

Model Question Paper
Second Semester M. Tech Degree Examination in
Electronics and Communication Engineering
Stream: Telecommunication Engineering (2013 Scheme)
TTD 2011: Space time coding and MIMO system

Time: 3 hours

Max. Marks: 60

Instructions: *Answer any 2 questions from each module (Each Carries 10 Marks)*

Section I

1. a) Derive the expression for capacity of a frequency flat deterministic MIMO channel and compare the capacity with a SISO channel. (5)
b) Find the capacity of the MIMO system at 10dB SNR for
$$H = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$$
(5)
2. Explain the extended and iid channel models. (10)
3. a) Explain the various scattering functions in detail. (5)
b) Explain physical scattering models of SIMO, MISO and MIMO channels. (5)

Section II

4. a) Explain noise amplification in zero forcing receivers. (4)
b) Justify how noise enhancement is resolved in MMSE receivers. (6)
5. a) Derive the water filling algorithm. (5)
b) Consider the MIMO channel with

$$H = \begin{bmatrix} 2 & 3 \\ 1 & 3 \\ 4 & 2 \end{bmatrix}$$

Obtain:

- i) System Model (1)
 - ii) The transmit vector for zero forcing receiver. (4)
6. Explain transmit antenna diversity of MISO system for channel known and unknown at the transmitter. (10)

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Section III

7. Give a detail description about Alamouti code. (10)
8. Describe the Euclidean distance and determinant criteria for space time code design. (10)
9. a) Explain the radon theorem. (5)
b) Describe in detail the rank criteria for space time code design. (5)