**SRM Institute of Science and Technology**
**College of Engineering and Technology**
**DEPARTMENT OF ECE**

**SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu**

**Academic Year: 2023-24 (Odd)**

**Question Bank:** Unit 3
**Course Code & Title:**18ECC301T - Wireless Communications Year & Sem: VII

| | 18ECC301T - Wireless Communication | Program Outcomes (POs) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Graduate Attributes | | | | | | | | | | | | PSO | | |
| COs | Course Outcomes (COs) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| CO-1 | Interpret the concepts of Wireless communication and basic cellular networks | 3 | - | - | 3 | - | - | - | - | - | - | - | 2 | - | - | - |
| CO-2 | Analyze different Radio wave propagation models for cellular communication | - | 3 | - | 3 | - | - | - | - | - | - | - | - | - | - | 3 |
| CO-3 | Apply different multipath propagation channel models in wireless systems | - | 3 | 3 | - | - | - | - | - | - | - | - | - | - | - | 2 |
| CO-4 | Illustrate the Link performance improvement techniques | - | 3 | - | - | - | - | 2 | - | - | - | - | - | - | - | 3 |
| CO-5 | Summarize different wireless communication standards and systems | - | - | 2 | - | - | 2 | - | - | - | - | - | - | 2 | - | - |

| | 18ECC301T - Wireless Communication | Student Outcomes (SOs) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Graduate Attributes | | | | | | | PSO | | |
| COs | Course Outcomes (COs) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 |
| CO-1 | Interpret the concepts of Wireless communication and basic cellular networks | 3 | - | - | - | - | 3 | 2 | - | - | - |
| CO-2 | Analyze different Radio wave propagation models for cellular communication | 3 | - | - | - | - | 3 | - | - | - | 3 |
| CO-3 | Apply different multipath propagation channel models in wireless systems | 3 | 3 | - | - | - | - | - | - | - | 2 |
| CO-4 | Illustrate the Link performance improvement techniques | 3 | - | - | 2 | - | - | - | - | - | 3 |
| CO-5 | Summarize different wireless communication standards and systems | - | 2 | - | 2 | - | - | - | 2 | - | - |

## UNIT III

## MOBILE RADIO WAVE PROPAGATION (SMALL SCALE FADING)

### PART – B

| S.No | Answer ALL Questions | CO | BL | PO |
|---|---|---|---|---|
| 1 | Discuss the various factors influencing small scale fading. | 3 | 2 | 2 |
| 2 | Draw the receiver block diagram of Direct RF Pulse small scale fading measurement system. | 3 | 2 | 2 |
| 3 | Consider a transmitter which radiates a sinusoidal carrier frequency of 1850 MHz For a vehicle moving at 60 mph, compute the received carrier frequency if the mobile is moving (a) directly towards the transmitter, (b) directly away from the transmitter. | 3 | 3 | 3 |
| 4 | Brief about the frequency domain channel sounding technique with illustration. | 3 | 2 | 2 |
| 5 | Compare fast and slow fading of multipath channel. | 3 | 2 | 2 |
| 6 | Differentiate the fading types based on Multipath Delay Spread and Doppler Spread. | 3 | 2 | 2 |
| 7 | With neat schematic diagram depict the different types of small scale fading. | 3 | 2 | 2 |
| 8 | List the advantages and disadvantages of spread spectrum correlator multipath measurement method. | 3 | 2 | 2 |
| 9 | Enumerate the Direct RF pulse measurement process of mobile multipath channel. | 3 | 2 | 2 |
| 10 | What is the significance of Rayleigh fading and how is it derived from Ricean distribution? | 3 | 2 | 2 |

| | | | | |
|---|---|---|---|---|
| 11 | Define Coherence Bandwidth and Coherence time. | 3 | 2 | 2 |
| 12 | Briefly discuss the Ricean fading distribution. | 3 | 2 | 2 |
| 13 | Calculate the time delay bin width of wireless channel having maximum excess delay of 50μs and 32 multipath bins. | 3 | 3 | 3 |
| 14 | Mention the advantages and disadvantages of spread spectrum sliding correlator channel sounding. | 3 | 2 | 2 |
| 15 | Draw the block diagram of spread spectrum channel impulse response measurement system. | 3 | 2 | 2 |

**PART – C**

| S. No | Answer ALL Questions | CO | BL | PO |
|---|---|---|---|---|
| 1 | Explain the impulse response of mobile multipath channel and hence derive the expression for the received power. | 3 | 2 | 2 |
| 2 | (i) Discuss the fading types based on multipath time delay spread.<br>(ii) Consider a mobile user moving with a velocity of 500kmph at carrier frequency 128MHz and an angle of 25˚. Calculate the Doppler shift**.** | 3 | 2,4 | 3 |
| 3 | (i) The speed of an aircraft is 500 Km/hr and it is heading towards the airport control tower at an elevation of 45º. The communication between the aircraft tower and the plane takes place at a frequency of approximately 128 MHz. Calculate the expected Doppler shift of the received signal?<br>(ii) With neat diagram discuss the spread spectrum channel sounding technique. | 3 | 2.4 | 3 |
| 4 | (i) Discuss in detail the various parameters of mobile multipath fading channel(8)<br>(ii) Compare flat and frequency selective fading (4). | 3 | 2 | 2 |
| 5 | i. Compare fast and slow small scale fading (4).<br>ii. Consider an L=5 component multipath wireless with components arriving at 0μs, 2μs, 3μs, 6μs, 8μs and respective powers of components as -10dB, -20dB, 0dB, -10dB and -20dB respectively. What is the maximum and RMS delay spread of the wireless channel? | 3 | 2,3 | 2,3 |
| 6 | Discuss in detail with neat block diagrams the following small-scale multipath measurements (i) Direct RF pulse system (ii) Frequency Domain Channel Sounding. | 3 | 2 | 2 |
| 7 | Explain the factors influencing small scale fading and discuss in detail about the types of fading. | 3 | 2 | 2 |
| 8 | Discuss in detail with neat block diagrams the following small-scale multipath measurements (i) Direct RF pulse system (ii) Spread Spectrum Sliding Correlator Sounding | 3 | 2 | 2 |
| 9 | Discuss the following<br>(i) Fading types based on Doppler spread.<br>(ii) Time dispersion parameters of mobile multipath channel. | 3 | 2 | 2 |
| 10 | (i) Discuss in detail with neat block diagram the Spread Spectrum Sliding Correlator Sounding technique.<br>(ii) Consider an L=2 component multipath wireless with components arriving at 0μs, 2μs and respective powers of components as -10dB, 10dB respectively. What is the rms delay spread of the wireless channel? | 3 | 2,3 | 2,3 |