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



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

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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. | Outline and put in order the review on the history of Wireless Systems. | CO1 | 15 |
| b. | Brief on Cordless Phones. | CO1 | 5 |
| (OR) | | | | |
| 2. | a. | Write down the advantage of wireless LAN over wired LAN. Explain wireless LAN in detailed | CO1 | 10 |
| b. | Find the round trip time delay of data sent between a satellite and the earth for LEO, MEO and GEO satellites assuming the speed of light 3 x 108 m/s. If the maximum acceptable delay for a voice system is 30 ms, which system would be acceptable for two-way communication? | CO1 | 10 |
|  |  |  |  |
| 3. | a. | Explain on any two methods for improving coverage and capacity in a cellular system. | CO2 | 12 |
|  | b. | Illustrate with diagram and write short notes on handoff scenarios at cell boundary during  i. Improper handoff scenario ii. Proper handoff scenario. | CO2 | 8 |
| (OR) | | | | |
| 4. | a. | If a signal to interference ratio of 15dB is required for satisfactory forward channel performance of a cellular system. What is the frequency reuse factor and cluster size that should be used for maximum capacity if the path loss exponent is i. n = 4, ii. n = 3? Assume that there are six co-channel cells in the first tier, and all of them are at the same distance from the mobile. Use suitable approximations | CO2 | 12 |
|  | b. | Brief of dwell time, cell dragging and significance of Δ in handoff. | CO2 | 8 |
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| 5. | a. | If a transmitter produces 50 W of power, express the transmit power in units of i. dBm and ii. dBW. If 50 W is applied to a unit gain antenna with a 900 MHz carrier frequency, find the received power in dBm at a free space distance of 100 m from the antenna. What is power received at 10km from the antenna Pr (10 Km)? Assume unity gain for receiver antenna. | CO2 | 10 |
|  | b. | Find the simplified multipath delay for a two-ray channel model, when transmitter and receiver separation is relatively large d = 100 m, with ht = 10m and hr = 4m. | CO2 | 10 |
| (OR) | | | | |
| 6. | a. | Deduct the equation of received signal based on free space path loss and add short notes. | CO2 | 14 |
|  | b. | Under the free space path loss model, find the transmit power required to obtain a received power of 1 dBm for a wireless system with isotropic antenna (Gl=1) and a carrier frequency f = 5 G Hz, assuming a distance d = 10 m | CO2 | 6 |
|  |  |  |  |  |
| 7. |  | 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 | | CO2 | 20 |
| (OR) | | | | |
| 8. |  | With proper approximation deduce the time varying impulse response of the channel. | CO3 | 20 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. |  | Derive the expressions and determine the capacity of an AWGN channel. | CO3 | 20 |

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