Final Examination	Semester: First Semester
Duration: 3 Hours	Full Marks: 60
Course Code: PMIT 6217	Course Title: Wireless Network

Do not write anything on the question paper.
There are 7 **(Seven)** questions. Answer any 5 **(Five)** of them.
Figures in the right margin indicate marks.

1. a) "There is continuous flow of energy from electrical field to the magnetic field." Explain the statement   4

   b) "FDMA wastes bandwidth", How? Explain. Do you agree "TDMA is a complimentary access technique to FDMA"? If you agree then show your logic.   4

   c) Mention some open research topics and explain two of them   4

2. a) Explain **IrDA and Zigbee** technologies   4

   b) Access points can serve a varying number of computers using DHCP.   4

   c) In the GSM800 digital channelized cellular system, the one-way bandwidth of the system is 12.5 MHz. The RF channel spacing is 200 kHZ. Eight users share each RF channel and three channels per cell are used for control channels. Calculate the spectral efficiency of modulation (for a dense metropolitan area with small cells) using the following parameters: 4
      - Area of a cell=8 km^2
      - Total coverage area =4000km^2
      - Average number of calls per user during the busy hour= 1.2
      - Average holding time of a call=100 seconds
      - Call blocking probability=3%
      - Frequency reuse factor=7

3. a) Hand-off Provides continuity of communication across cells. Explain the statement. Why should we provide a higher priority to handoff calls?   4

   b) Explain Spread spectrum multiple access (SSMA). When a user will experience "near-far" problem for SSMA? How can it be mitigated?   4

   c) Define Cell Capacity of a TDMA System. Now calculate the capacity and spectral efficiency of a TDMA system using the following parameters: bandwidth efficiency factor η_b= 0.9, bit efficiency (with QPSK) μ=2, voice activity factor v_f=1.0, one-way system bandwidth B_w =12.5 MHz, information bit rate R =16.2 kbps, and frequency reuse factor N = 19.   4

4. a) What is **linear-feedback shift register?** Draw a 4-bit Fibonacci LFSR.   4

   b) Draw the Flow Chart of CSMA/CD-Algorithm   4

   c) OFDM offers many advantages over single-carrier modulations. mention those advantages   4

5. a) Show the graph for the probability that a transmitted bit is received in error at the receiver—versus the SNR for three different modulation techniques BPSK QAM16 and QAM 256

    b) What do you mean by Multipath propagation? How does it cause harmful interference to the signal? Explain with generating environment for urban area. 4

    c) Explain frequency reuse pattern. For a hexagonal geometry, evaluate the co-channel reuse ratio is: $q = \sqrt{3N}$. 4

6. a) "Hybrid **Modulation** systems exist where two characteristics are changed with each new symbol transmitted" Explain with example 4

    b) Draw a baseband OFDM transmission model. Proof the statement "When integrating received power over one symbol period, T_U, the output of the correlators is zero for any combination, except when $k = q$" 4

    c) If a normal GS time slot consists of 6 trailing bits, 825 guard bits, 26 training bits, and 2 traffic bursts of 58 bits of data, find the frame efficiency 4

7. a) Calculate S/I ratio for Worst case scenario in three sectors when cluster size N=7 and N=12 4

    b) A city has total population of 5,00,000. A network planar found the behavior of users of the city like: they generate 3 calls/hour with average holding time of 2 minutes. The service provider got the license of BW that can support 36 carriers of GSM. Determine number of sectors of 3/9 cell pattern maintaining GoS of 5%. 4

    c) Explain the Destination-Sequenced Distance Vector (DSDV) Packet Process Algorithm with example. 4