Reg. No. : | | | | | | | | | | |

Question Paper Code: 52231

M.E. DEGREE EXAMINATION, NOV 2016

Third Semester

Communication Systems

15PCM301 - WIRELESS COMMUNICATION ENGINEERING

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

(5 x 20 = 100 Marks)

1. (a) (i) Examine the NLOS multipath fading models. (15)

(ii) State the difference between small scale and large scale fading. (5)

Or

(b) Explain composite fading and link budget power design in details. (20)

2. (a) Explain the channel side information at transmitter and receiver in flat fading. (20)

Or

(b) Explain the capacity of frequency selectivity fading channels. (20)

3. (a) Explain transmitter diversity in detail:

(i) Channel known at transmitter. (10)

(ii) Alamouti scheme. (10)

Or

(b) Consider a cellular system where the power falloff with distance follows the formula $P_r(d) = P_t(d_0/d)\alpha$,where $d0$ = 100m and α is a random variable. The distribution for α is p (α = 2) = 0.4, $p(\alpha = 2.5) = 0.3$,$p(\alpha = 3) = 0.2$, and $p(\alpha = 4) = 0.1$ Assume a receiver at a distance d = 1000 m from the transmitter, with an average transmit power constraint of P_t= 100 mW and a receiver noise power of 1 mW. Assume both transmitter and receiver has CSI.

(i) Compute the distribution of the received SNR. (10)

(ii) Determine the maximum outage capacity per unit bandwidth of this channel.(10)

4. (a) Explain the advantage of multicarrier modulation. (20)

Or

(b) With case study explain the challenges in multicarrier modulation. (20)

5. (a) (i) Enumerate the significance of spatial multiplexing and BLAST architecture. (10)

(ii) Compare the features of STTC and STBC. (10)

Or

(b) (i) Consider a MIMO system where the channel gain matrix H is known at the transmitter and receiver. Show that if transmit and receive antennas are used for diversity then the optimal Weights at the transmitter and receiver lead to an SNR of _ = _MAX _, where is the largest Eigen value of HHH. (10)

(ii) Consider an M x M MIMO channel with ZMCSCG channel gains. Plot the ergodic capacity of this channel for M=1 and M=4 with $0 \leq \_ \leq 20$ dB and B=1MHz, assuming that both transmitter and receiver have CSI. Find the outage capacity for a 4x4 MIMIO channel with ZMCSCG elements at 10% outage for _=10 dB and B=1MHz. (10)