Course Handout (2022-23 EVEN SEMESTER)

Subject Name/Code : MOBILE COMMUNICATION & NETWORKS(18EC2T20) Branch/Sem/Batch :

Name of Faculty : Aradhana Raju , UTPAL DAS , SANGHAMITRA DAS

Scope & Objective -:

The objectives of this course is to study the concepts of communication networks, wireless communication with its challenges & developments, wireless application protocols & standards, and Bluetooth technology.

Pre-Requisite -:

Detailed Syllabus:

Module#	CO	Topics	Hours
1	1	Communication Networks: LANs, MANs, WANs, Switching techniques, Wireless ATM networks, TCP/IP protocol architecture, OSI protocol architecture, Internetworking.	8
2	2	Wireless Communication Technology: Propagation modes, LOS transmission, Fading in the mobile environment, Free-space Attenuation, Attenuation over Reflecting Surfaces, Radio wave Propagation, Propagation Path-loss Models, Cost 231 Model.	8
3	3	Cellular Wireless Networks: Principles of cellular network, first, second and third Generation systems. Mobile IP and wireless Access Protocol: Mobile IP, Wireless Application Protocol, Internet control message protocol, Message authentication, Service primitives and parameters.	9
4	4	Wireless LAN Technology: Overview, Infrared LANs, Spread spectrum LANs , Narrowband microwave LANs. IEEE 802.11 Wireless LAN: IEEE 802 protocol architecture, IEEE 802.11 architecture and services, IEEE 802.11 MAC, IEEE 802.11 physical layer.	9
5	5	Bluetooth: Overview, Radio specification, baseband specification, Link manager specification, Logical Link control and adaptation protocol; Wi-MAX standards, Wi-Fi standards, Zig-bee.	8
		Total	42 Hours

#	Topic	Module	Chapter	Course Coverage	No of Classes
1	Introduction to Communication Networks	1		TRUE	1
2	LANs, MANs, WANs	1		TRUE	1
3	Switching techniques	1		TRUE	1
4	Wireless ATM networks	1		TRUE	1
5	Wireless ATM networks cont..	1		TRUE	1
6	TCP/IP protocol architecture	1		TRUE	1
7	TCP/IP protocol architecture cont..	1		TRUE	1
8	OSI protocol architecture, Internetworking	1		TRUE	1
9	OSI protocol architecture, Internetworking cont..	1		TRUE	1
10	Propagation modes, LOS transmission, Fading in the mobile environment	2		TRUE	1
11	Free-space Attenuation	2		TRUE	1
12	Attenuation over Reflecting Surfaces, Radio wave Propagation	2		TRUE	1
13	Attenuation over Reflecting Surfaces, Radio wave Propagation cont..	2		TRUE	1
14	Propagation Path-loss Models	2		TRUE	1

15	Propagation Path-loss Models, problem solving	2		TRUE	1
16	Cost 231 Model	2		TRUE	1
17	Midterm question discussion	2		TRUE	1
18	Cellular Wireless Networks: Principles of cellular network	3		TRUE	1
19	first, second and third Generation systems	3		TRUE	1
20	Mobile IP and wireless Access Protocol: Mobile IP, Wireless Application Protocol	3		TRUE	1
21	Wireless Application Protocol cont..	3		TRUE	1
22	Internet control message protocol	3		TRUE	1
23	Internet control message protocol cont..	3		TRUE	1
24	Message authentication	3		TRUE	1
25	Wireless LAN Technology: Overview, Infrared LANs	4		TRUE	1
26	Service primitives and parameters	3		TRUE	1
27	Spread spectrum LANs	4		TRUE	1
28	Narrowband microwave LANs	4		TRUE	1
29	IEEE 802.11 Wireless LAN: IEEE 802 protocol architecture	4		TRUE	1
30	IEEE 802.11 MAC	4		TRUE	1
31	IEEE 802.11 physical layer	4		TRUE	1
32	IEEE 802.11 physical layer cont..	4		TRUE	1
33	Bluetooth: Overview	5		TRUE	1
34	Radio specification, baseband specification	5		TRUE	1
35	Link manager specification	5		TRUE	1
36	Logical Link control and adaptation protocol	5		TRUE	1
37	Wi-Fi standards	5		TRUE	1
38	Wi- MAX standards	5		TRUE	1
39	Wimax cont..	5		TRUE	1
40	Zig-bee	5		TRUE	1
41	Zig-bee cont..	5		TRUE	1
42	Questions discussion	5		TRUE	1

Total no. of classes : 42

Text Book

Wireless Communication and Networks, U. Dalal, Oxford University Press
Wireless Communication and Networks: 3G and Beyond, I. S. Misra, McGraw-Hill Education

Reference Book

Wireless Communication and Networking: Essential Reading, V. K. Garg, 2008, Morgan Kaufman
Wireless Communications, T. S. Rappaport, Pearson Education
Fundamentals of Wireless Communication, D. Tse and P. Viswanath, Cambridge University Press

Online Reference Material(s):

1. https://nptel.ac.in/courses/106/105/106105082/: by Prof. A. Pal, IIT Kharagpur
2. https://nptel.ac.in/courses/106/108/106108098/: by Prof. H.S. Jamadagni, IISc Bangalore
3. https://nptel.ac.in/courses/106/105/106105081/: by Prof. S. Ghosh, IIT Kharagpur
4. https://nptel.ac.in/courses/106/105/106105183/: by Prof. S. Chakraborty and Prof. S. K. Ghosh, IIT Kharagpur

Course Outcome:

1	Explain the fundamentals of mobile communication networks and various prototols.
2	Analyze radio propagation, fading, attenuation, channel modeling and other path losses.
3	Explain & compare various wireless application protocols & mobile IP implementations.
4	Use internet from remote location for multiple access signal structuring.
5	Multiplex higher layer protocols and design wi-fi infrastrcture.

Program Outcomes Relevent to the Course:

PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Mapping of CO's to PO's: (1: Low, 2: Medium, 3: High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO12**
1	3	2	3	1	1	
2	3	3	2	3	2	1
3	3	2	3	3	3	
4	3	3	2	2	2	1
5	3	3	3	3	3	