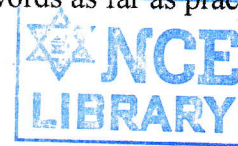


Exam.	Back		
Level	BE	Full Marks	80
Programme	BEI	Pass Marks	32
Year / Part	IV / I	Time	3 hrs.

Subject: - Wireless Communication (EX 715)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.



1. Compare and contrast third and fourth generation of mobile communication standards in terms of technology advancement. [4]
2. a) An urban area has a population of two million residents. System A has 394 cells with 19 channels each. Find the number of users that can be supported at 2% blocking if each user average two calls per hour at average call duration of three minutes. Assuming that trunk systems are operated at maximum capacity, compute the percentage market penetration of cellular provider. [5]
b) Why we need microcell zone concept? Explain microcell zone concept in brief. [3]
3. a) Describe briefly the types of small scale fading in radio propagation. Explain the factors which influences small scale fading. [4+4]
b) Assume free space propagation, a receiver is located 10 km away from a 50 w transmitter. The carrier frequency is 900 MHz. antenna gain at transmitter and receiver are 1 and 2 respectively, find: [8]
 - i) The power received at the receiver
 - ii) The magnitude of E-field at the receiver antenna
 - iii) The power flux density
 - iv) The rms voltage applied to the receiver input.

The receiver antenna has a purely real impedance of 50Ω and is matched to the receiver.
4. How can Minimum Shift Keying (MSK) be defined as a special type of continuous phase FSK and Orthogonal Quadrature Phase Shift Keying (OQPSK)? Compare OQPSK, MSK and GMSK in terms of their bandwidth efficiency and power efficiency. Which of them are suitable for modulation in GSM and Why? [3+3+2]
5. Why Equalization and diversity are needed in wireless communication systems? List out different diversity reception methods used for space diversity. Explain any one of them. [3+3+2]
6. What are the characteristics of speech signal? Explain about Linear Predictive Coders (LPC) with neat block diagram. [2+6]
7. a) Explain the non-linear effect in FDMA. If the total spectrum allocation is 25 MHz, the guard band allocated at the edge of the spectrum is 100 KHz, and the channel bandwidth is 200 KHz. Find the number of channels available in an FDMA system. [3+2]
b) Explain the Frequency Hopped Multiple Access (FHMA) technique using its transmitter and receiver blocks. [7]
8. Explain the operation of each component in GSM architecture. [8]
9. Write short notes on: (Any Two) [2×4]
 - a) CDMA design considerations
 - b) Regulatory issues in wireless communication
 - c) Interference in wireless/mobile communication

TRIBHUVAN UNIVERSITY
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Year / Part	IV / I	Time	3 hrs.

Subject: - Wireless Communication (EX 715)

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1. Define forward and reverse channel. How 5G will be different from 4G mobile communication. [2+2]
2. Define Grade of Service (GoS) and explain how can it be measured in a 'blocked call cleared' type of trunking system. A cellular service provider decides to use a digital TDMA scheme that can tolerate a signal-to-interference ratio of 15 dB in the worst case. The mobile radio channel provided a propagation path loss exponent of $n = 3$. Find the optimal value of N for (a) Omni-directional antennas, (b) 1200 sectoring, and (c) 60° sectoring. Comment on your results. [3+5]
3. a) What do you mean by diffraction in radio wave propagation? Derive an expression for phase difference in Fresnel Zone Geometry model of direction. [2+6]
- b) In mobile propagation in a cellular system, find the correction factor and pathloss for a medium size city assuming carrier frequency as 950 MHz, height of transmitting antenna at base station is 45 m, propagation distance between antennas is 10 km and height of receiving antenna in mobile station is 5 m. Compute free space pathloss and compare it with Hata pathloss. [4+4]
4. Mention advantages of digital modulation over analog modulation. Explain the transmission and detection process of GMSK modulation scheme with block diagram and constellation diagram. [2+6]
5. Determine the optimal solution of the weights using MSE algorithm with its appropriate diagram and derivation. [8]
6. What are the characteristics of speech signal? Explain the operation of linear predictive coder. [3+5]
7. a) What do you understand by CDMA? Mention its characteristics, advantages and limitations. [2+6]
- b) Explain working of frequency Hopping Multiple Access with an example. [4]
8. Draw and explain the global System for Mobile (GSM) architecture in brief. [8]
9. Write short notes on: (Any Two) [2×4]
 - a) Practical handoff considerations
 - b) RAKE receiver
 - c) Spectrum regulations
