Title of Course: RF Engineering

Code and Credit Structure: CT351 3-0-0-3

Course Placement: Technical Elective for BTech (ICT & CS) – 6th Semester

Pre-Requisites: Electromagnetic Theory, Analog Communication and Transmission Line Theory

Instructor: Prof. Sanjeev Gupta

Course Outline:

Introduction: RF Spectrum, High frequency (Radio Frequency and Microwaves) in Perspective and Applications, RF versus DC or Low AC signals, High Frequency Behaviour of Passive Components.

RF Networks: Applications of Smith Chart, Maximum Power Transfer Condition, Design of Matching Networks and Stub Matching. Single and Multi-port Networks, Symmetric and Reciprocal Networks, Scattering Parameters and Scattering Matrix.

Noise and Distortion in RF Systems: Noise Figure, Equivalent Noise Temperature, Non-linearity issues, Harmonic Distortion, Inter-modulation Distortion (IMD), Gains/Losses, Signal-to-Noise Ratio, Tracking noise and signal level through a complete system. Receiver Sensitivity, Minimum Detectable Signal and Tangential Signal Sensitivity, 1 dB Compression Pint and Third-order Intercept Point, Blocking (Linear) Dynamic Range and Spurious-free Dynamic Range.

Systematic Analysis of RF Transceiver System Design: Specifications, Block diagrams, Small Signal Analysis, dB Power, Link Budgets, System Design Trade-offs, Gains/Losses, Signal-to-Noise, Probability of Error, Bit Error Rate, $E_b/N_0$, Link Margin, Tracking Noise and Signal level through a complete system, Effects and Advantages of using Spread Spectrum techniques.


References:

Evaluation:

In-Semester Examination (27th Feb to 6th March 2021): 50%
End-Semester Examination (26th April to 3rd May 2021): 50%
Total marks out of 100 will be converted to a letter grade using a 10-point scale.