ANALYSIS AND DESIGN PRINCIPLES OF MICROWAVE ANTENNAS

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PRE-REQUISITES : Basic Knowledge of Electromagnetic Theory, Transmission line, Electronic network theory is required. Following are the NPTEL courses done earlier covering the above concepts
(a) Electromagnetic Theory
(b) Basic Tools in Microwave engineering
(c) Basic Building Blocks of Microwave Engineering

INTENDED AUDIENCE :

- BE/B. Tech students belonging to Electronics Engineering/Electronics and Communication Engineering/
- ME/M.Tech/MS students belonging to RF and Microwave Engineering
- PhD fellows having research area of antenna design

INDUSTRIES SUPPORT : Radar Industry, Space Industry, Avionics industry, Defense Industry, Internal security Industry, Mining industry, Geo-exploration Industry.

COURSE OUTLINE :

The course Analysis and Design principles of Microwave Antennas covers a broad spectrum of the antenna design and analysis, starting with the basic concepts of microwave radiation to numerical computation of antenna currents, Impulse Radiating Antennas (IRAs), antenna pattern synthesis, etc. This course will not only help the undergraduate and graduate students by providing fundamental concepts of antenna theory but also help the design engineer to get familiar with different state of the art techniques of antenna analysis and design. In a nutshell, this course would lay the foundation for further exploring the vast area of microwave antenna analysis and design.

ABOUT INSTRUCTOR :

Prof. Amitabha Bhattacharya was born in Kolkata, West Bengal in the year 1964. He received his B.Tech. (E&ECE) Degree from IIT Kharagpur in 1986, M.E. (E&TCE) from Jadavpur University in 1994 and Ph.D. (E. & ECE) from IIT Kharagpur in 1998.

He started his professional career in 1986 by joining as Junior Research Engineer in an ISRO- sponsored research project at IIT Kharagpur and continued thereafter as a Senior Research Assistant in a DRDO sponsored Research Project till 1991. In 1997, he joined SAMEER, Mumbai and then Defence Lab, Jodhpur as a Research Scientist. From 2000 onwards he joined teaching profession, first as an Assistant Professor in the Electronics and Instrument Department of Indian School of Mines, Dhanbad and then in 2007, in the faculty of Electronics and Electrical Communication Engineering Department of IIT Kharagpur in 2007. Presently he is working as a Professor in the same Department and is involved in the teaching and research activities of the RF and Microwave Group of the E&ECE Department.

Prof. Bhattacharya's research interest is in the areas of Microwave Imaging, Microwave Propagation, High Power Microwaves and Microwave Stealth Technology. He has published 127 research publications, two technical reports for Indian Defense, written a Tata McGraw Hill published text book on "Digital Communication" and co-authored a book chapter on "Modal Analysis of Reflector backed Hybrid Printed dipole antenna". He has also developed 6 NPTEL online courses on microwave Technology. He has been principal Investigator / consultant of 20 completed research projects and consultancies sponsored by agencies like DRDO, ISRO, Indian Army, BARC, MHRD, Wipro etc., has conducted 19 short term courses specially training scientists from HAL, ISRO, DRDO, Indian tri-services etc. in the areas of Electromagnetic Environments and Microwave Technologies. Dr. Bhattacharya has supervised ten Ph.D. thesis and forty-two postgraduate theses. Presently he is supervising five research students.

Prof. Bhattacharya is a fellow of Summa Foundation, USA and a senior member of IEEE, USA.

COURSE PLAN :

Week 1**:** Microwave Radiation Fundamentals
Week 2**:** Basic Antenna Parameters
Week 3**:** Wire Antennas
Week 4**:** Aperture Antennas
Week 5**:** Array of Radiating Elements
Week 6**:** Reflector Antenna
Week 7**:** Generalized Antenna Analysis by Potential Concept
Week 8**:** Selected Advanced Topics of Modern Antenna