Automotive Communication Systems

AELZG513

Mid-Semester Exam: Regular Question Paper

[30 M]

Q.1 Set. (A) In order to mitigate the co-channel interference effects the signal received at a base station from another base station operating with same channel should be less than -100 dBm. Determine the distance between co-channel cells for seven-cell and four-cell frequency reuse patter. The received signal power at reference distance of 1 m is 2 mW. Assume path loss exponent as 3. [5]

Q.1 Set. (B) In order to mitigate the co-channel interference effects the signal received at a base station from another base station operating with same channel should be less than -100 dBm. Determine the distance between co-channel cells for seven-cell and four-cell frequency reuse patter. The received signal power at reference distance of 1 m is 2 mW. Assume path loss exponent as 4. [5]

Q.2 Set. (A) Determine the received signal power at distances 3 Km and 5 Km using exact two ray ground reflection model and compare with approximate model under valid assumptions. Assume the following paramters

i Power measured at reference distance $d_0 = 1$ Km is 1 μW.

ii $f = 1800$ MHz, $h_t = 40$ m, $h_r = 3$ m, and $G_t = G_r = 0$ dBi.

[7]

Q.2 Set. (B) Determine the received signal power at distances 3 Km and 5 Km using exact two ray ground reflection model and compare with approximate model under valid assumptions. Assume the following paramters

i Power measured at reference distance $d_0 = 1$ Km is 1 μW.

ii $f = 1800$ MHz, $h_t = 40$ m, $h_r = 3$ m, and $G_t = G_r = 3$ dBi.

[7]

Q.3 Set. (A) Illustrate the bus arbitration process for CAN nodes with message IDs 0x5B3, 0x5B4, and 0x5B2 [4]

Q.3 Set. (B) Illustrate the bus arbitration process for CAN nodes with message IDs 0x5B3, 0x5B0, and 0x5B2 [4]

Q.4 Set. (A) The distance of obstacle from transmitter and receiver respectively is 10 Km, and 2 Km. Determine height of the obstacle to achieve minimum diffraction loss. Assume the height of transmitter and receiver as 50 m and frequency as 900 MHz. [4]

Q.4 Set. (B) The distance of obstacle from transmitter and receiver respectively is 10 Km, and 2 Km. Determine height of the obstacle to achieve minimum diffraction loss. Assume the height of transmitter and receiver as 50 m and frequency as 1800 MHz. [4]

Q.5 Set. (A) Describe CAN protocol and its frame structure. [5]

Q.5 Set. (B) Describe LIN protocol and its frame structure. [5]

Q.6 Set. (A) Differentiate between DSRC, and C-V2X vehicular communication stanfards. [5]

Q.5 Set. (B) Describe the different techniques employed for improving the cellular capacity. [5]