Registration no: | | | | | | | | | | |

Total Number of Pages: 02 **M.TECH**

WCPC201

2nd Sem MTech Regular/ Back Examination – 2015-16

MIMO WIRELESS COMMUNICATION SYSTEMS

BRANCH(S): WCT

Time: 3 Hours

Max marks: 70

Q.CODE: W864

Answer Question No.1 which is compulsory and any five from the rest.

The figures in the right hand margin indicate marks.

Q1 Answer the following questions: (2 x 10)

a) How does MIMO system reduce and avoid interference in wireless networks?
b) define coherence bandwidth and coherence time.
c) Draw the optimal diversity-multiplexing trade-off curve and explain it..
d) Differentiate ergodic capacity and outage capacity.
e) How can the MIMO channel be represent in the Kronecker product form in a spatial correlation model?
f) Compare the capacity achieved in TDMA system with that of DPC system.
g) Explain the effect of singular value decomposition of the MIMO channel with perfect CSIT.
h) What is transmit diversity? Explain one example of open-loop spatial transmit diversity technique.
i) Write down any two advantages if space-time coding.
j) Explain the ML detection technique for uncoded signals.

Q2 a) How can a MIMO channel be converted into parallel, non-interfering channels? Find out the constant MIMO channel capacity. (6)

b) Explain the system models for MIMO BC and MIMO MAC channels. (4)

Q3 a) Find out the MIMO multiple-access channel capacity for a constant channel. Explain the capacity region of the MIMO MAC for $M_R=1$ (6)

b) Explain various methods of obtaining CSIT. (4)

Q4 What is the role of encoder and precoder in a MIMO transmitter? Explain the two encoder structures for the encoder block. (10)

Q5 Explain the precoding design criteria based on (i) information and system capacity, (ii) error exponent, and (iii) pairwise error probability (10)

Q6 Explain the maximum likelihood detection mechanism used in a 2 x 2 MIMO system using Alamouti model (10)

Q7 a) What are the criteria grouping used for precoding design criteria? Explain the optimal power allocation used for various precoder design criteria with perfect CSIT. (5)

b) Compare the performance of TDMA sub-optimal transmission scheme with DPC. (5)

Q8 Write short notes on any (5 x 2)

a) Waterfilling power allocation scheme
b) Sphere detection
c) Tanner graphs
d) Space time trellis code