

Full Marks: 10

-

3. We have a space-division multistage switch with 400 inputs and outputs. Design the switch [4] and calculate the number of crosspoints based on the Clos criteria.

Time: 30 minutes

Quiz #1 (Set-2)

Full Marks: 10

1. a) What is the function of IXC? [1]

- b) What is the difference between bandwidth and data rate? [1]

- c) What is FDD control channel? [1]

- d) How many channels are there in ADSL if the downstream BW is 138kHz to 1104 kHz? [1]

2. A path in a digital circuit-switched network has a data rate of 1 Mbps. The queuing delay and processing delay is 3 ms. The distance between two parties is 5000 km and the propagation speed is 2×10^8 m. What is the latency if 1000 bits of data are exchanged during the data transfer phase? [2]

3. We have a space-division multistage switch with 300 inputs and outputs. Design the switch [4] and calculate the number of crosspoints based on the Clos criteria.

Time: 30 minutes

Quiz #1 (Set-3)

Full Marks: 10

1. a) How does circuit switching network work? [1]

- b) Why is ADSL unsuitable for Business user? [1]

- c) What is the function of POP? [1]

- d) How many channels are there in ADSL if the downstream BW is 150 kHz to 1024 kHz? [1]

2. A telephone normally has a bandwidth of 300 to 3300 Hz assigned for data communications. [2]
 The signal-to-noise is usually 20dB. What is the theoretical highest bit rate of the regular telephone line?

3. We have a space-division multistage switch with 500 inputs and outputs. Design the switch [4] and calculate the number of crosspoints based on the Clos criteria.

Time: 30 minutes

Quiz #1 (Set-4)

Full Marks: 10

1. a) What is the function of LATA? [1]

- b) How does packet switching network work? [1]

- c) How does FDD work? [1]

- d) If the upstream BW is 50 kHz to 150 kHz then how many channels are there in ADSL? [1]

2. What are the propagation time and the transmission time for a 3-kbyte message if the [2]
 bandwidth of the network is 10 Mbps? Assume that the distance between the sender and the
 receiver is 36000 Km and that light travels at 2.4×10^8 m/s.

3. We have a space-division multistage switch with 600 inputs and outputs. Design the switch [4] and calculate the number of crosspoints based on the Clos criteria.

Time: 30 minutes

Quiz #2 (Set-1)

