

Mobile Communication(404188)

Teaching Scheme:

Lectures: 3 Hrs/ Week

Examination Scheme:

In Semester Assessment:

Phase I : 30

End Semester Examination:

Phase II: 70

Course Objectives:

- To learn and understand the basic principles of Telecommunication switching, traffic and networks
- To learn and understand basic concepts of cellular system, wireless propagation and the techniques used to maximize the capacity of cellular network.
- To learn and understand architecture of GSM and CDMA system.
- To understand mobile management, voice signal processing and coding in GSM and CDMA system

Course Outcomes:

After successfully completing the course students will be able to

- Explain and apply the concepts telecommunication switching, traffic and networks
- Analyze the telecommunication traffic.
- Analyze radio channel and cellular capacity.
- Explain and apply concepts of GSM and CDMA system.

Unit I : Telecommunication Switching & Traffic

6L

Telecommunication switching: Message switching, Circuit switching, Manual System, Electronic Switching. Digital switching: Switching functions, Telecommunication Traffic: Unit of Traffic, Traffic measurement, A mathematical model, Lost- call systems: Theory, traffic performance, loss systems in tandem, traffic tables. Queuing systems: Erlang Distribution, probability of delay, Finite queue capacity, Systems with a single server, Queues in tandem, delay tables and application of Delay formulae.

Unit II : Switching Networks and Signaling

6L

Single Stage Networks, Gradings, Link Systems, Grades of service of link systems. Time Division Switching: Space and time switching, Time division switching networks, Synchronization, Call processing Functions, Common Control, Reliability, Availability and Security. Signaling: Customer line signaling. FDM carrier systems, PCM signaling, Inter-register signaling, Common channel signaling principles, CCITT signaling No. 6, CCITT signaling No. 7, Digital customer line signaling.

Unit III : Cellular Concepts

6L

Evolution of Wireless systems, Introduction to cellular telephone system, Frequency reuse, Channel Assignment, Handoff strategies, Cell Splitting, Propagation Mechanism: Free space loss, Reflection, Diffraction, Scattering. Fading and Multipath: Small scale multipath propagation, Impulse response model of multipath channel. Multiple Access Techniques-TDMA, FDMA, CDMA

Unit IV : First and Second Generation Mobile Systems

6L

First Generation Cellular Systems, AMPS, GSM Cellular Telephony: Introduction, Basic GSM Architecture, Basic radio transmission parameters in GSM system, Logical Channels, GSM time hierarchy, GSM burst structure, Description of call setup procedure, Handover, Modifications and derivatives of GSM.

Unit V : GSM Services

6L

GSM Physical layer: Speech Coding and decoding, GMSK modulation, Data transmission in GSM: Data Services, SMS, HSCSD, GPRS, EDGE.

Unit V : CDMA Based Mobile Systems

6L

Motivation for CDMA use, Spreading Sequences, Basic Transmitter and Receiver schemes, Rake Receiver, IS-95 system: Frequency Range, Downlink transmission, Uplink transmission, Power control, Introduction to 3G mobile systems: W-CDMA and cdma-2000.

Text Books

1. J. E. Flood , “Telecommunications Switching, Traffic and Networks”, Pearson Education
2. Krzysztof Wesolowski, “Mobile Communication Systems”, Wiley Student Edition.

Reference Books

3. Theodore S Rappaport, “Wireless Communications Principles and Practice” Second Edition, Pearson Education
1. John C. Bellamy, “Digital Telephony”, Third Edition; Wiley Publications
2. Thiagarajan Vishwanathan, “Telecommunication Switching Systems and Networks”; PHI Publications
3. Wayne Tomasi, “Electronic Communications Systems”; 5th Edition; Pearson Education
3. Yi-Bang Lin, Imrich Chlamtac, “Wireless and Mobile Network Architecture”, Wiley India Edition.
4. Vijay K Garg, Joseph E Wilkes, “Principles and Applications of GSM” Pearson Education
5. Vijay K Garg, Joseph E Wilkes, “IS-95CDMA and CDMA 2000 Cellular/PCS Systems

Implementation” Pearson Education

6. R. Blake, “Wireless Communication Technology”, Thomson Delmar.
7. W.C.Y. Lee, “Mobile Communications Engineering: Theory and applications”, Second Edition, McGraw-Hill International.
8. Mischa Schwartz, “Mobile Wireless Communications”, Cambridge University Press