Course Code	21ECE324T	Course Name	ADVANCED MOBILE COMMUNICATION SYSTEMS	Course Category	E	PROFESSIONAL ELECTIVE	L	T	P	C
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Pre-requisite Courses	*Nil*	Co- requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*ECE*	Data Book / Codes / Standards		*Nil*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*
CLR-1:	*introducing recent advancements and growing trends in mobile telecommunications*
CLR-2:	*figure out the methods to improve the Data Rates in mobile communication*
CLR-3:	*inferring technical requirements for 5G, network architecture*
CLR-4:	*acquire the knowledge of Network Planning and Deployment techniques*
CLR-5:	*analyzing security techniques and Applications of Advanced Mobile communication system*

Course Outcomes (CO):	*At the end of this course, learners will be able to:*	Program Outcomes (PO)												Program Specific Outcomes		
		1 Engineering Knowledge	2 Problem Analysis	3 Design/development of solutions	4 Conduct investigations of complex problems	5 Modern Tool Usage	6 The engineer and society	7 Environment & Sustainability	8 Ethics	9 Individual & Team Work	10 Communication	11 Project Mgt. & Finance	12 Life Long Learning	PSO-1	PSO-2	PSO-3
CO-1:	*examine the development, challenges and requirements of mobile communications*	*3*	*2*	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-2:	*interpret the methods to improve the data rate*	*3*	-	*2*	-	-	-	-	-	-	-	-	-	-	-	-
CO-3:	*connect the layers of communication systems*	-	-	-	*3*	-	-	-	-	-	-	-	-	-	*2*	-
CO-4:	*analyze the techniques of Planning and deployment of communication network*	-	-	-	*2*	-	-	-	-	*3*	-	-	-	-	-	-
CO-5:	*summarize the security, services and applications of Next generation communication techniques*	-	*2*	-	-	-	-	-	-	-	-	-	*3*	-	-	-

Unit-1 - Introduction — ***9 Hour***

Overview -What Is 5G? -Background -Research and Challenges for Electronics -Expected 5G in Practice - 5G and Security -Motivations -5G Standardization and Regulation -Global Standardization in 5G Era. 5G Requirements Based on ITU- The Technical Specifications of 3GPP-The 5 G Security.

Case Study*: Mobile Network Operators and Mobile Device Manufacturers in India*

Unit-2 - Data Rates in Mobile Communication — ***9 Hour***

Fundamental Constraints in achieving High Data Rates Noise-limited scenarios Interference-limited scenarios Higher-order Modulation, Multi carrier modulation Wider bandwidth, Spectrum Composition Low frequency spectrum, capacity and coverage, spectrum for 5GNR, unlicensed mm waves bands, Terahertz spectrum, spectrum requirements for 6G: SUB-6.

Unit-3 - Radio Network — ***9 Hour***

Radio access technology-Orthogonal Frequency Division Multiplexing- Channel estimation and equalization- Multiple-Input Multiple-Output Techniques-Advanced MIMO-Radio network architecture and Interfaces.

Case Study*: The Role of 5G and beyond in the Cyber-World*

Unit-4 - Network Planning and Deployment — ***9 Hour***

Core and Transmission Network Dimensioning- Radio Network Planning- Core and Radio Network Deployment Scenarios- Standalone and Non-Standalone Deployment Scenarios- Network Interfaces and Elements-core deployment-Measurements.

Case Study *: Security Opportunities for Stakeholders*

Unit-5 - Security Services and Applications — ***9 Hour***

Security Threats and Challenges- Security Implications in 5G Environments and Use Cases - Security Layers- Device Security- Security between Network Entities, Vehicle Communications- Machine Learning and Artificial Intelligence.

Case Study*: The concept and vision of 6G Massive IoT*

Learning Resources	1. *5G explained: security and deployment of advanced mobile communications by Jyrki T.J. Penttinen. Hoboken, NJ, USA: John Wiley & Sons, Inc., 2019.* 2. *6G wireless communications and mobile networking by xianzhong Xie, Bo Rong, Michel Kadoch-Bentham books*	3. *Rappaport.T.S.," Wireless Communications: Principles and Practice", 2nd Edition, Pearson, 2011* 4. *Chiller, "Mobile Communications", Pearson Education Asia Ltd., Reprint 2012*

Learning Assessment

	Bloom's Level of Thinking	*Continuous Learning Assessment (CLA)*				*Summative Final Examination (40% weightage)*	
		Formative CLA-1 Average of unit test (50%)		*Life-Long Learning CLA-2 (10%)*			
		Theory	*Practice*	*Theory*	*Practice*	*Theory*	*Practice*
Level 1	*Remember*	*15%*	-	*20%*	-	*30%*	-
Level 2	*Understand*	*30%*	-	*25%*	-	*40%*	-
Level 3	*Apply*	*40%*	-	*35%*	-	*30%*	-
Level 4	*Analyze*	*30%*	-	*20%*	-	-	-
Level 5	*Evaluate*	-	-	-	-	-	-
Level 6	*Create*	-	-	-	-	-	-
	Total	*100 %*		*100 %*		*100 %*	

Course Designers

Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
1 *Mr. Raji Kumar, Sr. Manager Core Corporation (Airtel)*	1 *Dr. Meenakshi, Professor of ECE, CEG, Anna University, meena68@annauniv.edu*	1 *Dr.C.T. Manimegalai, SRMIST*