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



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **14EC2044** | **Duration :** | **3hrs** |
| **Sub. Name :** | **FUNDAMENTALS OF WIRELESS COMMUNICATION** | **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. | Discuss on evolution of wireless systems in chronological order. | CO1 | 15 |
| b. | Summarize on different methods of spectrum allocation for existing wireless systems. | CO1 | 5 |
| **(OR)** | | | | |
| 2. | a. | Elaborate on different standards of WLAN with its specifications. | CO1 | 14 |
| b. | Write briefly on multiple access techniques for spectrum sharing in communication systems. | CO1 | 6 |
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| 3. | a. | A cellular service provider decides to use a digital TDMA Scheme which can tolerate a SIR of 15dB in the worst case. Find out the optimal value of N for (a) omni-directional antennas (b) 1200 sectoring and (c) 600 sectoring. Should sectoring be used? If so, which sectoring should be used? Assume a path loss exponent n = 4 and consider trunking efficiency. | CO2 | 14 |
| b. | Describe on the prioritizing techniques for handoff. | CO2 | 6 |
| **(OR)** | | | | |
| 4. |  | Model the pathloss associated with signal in LOS path alone for a wireless environment and also model the pathloss associated with two ray model. | CO2 | 20 |
|  |  |  |  |  |
| 5. |  | Consider a set of empirical measurements of given in the table below for an indoor system at 900 MHz. Find the path loss exponent γ that minimizes the MSE between the simplified model and the empirical dB power measurements, assuming that and K is determined from the free-space path gain formula at this Find , the variance of log-normal shadowing about the mean path loss based on empirical measurements given below.   |  |  | | --- | --- | | **Distance from transmitter** | **M =** | | 10 m | -70 dB | | 20 m | -75 dB | | 50 m | -90 dB | | 100 m | -110 dB | | 300 m | -125 dB |   Also find the received power at 150 m for the simplified path-loss model with this path-loss exponent and a transmit power of 1 mW. | CO2 | 20 |
| **(OR)** | | | | |
| 6. | a. | Write short notes on simplified Path loss model. | CO2 | 5 |
| b. | Model the power fall of characteristic combining path loss and shadowing. Also describe its outage probability. | CO2 | 15 |
|  |  |  |  |  |
| 7. |  | With proper approximation deduce the time varying impulse response of the wireless channel. | CO2 | 20 |
| **(OR)** | | | | |
| 8. | a. | For a narrow band wireless channel, calculate the level crossing rate and average fade duration. | CO2 | 15 |
| b. | Consider a time-invariant indoor wireless channel with LOS component at delay 23 ns, a multipath component at delay 48 ns, and another multipath component at delay 67 ns. Find the delay spread assuming that the demodulator synchronizes to the LOS component. | CO2 | 5 |
|  | | **Compulsory**: |  |  |
| 9. |  | Based on information theory, define capacity of a wireless channel. Derive the expression to find the capacity of an AWGN channel. | CO3 | 20 |