4. Attempt any *two* of the following : **(2×10=20)**

(a) What are the different types of services offered by GSM ? Draw the architecture of GSM and explain each block.

(b) (i) Write down the forward and reverse link channels in detail for IS—95.

(ii) Discuss GSM traffic channels (TCH) and control channels (CCH).

(c) (i) Give a comparison between GSM, IS—95 and DECT on the basis of Modulation technique, Multiple Access technique and frequency of operation.

(ii) Assume that a GSM, an IS—95 and a US Digital Cellular (IS—136) base station transmit the same power over the same distance. Which system will provide the best SNR at mobile receiver ?

5. Attempt any *two* of the following : **(2×10=20)**

(a) What is UMTS ? Explain the working with reference to distributed data base and network reachability. What are the main objectives of 4G cellular systems ?

(b) What do you understand by IMT—2000 ? Discuss 3G system in brief.

(c) What do you understand by mobile Ad-Hoc network ? Why and how a proper route is required to discover in Ad-Hoc network ? Also mention various applications of Ad-Hoc networks. Explain triangular routing problem in Mobile IP.





(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2895 Roll No. | | | | | | | | | | |

## B. Tech.

(SEM. VIII) THEORY EXAMINATION 2011-12

## WIRELESS & MOBILE COMMUNICATION

*Time : 3 Hours* *Total Marks : 100*

**Note :** (1) Attempt **all** questions.

(2) Each question carries equal marks.

1. Attempt any ***four*** of the following : **(4×5=20)**

(a) Define Far-field (or Fraunhofer region) of Transmitting antenna. Find the far field distance for an antenna with maximum dimension of 1 m and operating frequency of 900 MHz.

(b) The speed of an aircraft is 500 Km/hr and it is heading towards the airport control tower at an elevation of 25°. The communication between the aircraft tower and the plane takes place at a frequency of approximately 128 MHz. What is the expected Doppler shift of the received signal in positive and negative direction ?

(c) A vehicle receives a 900 MHz transmission while travelling at a constant velocity for 10 s. The average fade duration for a signal level 10 dB below the rms level is 1 ms. How far does the vehicle travel during the 10s interval ? How many fades does the signal undergo at the rms threshold level during a 10s interval ? Assume that the local mean remains constant during travel.

(d) If the coherence bandwidth is calculated as 100 kHz in the given radio channel of 900 MHz frequency, calculate the maximum symbol rate that can be transmitted over this channel that will suffer minimal intersymbol interference.

(e) What are the different types of small scale fading ? Give a comparison between flat fading and frequency selective fading.

(f) Explain and derive different parameters of mobile multipath channels.

2. Attempt any ***four*** of the following : **(4×5=20)**

(a) What do you understand by equalization ? How equalization differs with diversity ?

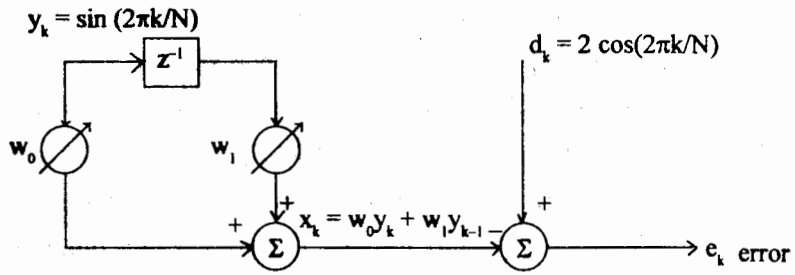
(b) What do you understand by RAKE receiver ? Explain the working of a M-branch RAKE receiver.

(c) What is near-far problem in CDMA wireless system ? What is done to combat this problem ?

(d) Consider the two tap adaptive equalizer shown in figure.

(i) Find an expression for MSE in terms of $w_0$, $w_1$ and N.

(ii) If N > 2, find the minimum MSE.




(e) Give a brief classification of speech coders. Explain the difference between waveform coder, source coders and hybrid coders.

(f) Explain code excited LPC in detail.



3. Attempt any ***two*** of the following : **(2×10=20)**

(a) (i) What is hand off ? With the help of received signal level plot, explain the difference between an improper and a proper hand off situation.

(ii) For the different cluster sizes N = 1, 3, 4, 7, 12 etc., find out the S/I ratio in dB for all the cases. Assume that all cells have equal radii and the base stations have equal power and are located at the centre of each cell.

(b) (i) What are the various techniques possible to improve coverage and capacity in cellular systems ? Show that the frequency reuse factor is given by K/S where K is the average number of channels per cell and S is the total number of channel available.

(ii) Assume that there are six co-channel cells in the first tier and all of them are at the same distance from the mobile. If an SIR of 12 dB is needed for satisfactory forward channel performance in a cellular system, what should be the optimum frequency reuse factor and cluster size if the path loss exponent is (a) n = 3 and (b) n = 4.

(c) A total of 24 MHz of Bandwidth is allocated to a particular FDD cellular telephone system that uses two 30 kHz simplex channel to provide full duplex voice and control channels. Assume each cell phone user generate 0.1 Erlangs of traffic. Assume Erlang B is used.

(i) Find the number of channel in each cell for a four cell reuse system.

(ii) If each cell is to offer capacity that is 90% of perfect scheduling, find the maximum number of users that can be supported per cell where omnidirectional antennas are used at each base station.