S. No.	Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
								Sessional	Final Exam	Total
3	ECE-701(B)	Advanced Mobile Technologies	PEC	3	2	1	0	50	100	150

Course Outcomes:

At the end of the course the student will be able to	
CO1	Describe major cellular communication standards and wireless communications networks.
CO2	Explain 5G technologies for communication systems.
CO3	Differentiate 5G Networks for various frequency bands.
CO4	Analyze the current state-of-art and challenges for 5G technologies.
CO5	Explore the need and potential applications of 6G and Terahertz technology.

Detailed Syllabus

Section-A

Unit 1: Evolution from 1G to 5G: Analog voice systems in 1G, digital radio systems in 2G, voice and messaging services, 2.5G (GPRS), 2.75G (EDGE), 3G UMTS (IMT 2000), 3G services and data rates, 4G (IMT Advanced), LTE, VoLTE, OFDM, LTE Advanced Pro (3GPP Release 13+), 5G (IMT 2020) 5G potential and applications, comparison of various generations. **(11 Hrs)**

Unit 2: Basics of 5G: Introduction to enhanced mobile broadband (eMBB), ultra-reliable low latency communications (URLLC), massive machine type communications (MMTC), D2D communications, V2X communications, Spectrum for 5G, spectrum access/sharing, millimeter wave communication. **(11 Hrs)**

Unit 3: 5G Network: New Radio (NR), Standalone and non-standalone mode, non-orthogonal multiple access (NOMA), massive MIMO, beam formation, flexible frame structure, Service Data Adaptation Protocol (SDAP), centralized RAN, open RAN, multi-access edge computing (MEC), network function virtualization (NFV).

(12 Hrs)

Section-B

Unit 4: Current state and Challenges ahead: 5G penetration in developed countries, stronger backhaul requirements, dynamic spectrum access and usage of unlicensed spectrum, large cell usage, LMLC, possible solutions for connectivity in rural areas (BharatNet, TVWS, Long-range Wi-Fi, FSO).

(8 Hrs)

Unit 5: Introduction to Terahertz and 6G Technology: Terahertz communication, need for THz Communication, applications, requirements, Challenges, Introduction to 6G Technology, features, Requirements, emerging applications, challenges. **(6 Hrs)**

Text Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Wireless Communication Principles and Practice	Theodore S. Rappaport	PHI	2nd (2011)
2	4G, LTE-Advanced Pro and The Road to 5G	Erik Dahlman	Elsevier	3rd (2016)
3	5G NR: Architecture, Technology, Implementation, and Operation of 3GPP New Radio Standards	Sassan Ahmadi	Elsevier	1st (2019)

Reference Books

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	6G Wireless Network	Yuleiwu	Springer	1st (2022)
2	THz Communication Paving the way towards wireless Tbps	Thomas Kurner	Springer	1st (2022)