GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Engineering
Level: UG
Subject Code : 3174803
Subject Name :Advanced Wireless Technologies and Mobile Systems

w. e. f. Academic Year:	A.Y. 2025-26
Semester:	VII
Category of the Course:	PEC

Prerequisite :	Computer Network
Rationale:	The proliferation of mobile devices and wireless communication has revolutionized data exchange, mobility, and access to services. This course delves into the principles and technologies behind mobile computing, cellular systems, and wireless networks. It also introduces students to real-world mobile application development environments like Android

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
1	Describe and differentiate mobile communication generations (2G/3G/4G) and their system architecture.	U
2	Explain GSM and GPRS technologies and their network operations.	U
3	Implement basic coding techniques for error detection and correction.	Ap
4	Compare and evaluate multiple access techniques and spread spectrum methods.	An
5	Apply Android development tools and APIs to create basic mobile applications.	Ap

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	0	3	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours
1	**Fundamentals of Transmission and Networks**: Covers analog/digital transmission, bandwidth, channel capacity, switching techniques (circuit/packet), and network types (LAN, MAN, WAN).	07
2	**Fundamentals of Cellular Networks:** Overview of first-generation analog systems, second-generation systems utilizing TDMA and CDMA technologies, and third-generation mobile communication systems.Antennas and Signal Propagation: Discussion on various types of antennas, propagation methods, line-of-sight communication, and signal fading in mobile environments.Spread Spectrum Techniques: Introduction to spread spectrum communication, including frequency hopping and direct sequence methods.Coding and Error Management: Techniques for error detection, block and convolutional error correction codes, and the use of automatic repeat requests (ARQ) to ensure reliable data transmission.	10
3	**Multiple Access and GSM/GPRS Architecture**: Focuses on FDMA, TDMA, CDMA, SDMA, packet radio, GSM architecture and call flow,GSM entities, call routing in GSM, PLMN interface, GSM addresses and identifiers, network aspects in GSM, GSM frequency allocation, authentication, and security. GPRS and packet data network, GPRS network architecture, GPRS network operation, data services in GPRS, Applications of GPRS, Billing and charging in GPRS. , Wireless System Operations and Standards: Cordless Systems, Wireless Local Loop, WiMAX and IEEE 802.16 Broadband Wireless Access Standards Mobile IP and Wireless Application, Protocol	13
4	**Wireless LANs (Wi-Fi)**: Introduces IEEE 802.11 architecture, MAC protocols, physical layers, and WPA security..	04
5	**Bluetooth Technology**: Covers Bluetooth specifications across radio, baseband, link management, and L2CAP protocol layers.	04

6	**Mobile App Development Using Android**: Android APIs, Android Architecture, Application Framework, The Application components, The manifest file, downloading and installing Android, Exploring the Development Environment, Developing and Executing the first Android application, Working with Activities, The Linear Layout , The Relative Layout , The Scroll View Layout, The Table Layout, The Frame Layout, Using the Text View, Edit Text View, Button View, Radio Button, Checkbox, Image Button, Rating Bar, The options Menu, The Context Menu.	07

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
–	**18**	**30**	**25**	**12**	**05**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

- William Stallings – *Wireless Communications & Networks*
- Asoke K. Telukder & Roopa R. Yavagal – *Mobile Computing Technology, Applications, and Services*
- T.S. Rappaport – *Wireless Communications: Principles and Practices*
- Pradeep Kothari – *Android Application Development Black Book*
- Raj Kamal – *Mobile Computing*
- Lauren Darcey & Shane Conder – *Android Wireless Application Development*

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