ECMC1T6A: RF CIRCUIT DESIGN

UNIT I : INTRODUCTION TO RF ELECTRONICS

The Electromagnetic Spectrum, units and Physical Constants, Microwave bands – RF behavior of Passive components : Tuned resonant circuits, Vectors, Inductors and Capacitors – Voltage and Current in capacitor circuits – Tuned RF / IF Transformers.

UNIT II : TRANSMISSION LINE ANALYSIS

Examples of transmission line – Transmission line equations and Biasing – Micro Strip Transmission Lines – Special Termination Conditions – sourced and Loaded Transmission Lines.

UNIT III : SINGLE AND MULTIPORT NETWORKS

The Smith Chart, Interconnectivity networks, Network properties and Applications, Scattering Parameters.

UNIT IV : MATCHING AND BIASING NETWORKS

Impedance matching using discrete components – Micro strip line matching networks, Amplifier classes of Operation and Biasing networks.

UNIT V : RF PASSIVE & ACTIVE COMPONENTS

Filter Basics – Lumped filter design – Distributed Filter Design – Diplexer Filters – Crystal and Saw filters Active Filters – Tunable filters – Power Combiners / Dividers – Directional Couples – Hybrid Couplers – Isolators. RF Diodes – BJTs-FETs-IIEMTs and Models.

UNIT VI : RF TRANSISTOR AMPLIFIER DESING

Characteristics of Amplifiers – Amplifier Circuit Configurations, Amplifier Matching Basics, Distortion and noise products, Stability Considerations, Small Signal amplifier design, Power amplifier design, MMIC amplifiers Broadband High Power multistage amplifiers, Lowe noise amplifiers, VGA Amplifiers.

UNIT VII : OSCILLATORS

Oscillator basics, Low phase noise oscillator design, High frequency Oscillator configuration LC Oscillators, VCOs, Crystal Oscillators, PLL Synthesizer, and Direct Digital Synthesizer.

UNIT VIII : RF MIXERS

Basic characteristics of a mixer – Active mixers – Image Reject and Harmonic mixers, Frequency, domain considerations.

TEXT BOOK :

1. RF circuit design: Theory and applications by Reinhold Ludwing, Pavel Bretchko Pearson Education Asia Publication, New Delhi 2001.

REFERENCE BOOKS :

1. Radio frequency and microwave electronic illustrated Mathew M. Radmangh, 2001, PE Asia Publication.

2. Secrets of RF Design by Joseph Carr., 3rd Edition, Tab Electronics

3. Complete Wireless Design by Cotter W. Sawyer, 2nd Edition, Mc-Graw Hill.

4. Practical RF Circuit Design for Modern Wireless Systems Vol. 2 by Less Besser and Rowan Gilmore.