Question Paper

Exam Date & Time: 17-May-2022 (10:00 AM - 01:00 PM)

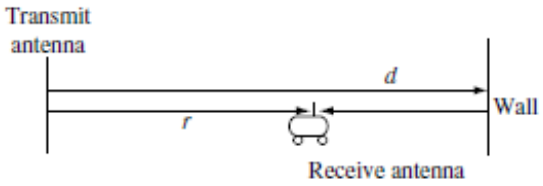
MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

SIXTH SEMESTER B.TECH END SEMESTER EXAMINATIONS, MAY 2022.

WIRELESS COMMUNICATION AND COMPUTING [ICT 3272]

Marks: 50 **Duration: 180 mins.**

Instructions to Candidates:
Answer ALL questions.
Missing data, if any, may be suitably assumed.

1)	A)	Explain the slow frequency hop spread spectrum (FHSS) method. Consider a scenario where data symbols are defined with 4FSK modulation with Δf as message bandwidth, and a 2-bit PN sequence generator used is generating a pattern of 1 0 0 1 1 1 0 0 repeatedly. Draw the slow FHSS pattern for a 4FSK symbol duration = 2.5 x Tc for the input data bit pattern 0 0 0 1 0 1 1 0 1 1 0 0 0 1 1 1 1 0 0 1 0.	(5)
	B)	Draw a neat diagram of GSM system architecture and explain the components of network subsystem.	(3)
	C)	Explain the concept of direct Sequence Spread Spectrum (DSSS).	(2)
2)	A)	A cellular service provider decides to use a TDMA scheme that can tolerate a signal-to-interference ratio of 16 dB in worst case. Find the optimum value of cluster size N in case of [Assuming n = 4] a. Omnidirectional antenna b. 120-degree sectoring c. 60-degree sectoring d. Which sectoring will be better, 60^{o} or 120^{o}? e. What are the advantages of sectoring?	(5)
	B)	Consider a handset located at a fixed distance 'r' from the base station (assume the handset location is standstill) and is near a reflecting surface as shown in Figure Q. 2B. Derive the channel model and obtain the expression for the Doppler shift.  Figure Q. 2B	(3)
	C)	Write the difference between cordless and pager.	(2)
3)		With representative diagrams, explain different methods used in wireless signal propagation.	(5)

	A)		
	B)	Explain the attachment procedure of mobile station to serving GPRS support node in a general packet radio system.	(3)
	C)	Explain the concept of Frequency Division Multiple Access and Time Division Multiple Access.	(2)
4)		Illustrate the solution to *count to infinity* problem with a suitable example.	(5)
	A)		
	B)	Consider a base station transmitting to a mobile station in free space. The following parameters relate to this communication system: Distance between the base station and mobile station: 8000 m. Transmitter frequency: 2 GHz. The base station transmitting power, Pt = 20 Watts. Total system losses: 5 dB. Mobile receiver noise figure Nf = 2 dB. Mobile receiver antenna temperature = 290 K Mobile receiver bandwidth Bw = 1.25 MHz. Antenna gains are 8 dB and 0 dB for the base station and mobile station, respectively. Antenna height at the base station and mobile station is 20 m and 3 m, respectively. Calculate the received signal power at the mobile receiver antenna and the signal-to-noise ratio (SNR) of the received signal.	(3)
	C)	How does the management layer of *cellular digital packet data* handle the radio resources?	(2)
5)		How antenna diversity helps in improving the effectiveness signal transmission and reception in wireless communication. Explain the following diversity concepts along with the channel capacity achieved for an assumed SNR.	(5)
	A)	a. SIMO b. MISO	
	B)	Write the stepwise mobile call establishment procedure in the cellular network.	(3)
	C)	What are the economic guidelines to be followed while designing the wireless communication system?	(2)

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