

---

---

# King Fahd University of Petroleum & Minerals

## Department of Electrical Engineering EE577 Wireless and Personal Communications

Quiz Number 3 (May 22, 2006)

Time 20 minutes

Student name

ID#

---

---

### Question 1

A receiver uses polarization diversity in where a vertical antenna is used to receive vertically polarized signal, while a loop antenna is used to pick the horizontally polarized signal. When the vertical antenna is tilted  $60^\circ$  from the true vertical position, the combined signal at the output of the receiver is observed to degrade considerably. Can you figure out why this is happening?

### Question 2

A receiver housed in a motor vehicle uses a certain type of diversity. At fast mobile speeds the diversity system provides an excellent diversity gain. However, when the vehicle approaches traffic lights, it slows down and with it the system diversity gain also start to degrade. At the red traffic signal as the vehicle comes to a complete stop, the diversity system seems to collapse . What kind of diversity the receiver is using?

### Question 3

A DS-SS is operating at operating at 4.82 Megachips/sec. The signal is received using a four fingers rake receiver. Enumerate ways with which the finger signals may be combined to get gain over a single path receiver.

---

**Question 4**

In your opinion, which receiver, equalizer or a rake, will deliver higher output signal to noise ratio and why? Defend your answer giving a basis of your conclusion.

**Question 5**

Draw a typical format of a packet and describe the role of each field you have identified in the format.

---

**Question 6**

Enumerate the differences between the following modes of packet transmission:

- (a) ALOHA                      (b) Slotted ALOHA                      (c) p-persistent CSMA  
(d) PRMA

**Question 7**

In CSMA, the vulnerable time period is defined by two parameters - the transmitter attack time and transmitter hangtime. What are the differences between them?

---

**Question 8**

GSM system was developed by a consortium with members from the telecommunication operators of Europe. The GSM system was designed to meet certain technical criteria. What were the criteria?