Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_\_

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**End Semester Examination – Nov/Dec – 2017**

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| **Code :** | **17EC3005** | **Duration :** | **3hrs** |
| **Sub. Name :** | **WIRELESS COMMUNICATION NETWORKS** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Explain the concepts of ray tracing mechanism for Two ray model in detail. | CO2 | 8 |
| b. | Derive the amplitude and phase distribution of small scale fading without dominant components. Include necessary equations and graphs | CO2 | 8 |
| c. | Under a free space path loss model, find the transmitted power required to obtain a received power of 1 dBm for a wireless system with isotropic antennas (*Gl* = 1) and a carrier frequency *f* = 5 GHz, assuming a distance *d* = 10*m*. | CO1 | 4 |
| (OR) | | | | |
| 2. | a. | Illustrate any three types of Empirical path loss models and its significance. | CO1 | 8 |
| b | Consider a two-path channel with impulse response . Find the distance separating the transmitter and receiver, as well as *α*1 and *α*2, assuming free space path loss on each path with a reflection coefficient of -1. Assume the transmitter and receiver are located 8 meters above the ground and the carrier frequency is 900 MHz. | CO1 | 7 |
| c | For the 10-ray model, assume the transmitter and receiver are in the middle of a street of width 20 m and are at the same height. The transmitter-receiver separation is 500 m. Find the delay spread for this model. | CO1 | 5 |
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| 3. | a. | Obtain the Shannon Capacity of a system model with transmitter and receiver CSI. and apply the optimal power allocations policy to maximize capacity. | CO3 | 10 |
|  | b. | Consider a time-invariant frequency-selective block fading channel consisting of three subchannels of bandwidth *B* = 1 MHz. The frequency response associated with each channel is *H*1 = 1, *H*2 = 2 and *H*3 = 3. The transmit power constraint is *P* = 10 mW and the noise PSD is *N*0 = 10*−*9 W/Hz. Find the Shannon capacity of this channel and the optimal power allocation that achieves this capacity. | CO3 | 10 |
| (OR) | | | | |
| 4. | a. | Develop a system model for Receiver diversity. Stress out the difference between array gain and diversity gain in the fading channel. | CO3 | 5 |
|  | b. | Elaborate the types of receiver diversity schemes with necessary diagram and equations. | CO3 | 15 |
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| 5. | a. | Find the equivalent parallel channel model for a MIMO channel with channel gain matrix. | CO4 | 10 |
|  | b. | What is a Hermitian Matrix? State the Properties of Unitary matrixes and its significance in MIMO system. | CO4 | 10 |
| (OR) | | | | |
| 6. | a. | Consider a MIMO channel with gain matrix    Find the capacity of this channel under beamforming assuming channel knowledge at the transmitter and receiver, *B* = 100 KHz, and *ρ* = 10 dB. | CO4 | 10 |
|  | b. | Discuss in detail on MIMO Channel with beamforming. | CO4 | 10 |
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| 7. | a. | Consider an FDMA system for multimedia data users. The modulation format requires 10 MHz of spectrum, and guard bands of 1 MHz are required on each side of the allocated spectrum to minimize out-of-band interference. What total bandwidth is required to support 100 simultaneous users in this system? | CO5 | 10 |
|  | b. | Describe any two types of multiple access techniques in multi user communications. | CO5 | 10 |
| (OR) | | | | |
| 8. | a. | Compare the packet transmission strategies in pure Aloha and Slotted Aloha schemes in Random access technique. | CO5 | 10 |
|  | b. | Describe the uplink and downlink Multiuser channels with neat sketch. | CO5 | 10 |
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|  | | **Compulsory:** |  |  |
| 9. | a. | Explain with block diagram of an LTE downlink/uplink transmitter in detail. | CO6 | 10 |
|  | b. | Illustrate the Physical layer procedure in 3G-LTE std. | CO6 | 10 |

ALL THE BEST