2001.