Wireless Communication

Wireless Communication

Module I: History of wireless communication: Concept of mobile and personal communication, wireless cellular platform, the design fundamentals of cellular networks, frequency reuse, spectrum capacity enhancement techniques, co-channel and adjacent channel interference, location management, handoff management; Concept of mobile IP for mobility management issues.

Module II: Propagation Models for Wireless Networks: Two-ray ground reflection model, a micro-cell propagation model, a macro-cell propagation model, shadowing model, large scale path loss and shadowing, multi path effects in mobile communication, linear time variant channel model; Concept of coherent bandwidth, Coherent time, Doppler Shift - Effect of velocity of the mobile, models for multi path reception, mobile communication antennas.

Module III: Multiple access techniques in wireless communications: frequency division multiple access technology (FDMA), time division multiple access (TDMA), space division multiple access (SDMA), code division multiple access (CDMA); spectral efficiency of different wireless access technologies, spectral efficiency in FDMA system, spectral efficiency in TDMA system, spectral efficiency for DS-CDMA system.

Module IV: Second Generation Mobile Networks-GSM: Architecture and protocols, access technology, call set up procedure, 2.5 G networks; evolution to GPRS, concept of data communication on GPRS, session management and PDP Context, data transfer through GPRS network and routing, concept of LTE, WiMax, 4G and 5G

Module V: Applications of different RF bands: ranges • Brief about various applications of RF technology like WiFi, Bluetooth, Air traffic control, GPS navigation system, satellite systems, mobile networks, radio astronomy and remote sensing, 5G technology. • LTE-WiFi Radio Level Aggregation (LWA).

Books:

[1] Wireless Communications- Principles and Practice, T S Rappaport, Pearson Education India, Second Edition.
[2] Wireless Communication and Networks, Upen Dalal, Oxford university Press, First Edition, 2015.
[3] Wireless Communication and Networks 3G and Beyond, Iti Saha Misra, Tata McGraw Hill Education Pvt. Ltd, Second Edition, 2009.
[4] Mobile Communication Engineering – Theory and Applications W C Y Lee, TMH Publication, Second Edition, 2008.
[5] Wireless Communication, Andrea Goldsmith, Cambridge University Press, 2005
[6] Fundamentals of Wireless Communication, David Tse and Pramod Viswanath, Cambridge University Press, 2005

Microwave Engineering

RCS6C001 Microwave Engineering

Module I: High Frequency Transmission lines and Wave guides : The Lumped –Element Circuit model for a Transmission line. Wave propagation. The lossless line. Field Analysis of Co-ax Transmission Lines. R, L. C. G parameters of Co-ax& Two wire Transmission Lines. Terminated lossless transmission line. Transmission line as circuit element. The Smith Chart. Solution of Transmission line problems using Smith Chart. Single Stub and Double Stub matching. Lowloss line. Wave guides : Rectangular waveguide, Field solution for TE and TM modes, Field patterns power flow through waveguide. Attenuation due to conductor and dielectric losses. Design of Rectangular waveguide to support Dominant TE10 only.

Module II: TEM mode in Co-ax line. Cylindrical waveguide - Dominant Mode. Design of Cylindrical Waveguide to support Dominant TE11 mode. Microwave Resonator : Rectangular Waveguide Cavities. Resonant frequencies and of Cavity Supporting. Dominant mode only. Excitation of waveguide and Resonators (in princle only) Waveguide Components: Power Dividers and Directional Couplers : Basic Properties. The T-Junction Power Divider. Waveguide

Directional Couplers. Fixed and Precision Variable Attenuator. Ferrite, Fermle Isolator . Principle of Operationing.

Module III: Principle of Operation as an amplifier at high frequency, HEMT Amplifier, Concept of Doherty Amplifier and its use at high frequency, Gunn Oscillator Principle and performance Simple Analysis Electron – field interaction, Mixer: Linear Mixer Operation, active devices to use as mixer

Module IV: Microwave Antennas: Horn Antennas : E-And H- Plane Horns. Radiation Patterns. Pyramidal Horn. Gain of Horn Antenna. Paraboloid Reflector Antenna – Simple Analysis , Radiation Pattern in principal Planes. Gain and Bandwidth of Reflector Antenna. Microwave Propagation : Line of sight propagation. Attenuation of Microwaves by Atmospheric gases, Water Vapour & Precipitates. Microwave Measurement : Measurement of Admittance . Measurement of Gain of a Horn Antenna.

Books:
[1] Microwave Engineering by D. M. Pozor , 2nd Edition. John Willy & Sons. Selected portions from Chapter 2, 3, 4, 6, 7 & 9.
[2] Principles of Microwave Engineering By Reich, Oudong and Others.
[3] Microwave Device and Circuit, 3rd Edition, Sammuel Y., Liao, Perason
[4] Microwave Devices and Circuits, G S N Raju

Artificial Intelligence and Machine Learning

Artificial Intelligence and Machine Learning

Module-I: INTRODUCTION –The Foundations of Artificial Intelligence; - INTELLIGENT AGENTS – Agents and Environments, Good Behaviour: The Concept of Rationality, the Nature of Environments, the Structure of Agents, SOLVING PROBLEMS BY SEARCH – Problem-Solving Agents, Formulating problems, Searching for Solutions, Uninformed Search Strategies, Breadth-first search, Depth-first search, Searching with Partial Information, Informed (Heuristic) Search Strategies, Greedy best-first search, A* Search, CSP, Means-End-Analysis.

Module-II: ADVERSARIAL SEARCH – Games, The Mini-Max algorithm, optimal decisions in multiplayer games, Alpha- Beta Pruning, Evaluation functions, Cutting off search, LOGICAL AGENTS

– Knowledge-Based agents, Logic, Propositional Logic, Reasoning Patterns in Propositional Logic, Resolution, Forward and Backward chaining - FIRST ORDER LOGIC – Syntax and Semantics of First-Order Logic, Using First-Order Logic , Knowledge Engineering in First-Order Logic - INFERENCE IN FIRST ORDER LOGIC – Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution

Module-III: UNCERTAINTY – Acting under Uncertainty, Basic Probability Notation, The Axioms of Probability, Inference Using Full Joint Distributions, Independence, Bayes' Rule and its Use, PROBABILISTIC REASONING – Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation
of Conditional Distribution, Exact Inference in Bayesian Networks, Approximate Inference in Bayesian Networks

Module-IV: LEARNING METHODS – Statistical Learning, Learning with Complete Data, Learning with Hidden Variables, Rote Learning, Learning by Taking Advice, Learning in Problem-solving, learningfrom Examples: Induction, Explanation-based Learning, Discovery, Analogy, FormalLearning Theory, Neural Net Learning and Genetic Learning. Expert Systems: Representingand Using Domain Knowledge, Expert System Shells, Explanation, Knowledge Acquisition.

Books:
[1] Elaine Rich, Kevin Knight, & Shivashankar B Nair, Artificial Intelligence, McGraw Hill,3rd ed.,2009
[2] Stuart Russell, Peter Norvig, Artificial Intelligence -A Modern Approach, 2/e, Pearson, 2003.
[3] Nils J Nilsson, Artificial Intelligence: A New Synthesis, Morgan Kaufmann Publications,2000
[4] Introduction to Artificial Intelligence & Expert Systems, Dan W Patterson, PHI.,2010
[5] S Kaushik, Artificial Intelligence, Cengage Learning, 1st ed.2011