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Question Paper Code: U6401

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2025

Sixth Semester

Electronics and Communication Engineering

21UEC601- WIRELESS COMMUNICATION

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5Marks)

- Which of the following is/are the main part(s) of basic cellular system? CO1-U
(a) A mobile Unit (b) A cell Site
(c) A mobile Telephone Switching Office (d) All of the above
- Free space loss depends on carrier frequency and distance, while the rooftop- to -street diffraction loss depends on _____. CO1-U
(a) Width of the street (b) height of the wall
(c) Orientation (d) All the above
- In FHSS, the sender and the receiver have privacy if the hopping period is _____. CO1-U
(a) short (b) Long (c) zero (d) infinity
- Diversity technique is applied at _____. CO1-U
(a) Base station (b) Mobile receiver
(c) Base station & Mobile receiver (d) None of the above
- 5G is used across three main types of connected services, including _____. CO1-U
(a) Massive IoT (b) Mission-critical communications
(c) Enhanced mobile broadband (d) all of the above

PART – B (5 x 3= 15 Marks)

6. Consider that a service operator has a total of 700 duplex channels available for use. If he allots each cell 100 unique channels, then distribution to 7 different cells will be possible. Now suppose the service provider reuses his channels at least 50 different times, then capacity will be? CO2-App
7. Calculate the Brewster angle θ_B for a wave impinging on poor ground having a permittivity $\epsilon_r=4$ at the frequency of 100 MHz. Also calculate the same for typical ground with permittivity of $\epsilon_r=15$. CO3-APP
8. What is the minimum number of bits in a PN sequence if we use FHSS with a channel bandwidth of $B =4$ KHz and $B_{ss} =100$ KHz? CO3-App
9. Compare linear equalizers and non-linear equalizers. CO1-U
10. What is cognitive radio in 5G? CO1-U

PART – C (5 x 16= 80 Marks)

11. (a) Explain how the channel is assigned to the cellular system and elaborate its methods. CO1-U (16)
- Or
- (b) (i) Explain about noise and interference limited system. (8m) CO1-U (16)
(ii) Explain sectoring, cell splitting and micro zone cell concept. (8m)
12. (a) (i) Explain RMS delay spread, Maximum excess delay, Mean Excess delay and Coherence Bandwidth. (8m) CO1-U (16)
(ii) Derive the electric field generated in total for the free space propagation model (8m)
- Or
- (b) Explain the parameters of mobile multipath channels in detail. CO1-U (16)
13. (a) What is QPSK? Derive the bit error probability of QPSK and also explain the constellation diagram of it. CO1-U (16)
- Or
- (b) Explain Direct sequence Spread spectrum in detail CO1-U (16)

14. (a) Let an RX be connected to two antennas, for which the SNRs are independent and exponentially distributed using the same average SNR. RSSI-driven selection diversity is employed and the outage probability is P_{out} . We are interested in the fading margin. CO4-App (16)
- (a) Derive an expression in terms of P_{out} for the fading margin when only one antenna is used. (6 Marks)
- (b) Derive an expression in terms of P_{out} for the fading margin when both antennas are used. (6 Marks)
- (c) Use the two results above to calculate the diversity gain for an outage probability of 1%. (4 Marks)
- Or
- (b) Design an LMS equalizer in detail, the output of an equalizer should be a Nyquist pulse for a single symbol case. CO4-App (16)
15. (a) Illustrate the technology used in Bluetooth and IEEE 802.15.5. CO1-U (16)
- Or
- (b) How the Millimeter Wave Technology in 5G does varies from Microwave technology? CO1-U (16)

