**C**    **Reg. No. :** ☐☐☐☐☐☐☐☐☐☐☐☐

## Question Paper Code: U6401

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2024

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)

1. 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

2. Free space loss depends on carrier frequency and distance, while the          CO1-U
   rooftop- to -street diffraction loss depends on_____.

   (a) Width of the street                     (b) height of the wall

   (c) Orientation                            (d) All the above

3. In FHSS, the sender and the receiver have privacy if the hoping period          CO1-U
   is_____.

   (a) short          (b) Long          (c) zero          (d) infinity

4. Diversity technique is applied at _____          CO1-U

   (a) Base station                          (b) Mobile receiver

   (c) Base station & Mobile receiver          (d) None of the above

5. 5G is used across three main types of connected services,          CO1-U
   including_____.

   (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 $\theta_B$ for a wave impinging on poor ground having a permittivity $\varepsilon_r=4$ at the frequency of 100 MHz. Also calculate the same for typical ground with permittivity of $\varepsilon_r=15$.                     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 Bss =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)

**U6401**

14. (a) Let an RX be connected to two antennas, for which the SNRs are     CO4-App     (16)
        independent and exponentially distributed using the same average
        SNR. RSSI-driven selection diversity is employed and the outage
        probability is Pout. We are interested in the fading margin.
        (a) Derive an expression in terms of Pout for the fading margin
        when only one antenna is used.                    (6 Marks)
        (b) Derive an expression in terms of Pout 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     CO4-App     (16)
        should be a Nyquist pulse for a single symbol case.

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     CO1-U     (16)
        Microwave technology?

**U6401**

**U6401**