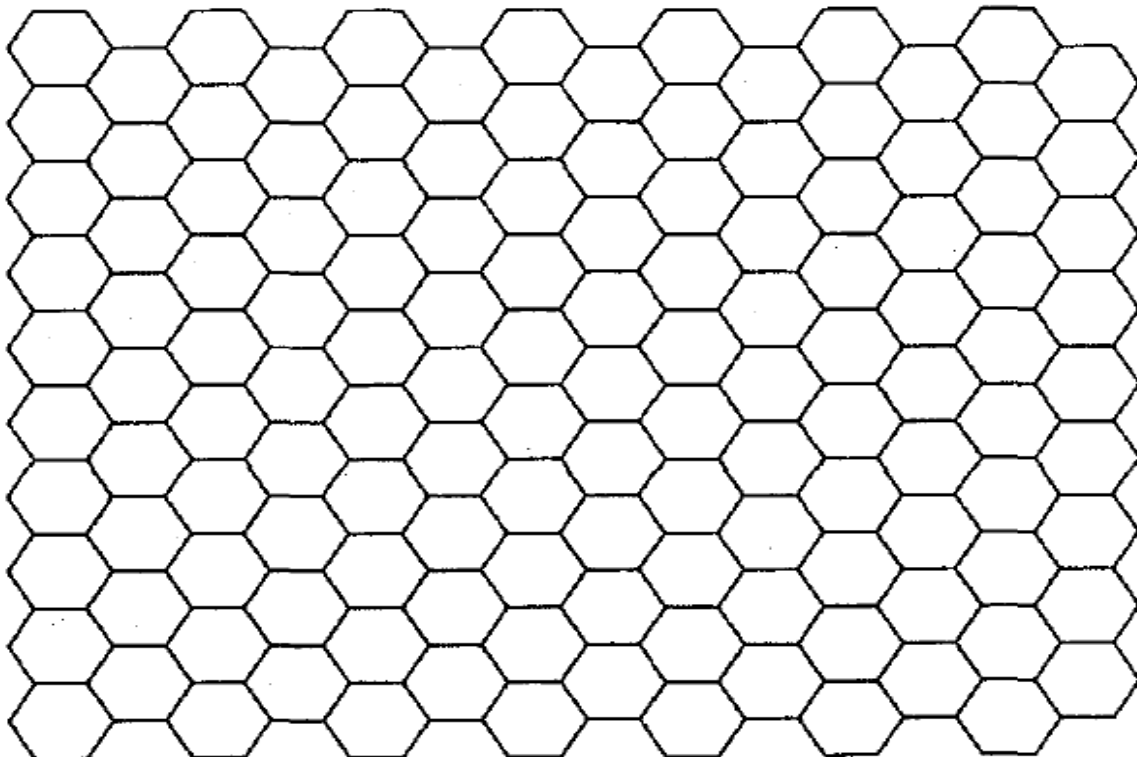
Full Marks: 10

1. a) Why is antenna size large in traditional mobile system? [1]

- b) Do you prefer call drop or call block? Why? [1]

- c) What happen if we take handoff margin too small? [1]

2. a) Find the co channel cells (mark by C) and adjacent cells (mark by A) for the cell M. Assume cluster size 27. [2]



- b) Suppose that a mobile station is moving along a straight line between base stations BS_1 and BS_2 with path loss 2 and the threshold value -50 dB. Assume that 1m reference distance received power 15W and a handoff request is sent at position 0.5 km and 2 km. Show at which position the hand off will take place. [2]
3. Assume a geographic area of 212.48 Km^2 is covered by a cellular system with a cell radius of 1.6 km. A total frequency bandwidth that supports 309 channels, and a reuse factor of $N = 9$. If there are 0.96 MHz is dedicated to control channel which uses 10 KHz for simplex channel. [3]
- a. How many cells are there in the geographic area?
- b. How many traffic channels are there per cell?
- d. How many times the total frequencies are reused?

Time: 30 minutes

Quiz #2 (Set-2)

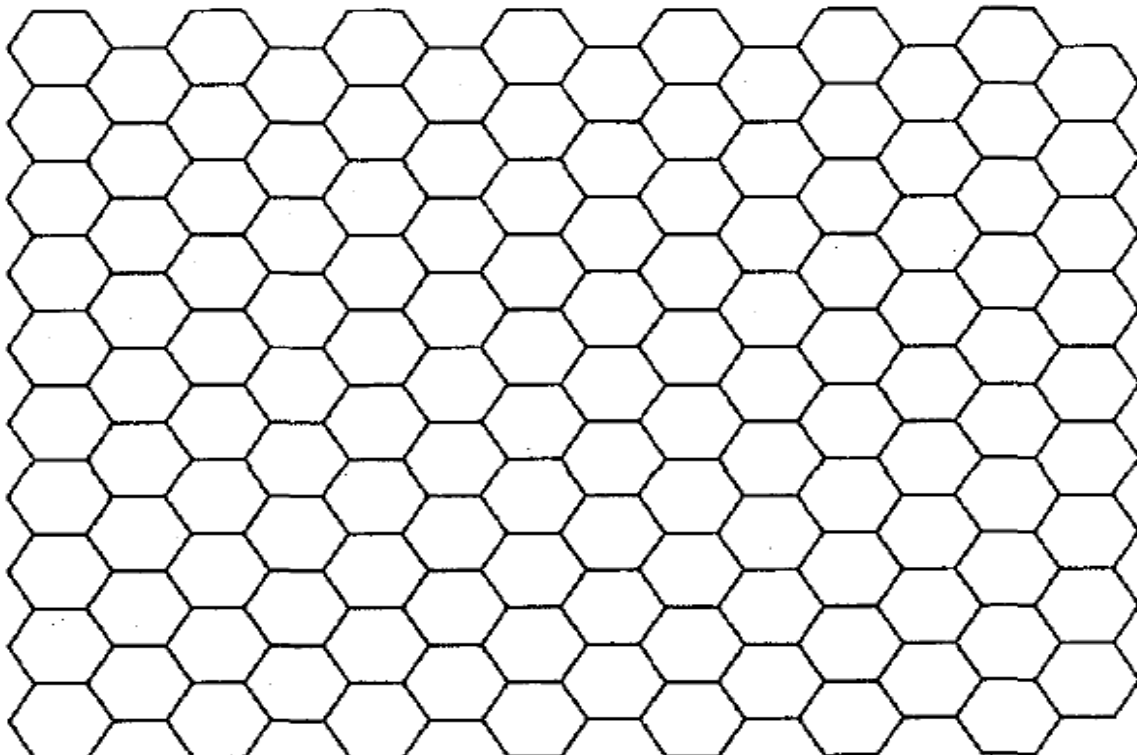
Full Marks: 10

1. a) Why do we get low capacity in traditional mobile system? [1]

