TEERTHANKER MAHAVEER UNIVERSITY
(Established under Govt. of U. P. Act No. 30, 2008)
Delhi Road, Moradabad (U.P.)

PhD PROGRAMME

SYLLABUS FOR DISCIPLINE-SPECIFIC COURSE
ELECTRONICS & COMMUNICATION ENGINEERING

Course Code: PDS240131	Advances in Electronics & Communication Engineering	L	T	P	C
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Objective:	To familiarize the research scholar with the fundamentals of scientific research.				
Course Outcomes:	On completion of the course, students will be able to:				
CO 1:	Understand the basic construction and working principles of electronic devices				
CO 2:	Understand the different modulation techniques				
CO 3:	Understand the principles of advanced data communication systems				
CO 4:	Analyze microwave circuits using scattering parameters.				
CO 5:	Evaluate the need for the emerging wireless networks				
Course Content:					
Unit 1:	Advanced Semiconductor Devices: Semiconductor Electronics: Overview, Maxwell's Equations and Boundary Conditions, Semiconductor Electronics Equations, Generation and Recombination in Semiconductors, Semiconductor p-N and n-P Hetero junctions, Semiconductor n-N Hetero junctions and Metal-Semiconductor Junctions. Optoelectronic devices & nano-electronics, solar cells, photo detectors, light emitting diodes, semiconductor lasers. Nanodevices, material and classification, issues in scaling MOS transistors, transport in nano MOSFET, carbon nanotubes (CNTs).				
Unit 2:	Advanced Digital Communication Systems: Modulation Techniques, Coherent and Non-Coherent Detection, Error performance for binary system, and Symbol error performance for M-ary systems. Communication link analysis: Link budget analysis, Simple link analysis, system trade-offs, and Modulation coding trade-offs				
Unit 3:	Advanced-Data Communications system: Data Communication Components, Networks, Distributed Processing, Network Criteria- Applications, Protocols and Standards, Standards Organizations- Regulatory Agencies, Line Configuration- Point-to-point Multipoint, Topology- Mesh- Star- Tree- Bus- Ring- Hybrid Topologies, Categories of Networks- LAN, MAN, WAN and Internetworking.				
Unit 4:	Advanced Microwave Integrated circuits: Introduction to Microwave circuit concepts: one port junction, terminal voltages & currents in multi-port junctions, Poynting's Energy Theorem,				

	Normalized waves, and scattering matrix. Properties of [S] matrix. [S] matrix of magic T, E, and H plane Tees, directional coupler, Application of Hybrid junction and magic tee. Microwave amplifiers and oscillators. Measurement of VSWR, impedance, frequency, dielectric constant power, attenuation, power, and other microwave circuit performance parameters
Unit 5:	Wireless & Broadband Communication: IEEE/ITU communication standards and specifications, Wireless embedded approach, MIMO Antennas, Massive MIMO Antennas, Millimeter wave Communication, Application of 5G.
Textbooks:	1. S. C. Gupta, "Optoelectronic Devices and Systems," Second Edition, PHI Learning Private Limited, New Delhi, 2015 2. C.A. Ballanis, "Antenna Theory, Analysis, and Design", John Wiley & Sons, Third edition 2005. 3. Data Communications and Computer Networks - Prakash C. Gupta, 2006, PHI. 4. Microwave Integrated Circuits by K.G. Gupta & Amarjit Singh. *The latest editions of all the suggested books are recommended.
Reference Books:	1. Robert Boylestad & Louis Nashelsky, Electronic Circuit and Devices, Pearson India. 2. Malvino and Leach, Digital principle and applications, McGraw Hill 3. Simon Haykin, "Communication Systems",4th Edition, Wiley India.
Additional Electronic Reference Material:	1. https://nptel.ac.in/courses/117/102/117102059/ https 2. https://nptel.ac.in/courses/108/108/108108112/