



**KINGS**  
COLLEGE OF ENGINEERING



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**ACADEMIC YEAR 2010-2011 / EVEN SEMESTER**

**QUESTION BANK**

**SUBJECT CODE & NAME: EC 1019 – MOBILE COMMUNICATION**

**YEAR / SEM: IV / VIII**

**UNIT – I**

**CELLULAR CONCEPT AND SYSTEM DESIGN FUNDAMENTALS**

**Part – A (2 MARKS)**

1. Define page.
2. Define the term Roamer.
3. Define handoff?
4. Define cluster.
5. State the different types of handoffs.
6. What is intersystem handoff?
7. What is co-channel interference?
8. What is grade of service?
9. What is cell splitting?
10. What is sectoring?
11. State the different techniques used for improving coverage and capacity in cellular systems.
12. Define the term dwell time.
13. State the advantage of umbrella cell approach.
14. Define the term Erlang.
15. What is frequency planning?
16. What is trunking efficiency? .
17. State the basic constituents of a cellular system.
18. State the relation between traffic intensity ( $A_u$ ) and holding time (H).
19. State the two types of trunked system.
20. Define co channel cells.

**Part – B (16 MARKS)**

1. Explain with suitable timing diagram, how a cellular telephone call is set up. (16)
2. (a) Draw the block diagram of a cellular system and explain how a cellular telephone call is made between the landline and the mobile user and when the call is initiated by the landline customer. Draw suitable timing diagrams. (10)  
(b) Explain briefly about 3G CDMA techniques. (6)
3. (a) What is the need for frequency reuse? Explain the frequency reuse concept and show that  $N=i^2+ij+j^2$  Where N is the number of cells per cluster. (8)  
(b) Derive an expression for signal to interference ratio (S/I) for 7 cell cluster system. (8)
4. Explain about the cellular concepts in detail  
(i) Frequency reuse  
(ii) Channel assignment (16)
5. Explain the significance of following cellular concepts in detail  
(i) Interference  
(ii) System Capacity (16)
6. Explain mobile radio systems in detail (16)
7. (a) What is Grade of service? How are Erlang B formula and Erlang C formula used in cellular systems? (6)  
(b) A hexagonal cell with four cell system has a radius of 2 km and a total of 50 channels are used in the system. If the load per user is 0.03 Erlangs, and  $v = 2$  call/hour, compute the following for Erlang C system by assuming 5% probability of delay with  $C = 15$  and traffic intensity = 9.0 Erlangs.  
(i) How many users per square kilometer this system will support?  
(ii) What is the probability that a call will be delayed for more than 10 secs? (10)
8. Discuss the 'handoff' strategies employed in the design of a mobile communication system. (16)
9. Discuss the methods that may be used for improving the capacity in cellular systems. (16)
10. What are the different techniques used for increasing the capacity and improving the coverage in cellular system? Explain them. (16)

**UNIT – II**

**MOBILE RADIO PROPAGATION**

**Part – A (2 MARKS)**

1. Mention the basic propagation mechanisms, which impact propagation in mobile communication.
2. State the two different types of fading.
3. Define Rayleigh fading.
4. Define the term coherence bandwidth.
5. What is direct wave path?
6. Mention the three partially separable effects of radio propagation.
7. What is reflection?
8. What is diffraction?
9. What is scattering?
10. Define Brewster angle?
11. What are the possible conditions in a point-to-point prediction model?
12. What are the merits of point-to-point model?
13. What is a smart antenna?
14. What is EIRP?
15. Why we use 1mi intercept for mobile communication?

