



P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belagavi)
Seventh Semester, B.E. - Electronics and Communication Engineering
Semester End Examination; February - 2022
Fundamentals of Wireless Communication

Time: 3 hrs

Max. Marks: 100

Course Outcomes

The Students will be able to:

CO1: Apply signal processing for wireless communication system to understand basic principles of wireless communication.

CO2: Analyze various standards and methodologies to improve the cellular capacity.

CO3: Apply communication system to interpret multiple access techniques and capacity in cellular system.

CO4: Apply fundamentals of cellular communication system to understand handoff, roaming strategies and various wireless systems, standards and mobile radio propagation.

CO5: Design and analyze a cellular system for various parameters like capacity, interference, handoff, radio propagation etc.

Note: I) PART - A is compulsory. Two marks for each question.

II) PART - B: Answer any **Two** sub questions (from a, b, c) for Maximum of **18 marks** from each unit.

Q. No.	Questions	Marks	BLs	COs	POs
I : PART - A		10			
I a.	Name the different types of mobile radio transmission systems.	2	L1	CO1	PO1
b.	What do you mean by guard channel concept and mention its disadvantage.	2	L1	CO2	PO1
c.	Write the constellation diagram of M-ray QAM signals.	2	L2	CO3	PO1
d.	If a US AMPS cellular operator is allocated 12.5 MHz for each simplex band and if B_t is 12.5 MHz, B_{guard} is 10 kHz and B_c is 30 kHz. Find the number of channels available in an FDMA system.	2	L2	CO4	PO1
e.	Find the far field distance for an antenna with maximum dimension of 1.5 m and operating frequency 1000 MHz.	2	L2	CO5	PO1
II : PART - B		90			
UNIT - I		18			
1 a.	Explain the block diagram of cellular systems and discuss the difference between wireless and fixed telephone networks.	9	L2	CO1	PO1
b.	Explain the concept of Bluetooth and Personal Area Networks (PAN).	9	L2	CO1	PO1
c.	Explain the wireless local area network IEEE 802.11 wireless LAN standard.	9	L2	CO1	PO1
UNIT - II		18			
2 a.	Explain the frequency reuse concept and discuss the method of locating cochannel cells in a cellular system.	9	L4	CO5	PO2
b.	Explain the handoff strategies and also discuss improper and proper handoff situations.	9	L3	CO5	PO2
c.	Explain the concept of cell splitting and cell sectoring with suitable diagram.	9	L3	CO5	PO2

UNIT - III**18**

- 3 a. Explain GSM system architecture with block diagram. 9 L3 CO2 PO2
- b. Explain the MPSK modulation with related equations and constellation diagram for 8-PSK. 9 L3 CO2 PO2
- c. Describe the working of direct sequence spread spectrum systems. 9 L2 CO2 PO2

UNIT - IV**18**

- 4 a. Explain the TDMA hyper frame structure with diagram in detail. 9 L2 CO3 PO1
- b. Explain the features of FDMA and nonlinear effects in FDMA. 9 L2 CO3 PO1
- c. Explain the packet radio access techniques and its protocols with suitable diagram. 9 L2 CO3 PO1

UNIT - V**18**

- 5 a. Assume a receiver is located 10 km from a 50 W transmitter. The carrier frequency is 900 MHz, free space propagation is assumed $G_t = 1$ and $G_r = 2$. Find;
- i) The power at the receiver 9 L3 CO4 PO2
- ii) The magnitude of the E field at the receiver antenna
- iii) The rms voltage applied to the receiver input assuming that the receiver antenna has a purely real impedance of 50Ω and is matched to the receiver.
- b. A mobile is located 5 km away from the station and uses vertical $\lambda/4$ monopole antenna with a gain of 2.55 dB to receive cellular radio signals. The E field at 1 km from the transmitter is measured to be 10^{-3} V/m. The carrier frequency used for this system is 900 MHz. 9 L4 CO4 PO2
- i) Find the length and the effective aperture of the receiving antenna.
- ii) Find the received power at the mobile using the two ray ground reflection model assuming the height of the transmitting antenna is 50 m and the receiving antenna is 1.5 m above ground.
- c. Explain the types of fading and fading effect due to multipath time delay spread and Doppler spread in brief. 9 L2 CO4 PO1

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