

DAYANANDA SAGAR COLLEGE OF ENGINEERING
(An Autonomous Institute Affiliated to VTU, Belagavi)
 ShavigeMalleshwara Hills, Kumaraswamy Layout, Bengaluru-560078
Department of Telecommunication Engineering
Online Continuous Internal Assessment Test - I

Course: **MIMO Technologies**
 Course Code: **17TE7DCMTN**
 Semester: **VII - 'A' & 'B'**

Date: 06/10/2020
Maximum marks: 50
Duration: 90 Min

Note: Answer 5 full questions.		Marks
1	<p>a) Diversity techniques may exploit the ----- propagation, resulting in a diversity gain i) Single path ii) Multipath iii) Narrow path iv) Fading path</p> <p>b) In Diversity redundant -----code may be added and different parts of the message transmitted over different channels. i) BEC ii) FEC iii) CSI iv) CQI</p> <p>c) In -----Combiner, the first fully received and valid data packet will be immediately further processed, whereas the later arriving redundant packets will be immediately discarded after reception. i) Max-Ratio ii) Equal gain iii) Scanning/Switching iv) Selection</p> <p>d) Space diversity means using different physical paths for the signal, at a -----frequency. i) Multiple ii) Single iii) Co Channel iv) Orthogonal</p> <p>e) -----order means how many degrees of freedom u can have in your design. i) Rank ii) Selection iii) Diversity iv) Uplink/Downlink</p> <p>f) The data rate is directly proportional to the number of ----- i) Noise level ii) Frequency Level iii) Amplitude level iv) Signal levels</p> <p>g) Increasing the levels of a signal may ----- the reliability of the system i) Reduce ii) Increase iii) not effect iv) improve</p> <p>h) Maximum bit rate = $2 \times \text{Bandwidth} \times \log_2 V$ is Nyquist bit rate for ---- --(<i>V is the number of discrete levels in the signal</i>) i) Signaling Channel ii) Imperfect Channel iii) Perfect Channel iv) Noisy Channel</p> <p>i) Shannon's Capacity gives the theoretical maximum data rate or capacity of a ----- i) Signaling Channel ii) Imperfect Channel iii) Perfect Channel iv) Noisy Channel</p> <p>j) Information is an ----- in uncertainty or entropy. i) increase ii) decrease iii) same iv) no effect</p>	1x10
2	What are the multipath delay spread, Doppler spread, coherence time and coherence bandwidth of the channel	10
3	Evaluate the (ergodic) channel capacity for MIMO assuming that only the receiver has access to the channel state information.	10
4	Describe the coherent maximum likelihood receiver (make sure to give a	10

	block diagram) if the channel state information is available at the receiver.	
	(OR)	
5	What is the optimal decision rule at the receiver? What is the probability of error with selection combining?	05 05
6	Using the singular value decomposition, describe the equivalent representation with parallel channels for unequal transmitting and receiving antenna.	10
	(OR)	
7	Consider an $N_t \times 1$ MIMO system with quasi-static Rayleigh fading links and elaborate on optimal value of the number of active antennas? What is the resulting outage probability?	10

Faculty: Dr.SAYED ABDULHAYAN

No. of copies: 85