b) Do you want handoff frequent or infrequent? Why? [1]

c) What are the reasons of unsuccessful handoff? [1]

2. a) Find the co channel cells (mark by C) and adjacent cells (mark by A) for the cell M. Assume cluster size 28. [2]



b) Suppose that a mobile station is moving at a speed of 60 km/hr along a straight line [2]
between base stations BS_1 and BS_2 . The received power at a reference distance 1 km is 10W.
For path loss 3, a cell radius of 2 km and a 2 second handoff, what is P_r (min useable) and P_r
(Handoff) in dB?

3. Assume a FDD cellular system of 40 cells with a cell radius of 1.5 km. A total of 50 MHz of [3]
bandwidth is allocated which uses 5 KHz simplex channel. If there are 1000 channel is
dedicated to control channel and a reuse factor of $N = 7$.

a. What geographic area is covered by the system?

b. How many traffic channels are there per cell?

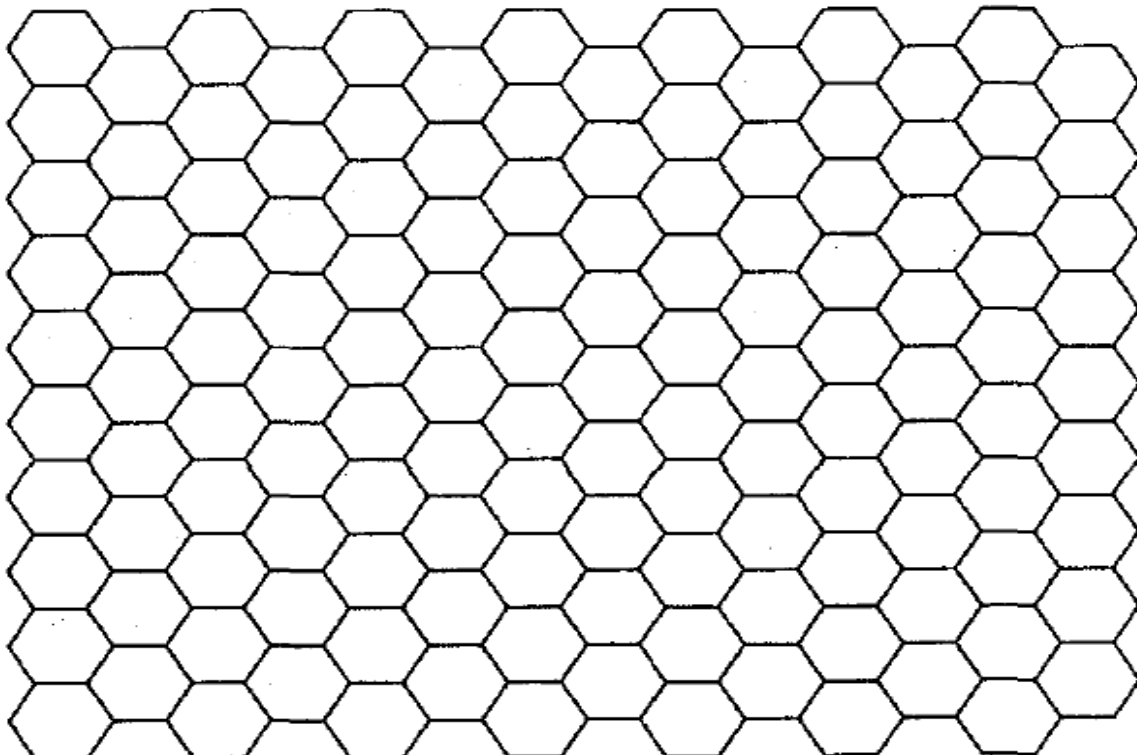
d. How many times the total frequencies are reused?

