Recent years have seen rapid changes in RF techniques as well as technology. This trend is continuing enabling the use of increasingly higher RF frequencies with their inherent advantages of smaller size components and larger bandwidth. In particular, the use of planar circuit architecture and integration using micro-machining technology has opened up new opportunities in terms of reduction in cost, weight, volume, power consumption as well as extension of operating frequencies. In keeping with the advances in technology, the design approach is also undergoing a rapid change through improved digital signal processing (DSP) techniques and CAD tools. Thus the scope of RF Design Techniques and Technology, that was confined to lower microwave frequency bands (~10 GHz), has expanded to encompass the millimeter wave frequency band (30-300 GHz). This paradigm places new demands on Microwave Education. The responsibility of microwave educators today is to drive students beyond the basic concepts to circuit and system level practical hands-on-education in order to produce highly skilled and motivated wireless engineers who are directly usable to the industry.

The present talk is focused to motivate students to opt for career in RF and Microwave Engineering. Starting with the behavior of conventional circuit elements at RF and Microwave frequencies and describing equivalent lumped circuit models of distributed transmission line elements, different technologies available to a designer to built Microwave and Millimeter Wave Integrated Circuits and subsystem will be presented. Starting from conventional microstrip technology, other key technologies including suspended stripline, dielectric integrated guides, fin line, MMIC, RF CMOS and LTCC will be briefly described. Design methodology including use of existing CAD tools leading to development of several high performance components/ subsystems at lower microwave frequencies as well as millimeter wave frequencies centered around 35 GHz, 60 GHz and 140 GHz will be presented. Micromachining has recently been applied to millimeter wave field to create low loss and high performance components and antennas. Methodology for the design, development and fabrication of passive components, antennas, switches and phase shifters at millimeter wave frequencies will be described next. Concept of developing reconfigurable RF circuits using either variable capacitors or switches will then be briefly presented. Future research activities in our group in the area of RF Nanotechnology will finally be presented.
**Professor Shiban K Koul** is a Professor and Deputy Director (Strategy and Planning) at the Indian Institute of Technology Delhi. He is also the Chairman of Astra Microwave Products Limited, Hyderabad, a major company involved in the Development of RF and Microwave systems in India. His current research interests include: RF MEMS, Device modelling, Microwave and Millimetre wave IC design and Reconfigurable microwave circuits including antennas. He is the author/co-author of 220 Research Papers and 7 state-of-the art books. He holds 6 patents and 6 copyrights. He has successfully completed 28 major sponsored projects, 52 consultancy projects and 36 Technology Development Projects.

Dr Koul has received Gold Medal by the Institution of Electrical and Electronics Engineers Calcutta (1977); S.K.Mitra Research Award (1986) from the IETE for the best research paper; Indian National Science Academy (INSA) Young Scientist Award (1986); International Union of Radio Science (URSI) Young Scientist Award (1987); the top Invention Award (1991) of the National Research Development Council for his contributions to the indigenous development of ferrite phase shifter technology; VASVIK Award (1994) for the development of Ka-band components and phase shifters; Ram Lal Wadhwa Gold Medal (1995) from the Institution of Electronics and Communication Engineers (IETE); Academic Excellence award (1998) from Indian Government for his pioneering contributions to phase control modules for Rajendra Radar, Shri Om Prakash Bhasin Award (2009) in the field of Electronics and Information Technology, Teaching excellence award (2012) from IIT Delhi, Award for contributions made to the growth of smart material technology (2012) by the ISSS, Bangalore and M.N.Saha Memorial Award (2013) from the IETE for the best application oriented research paper.

Dr Koul is a Fellow of the Institution of Electrical and Electronics Engineers, USA (IEEE), Fellow of the Indian National Academy of Engineering (INAE), Fellow of the Institution of Electronics and Telecommunication Engineers (IETE), Member of the Micro and Nano Technology Foundation (MANCEF), USA, Member of the Indian Society of Smart Materials (ISSS), Chief Delegate for world Micro machine Summit from India. He is the Chief Editor of IETE Journal of Research, a member of the National Committee for URSI Commissions B&C, academic expert member on the board of smart materials and research (B-smart) and a member of the national committee of COSPAR-URSI-SCOSTEP. He is on the Editorial boards of Journal of IETE and Microwave and Optical Technology Letters, John Wiley, USA. He is currently serving as one of the associate Editor of the International Journal of Microwave and Wireless Technologies, Cambridge, UK.

Dr. Koul is a serving ADCOM member and a Member of IEEE MTT society’s Technical committees on Microwave and Millimetre Wave Integrated Circuits (MTT-6) and RF MEMS (MTT-21), Member of India Initiative team of IEEE MTT-S, Membership Services Regional Co-coordinator India, Vice Chair MGA and MTT-S Speaker bureau lecturer. He is also a Distinguished IEEE MTT-S lecturer for the period 2012-2014.

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