**Part – B (16 MARKS)**

1. Explain the time dispersion and frequency dispersion parameters of a mobile multipath channel. How do you classify mobile channels based on these parameters? **(16)**
2. What do you understand by large scale fading? Explain the 2-ray ground reflection model for path loss prediction. **(16)**
3. Derive and explain the Free space propagation model to determine the received power at a distance 'd' and relate this power to Electric field. **(16)**
4. For a Two-Ray model derive the expression for the received power at a distance 'd' from transmitter and show that,  $P_r = P_t G_t G_r h_t^2 h_r^2 / D^4$  **(16)**
5. Explain about outdoor and indoor propagation models. **(16)**
6. Explain about types of small scale fading? **(16)**
7. Explain methods of multipath measurements in detail. **(16)**

**UNIT – III**

**MODULATION TECHNIQUES AND EQUALIZATION**

**Part – A (2 MARKS)**

1. Define modulation.
2. State the different analog modulation schemes.
3. State the different modulation schemes.
4. Define amplitude modulation.
5. State the techniques used for SSB generation.
6. State the advantages of digital modulation schemes.
7. Define bandwidth efficiency.
8. Define Power efficiency.
9. State the different types of line coding.
10. State the types of modulation schemes used in mobile communication.
11. What is coherent detector?
12. State the advantage of using GMSK rather than MSK.
13. What is CPFSK?
14. State the difference between MSK and GMSK.
15. What is a diversity receiver?

**Part – B (16 MARKS)**

1. Explain about modulation techniques in detail **(16)**
2. Bring out the salient features of the MSK modulation scheme. Explain the MSK transmitter and receiver implementations with suitable diagrams. Highlight the significance of achieving the minimum frequency shift. **(16)**
3. What is nonlinear equalization? Explain the three non linear methods of Equalization with suitable diagrams. **(16)**
4. Explain the diversity techniques in detail. **(16)**
5. Explain about linear equalization techniques. **(16)**
6. Explain Gaussian MSK and M-ary QAM **(16)**

**UNIT – IV**

**CODING AND MULTIPLE ACCESS TECHNIQUES**

**Part – A (2 MARKS)**

1. What is CDMA digital cellular standard (IS 95)?
2. What are frequencies used in forward and reverse link frequency in IS-95?
3. State certain access technologies used in mobile satellite communication systems.
4. What is CDPD?
5. Write some features of TDMA?
6. Write some features of CDMA?
7. Write the features of DECT?
8. What is near-far effect in wireless network?
9. Expand PCS, PLMR, NLOS and DECT.
10. What is PHP?

**Part – B (16 MARKS)**

1. Discuss the multiplexing techniques. **(16)**
2. What are the characteristics of speech that enable speech coding? Discuss the criteria used for choosing speech codecs for a mobile communication system.  
Differentiate between waveform coders and vocoders with examples. **(16)**
3. List the difference between SDMA/TDMA/FDMA/CDMA **(16)**
4. Draw the block diagram of a LPC coding system and explain the different types of LPC used for wireless systems **(16)**
5. Explain spread spectrum with its types. **(16)**
6. Explain about the TDMA. **(16)**
7. Why CDMA is needed and explain it with an example? **(16)**
8. (a) Discuss the salient features of FDMA and TDMA techniques. **(12)**  
(b) If a normal GSM time slot consists of 6 trailing bits, 8.25 guard bits, 26 training bits and 2 traffic bursts of 58 bits of data, find the frame efficiency. **(4)**
9. (a) Explain the concept of CDMA. What are its merits and demerits? **(8)**  
(b) Explain the TDMA frame structure and derive the efficiency of a TDMA system. **(8)**

**UNIT – V**

**WIRELESS SYSTEMS AND STANDARDS**

**Part – A (2 MARKS)**

1. What are the logical channels that the control channel consists?
2. What is BCCH?
3. What is CCCH?
4. What is SIM?
5. What are main subsystems of GSM architecture?
6. What are the channel types of GSM system?
7. What are the interfaces used in the GSM?
8. Write some third generation wireless standards.
9. What is Bluetooth?
10. Write the specifications of DECT?

**Part – B (16 MARKS)**

1. Explain about second and third generation wireless network. **(16)**
2. Discuss some of the reservation based multiple access protocols for wireless networks, with suitable illustrations. **(16)**
3. (a) With suitable block diagram explain the GSM system. **(8)**  
(b) Draw the transmitter and receiver block diagram of MSK and explain. **(8)**
4. Explain about IS-95 with a neat diagram. **(16)**
5. Explain the significance of DECT **(16)**
6. Explain in detail about WLL and Bluetooth **(16)**