B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

February / March 2023 Semester End Main Examinations

Programme: B.E.
Semester: VII

Branch: Electronics & Telecommunication Engineering
Duration: 3 hrs.

Course Code: 19ET7PCWCM
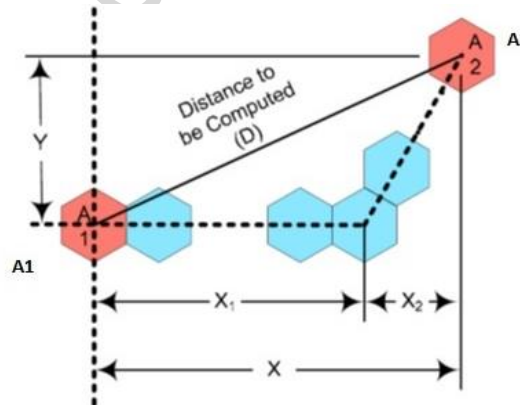**Max Marks:** 100

Course: Wireless Communication
Date: 20.02.2023

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) Explain the channel assignment strategies for efficient utilization of the radio spectrum **08**

b) A spectrum of 30 MHz is allocated to a wireless FDD cellular system which uses two 25 KHz simplex channels to provide full duplex voice and control channels. Compute the number of channels available per cell if a system uses **06**

    (a) four-cell re use

    (b) Seven cell reuse

  Comment on the capacity of the system with increase in the frequency reuse

c) Derive the relationship between D and the cell radius R if the cluster size is N. **06**

OR

2 a) Define Handoff. Illustrate with a neat diagram, handoff scenario at cell boundary **08**

b) Given a cellular system in which there are a total of 1000 radio channels available for handling traffic. It is also given that the area of a cell is $6km^2$ and the area of the entire system is $2100km^2$ **06**

    (1) Calculate the system capacity if N=7.

    (2) How many times would the cluster of size 4 have to be replicated in order to approximately cover the entire cellular area?

    (3) Calculate the system capacity if N=4.
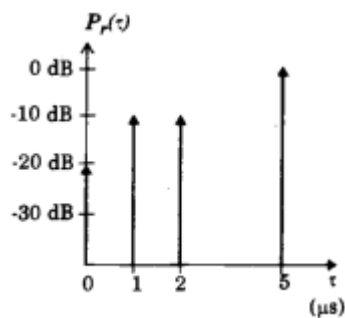
	c)	Analyse the near far effect under 2 different scenarios with a neat diagram, suitable justification and solution to overcome the effect	**06**

UNIT - II

3	a)	With necessary equations, explain two ray ground reflection model.	**08**
	b)	If a transmitter produces 70W of power, express the transmit power in units of (a) dBm (b) dBw. If 70W is applied to an unity gain antenna with a 900MHz carrier frequency, determine the received power in dBm at a free space distance of 200m from the antenna. What is Pr(100km)? Assume unity gain for the receiver antenna	**06**
	c)	Briefly discuss the most widely used model for signal prediction in urban area	**06**

UNIT - III

4	a)	Explain the factors that influence small scale fading	**08**
	b)	Discuss the types of fading due to multipath delay spread with necessary equations and waveforms	**06**
	c)	Calculate the mean excess delay, rms delay spread, and the maximum excess delay (10 dB) for the multipath profile given in the figure below. Estimate the 50% coherence bandwidth of the channel. Would this channel be suitable for AMPS or GSM service without the use of an equalizer	**06**

$P_r(\tau)$

```
 0 dB ┤                    ↑
       │
-10 dB ┤      ↑     ↑
       │
-20 dB ┤
       │
-30 dB ┤
       │
       └──┬──┬──┬────┬──→ τ
          0  1  2    5   (µs)
```

OR

5	a)	Discuss the need for diversity technique and practical Space diversity considerations with a generalized block diagram of Space Diversity	**08**
	b)	Define Coherence bandwidth and briefly describe the significance of 50% coherence bandwidth	**06**
	c)	Discuss the operating modes of an adaptive equalizer	**06**

UNIT - IV

6	a)	Briefly explain the architecture of GSM with a neat diagram	**08**
	b)	Illustrate with a neat diagram, the structure of a time slot in GSM	**06**
	c)	Illustrate with a timing diagram, Overlapping bursts assuming uncompensated propagation delay	**06**

UNIT - V

7	a)	Discuss the principle of OFDMA with a neat diagram. How does it differ from traditional Frequency Division Multiplexing (FDM)?	**10**
	b)	With a neat diagram, explain the evolution of system architecture from GSM and UMTS to LTE	**10**

******