Time: 30 minutes

Quiz #2 (Set-3)

Full Marks: 10

-
1. a) Why do we get low capacity in traditional mobile system? [1]
- b) What happen if we take handoff margin too big? [1]
- c) Handoff must be performed infrequently. Why? [1]
2. a) Find the co channel cells (mark by C) and adjacent cells (mark by A) for the cell M. Assume cluster size 21. [2]



- b) Suppose that a mobile station is moving at a speed of 72 km/hr along a straight line [2]
between base stations BS_1 and BS_2 . The received power at a reference distance 1 km is 15W.
For path loss 2, a cell radius of 1.5 km and a 3 second handoff, what is P_r (min useable) and
 P_r (Handoff) in dB?
3. Assume a geographic area of 371.84 Km^2 is covered by a cellular system with a cell radius of [3]
1.6 km. A total frequency bandwidth that supports 400 channels, and a reuse factor of $N = 4$.
If there are 1.5 MHz is dedicated to control channel which uses 15 KHz for simplex channel.
- a. How many cells are there in the geographic area?
- b. How many traffic channels are there per cell?
- d. How many times the total frequencies are reused?

Time: 30 minutes

Quiz #2 (Set-4)

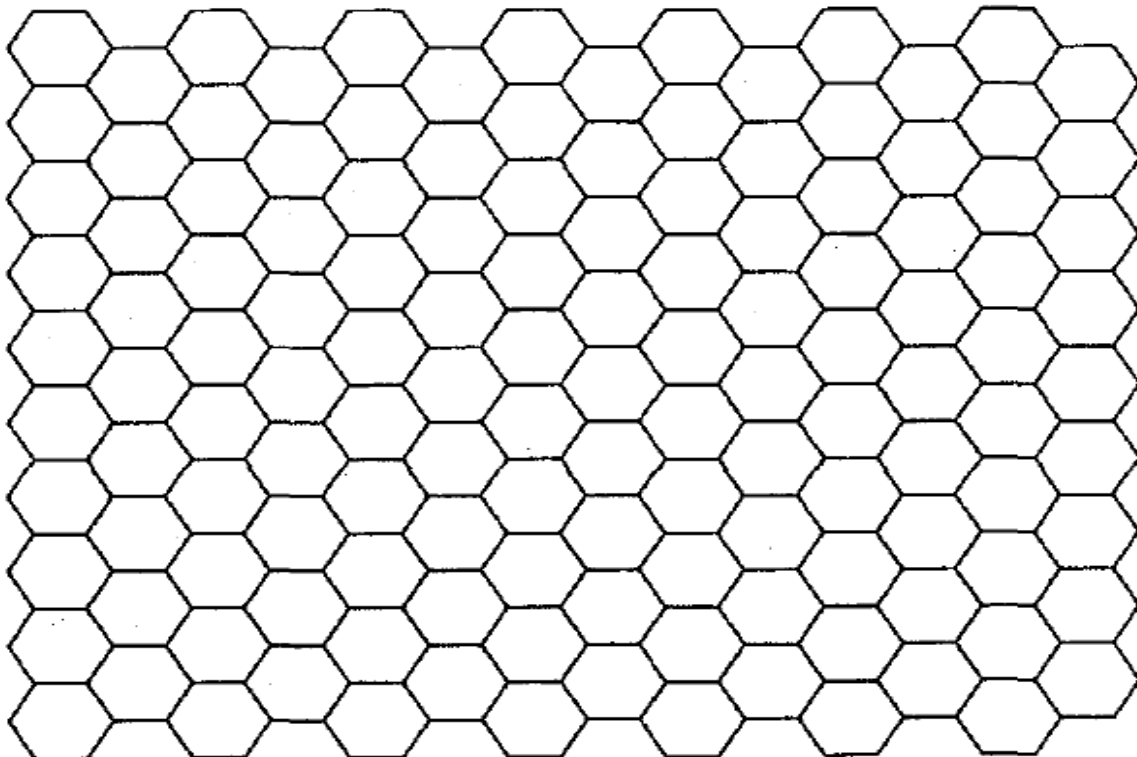
Full Marks: 10

1. a) Why is antenna size large in traditional mobile system? [1]

b) Do you prefer large cell or small cell? Why? [1]

c) Handoff must be performed successful. Why? [1]

