COURSE CODE: 12M1WEC432   MAX. MARKS: 35
COURSE NAME: Fundamentals of MIMO Systems
COURSE CREDITS: 3   MAX. TIME: 2 Hrs

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

Q1. (a) Perform decoupling of MIMO channel and find the maximum rate with which information is transmitted in MIMO stystem. (4)

    (b) Compute maximum capacity of given MIMO channel for three transmit and three receive antennas using optimal power allocation scheme. The given total transmit power (P)= -1.25 dB and noise power= 3 dB. (4)

$$\begin{bmatrix} 2 & -6 & 0 \\ 3 & 4 & 0 \\ 0 & 0 & 2 \end{bmatrix}$$

Q2. (a) Justify that Almouti code results in 3 dB loss in SNR in comparison to MRC. (2)

    (b) How cyclic prefix addition in OFDM affect the detection at the receiver for frequency selective channel? Also show cyclic prefix addition at the transmitter of OFDM system with an example. (4)

Q3. What do you understand by multicarrier transmission and how detection is performed in it? What is the bottleneck of multicarrier modulation system? (5)

Q4. (a) Why carrier offset and PAPR problem occur in MIMO-OFDM communication system and how they affect system performance? (4)

    (b) Find BER of OFDM system with L= 16 channel taps, subcarriers=256, and SNR= 35 dB. (2)

Q5. (a) Why it is difficult to implement MIMO in 2G cellular phones? (2)

    (b) Draw and explain schematic of MIMO-OFDM communication system (3)

Q6. (a) Explain puncturing technique employed in LTE. (2)

    (b) What are the requirements of 4G communication system? (3)