2. a) Find the co channel cells (mark by C) and adjacent cells (mark by A) for the cell M. Assume cluster size 19. [2]



- b) Suppose that a mobile station is moving along a straight line between base stations BS_1 and BS_2 with path loss 4 and the threshold value -99 dB. Assume that 1.5m reference distance received power 50W and a handoff request is sent at position 0.8 km and 4.5 km. Show at which position the hand off will take place. [2]
3. Assume a FDD cellular system of 35 cells with a cell radius of 1.7 km. A total of 75 MHz of bandwidth is allocated which uses 15 KHz simplex channel. If there are 88 channel is dedicated to control channel and a reuse factor of $N = 9$. [3]
- a. What geographic area is covered by the system?
- b. How many traffic channels are there per cell?
- d. How many times the total frequencies are reused?

ID: _____

Full Marks: 10

- a) What do you mean by 0.5 Erlang? [1]

- b) Describe the effects of interference in channel? [1]

- c) Assume that a cellular system supports 350 channels and each user makes 1 call each 2 hours with average call duration of 1 minute, how many users can be supported for 0.5% probability of blocking in an Erlang B system for a cluster size of 7 cells. [3]

2. a) Determine the distance from the nearest co-channel cell for a cell having a radius of 0.6 km [1.5]
and shift parameters $i=2$ and $j=4$ in a regular hexagonal geometry pattern.

b) Determine the signal-to-co-channel interference ratio at the mobile receiver located at the [2]
boundary of its omnidirectional operating cell in a cellular system designed with $N = 7$ and $n=4$.

c) If signal-to-interference ratio of 15 dB is required for satisfactory forward channel [1.5]
performance of a cellular system, what is the co-channel reuse factor and cluster size that
should be used for maximum capacity if the path loss exponent is $n= 4$?

ID: _____

Full Marks: 10

- [3]

2. a) Determine the cluster size for a cellular system having distance of 5.5 km from the nearest co-channel cell for a cell and a radius of 0.6 km. [1.5]

b) Determine the signal-to-co-channel interference ratio at the mobile receiver located at the boundary of its omnidirectional operating cell in a cellular system designed with $N = 4$ and $n=3$. [2]

c) Consider the advanced mobile phone system in which an S/I ratio of 18 dB is required for the accepted voice quality. What should be the reuse factor for the system? Assume path loss exponent $n=4$. [1.5]

ID: _____

Full Marks: 10

1. a) How imperfect filter creates ACI problem? [1]
- b) When do we use Erlang-C chart? [1]
- c) Assume that a cellular system supports 100 channels and each user makes 2 call each 1 hour with average call duration of 2 minutes, how many users can be supported for 0.5% probability of blocking in an Erlang B system for a cluster size of 4 cells. [3]

2. a) Determine the cluster size for a cellular system having distance of 36 km from the nearest co-channel cell for a cell and a radius of 4 km. [1.5]

b) Determine the signal-to-co-channel interference ratio at the mobile receiver located at the boundary of its omnidirectional operating cell in a cellular system designed with $N = 3$ and $n=4$. [2]

c) Consider the advanced mobile phone system in which an S/I ratio of 17 dB is required for the accepted voice quality. What should be the reuse factor for the system? Assume path loss exponent $n=3$. [1.5]

ID: _____

Full Marks: 10

1. a) Do you prefer CCI low or high-why? [1]
- b) What do you mean by 1 Erlang? [1]
- c) Assume that the cellular system is an Erlang-B system with a total 360 channels and a cluster size of 9 cells. Assume that each user makes 6 call each 2 hours with average call duration of 2 minute and the desired probability of call blocking is 0.2%. [3]

2. a) Determine the distance from the nearest co-channel cell for a cell having a radius of 36 km [1.5]
and shift parameters $i=3$ and $j=3$ in a regular hexagonal geometry pattern.

b) Determine the signal-to-co-channel interference ratio at the mobile receiver located at the [2]
boundary of its omnidirectional operating cell in a cellular system designed with $N=9$ and $n=2$.

c) If signal-to-interference ratio of 12 dB is required for satisfactory forward channel [1.5]
performance of a cellular system, what is the co-channel reuse factor and cluster size that
should be used for maximum capacity if the path loss exponent is $n=3$?