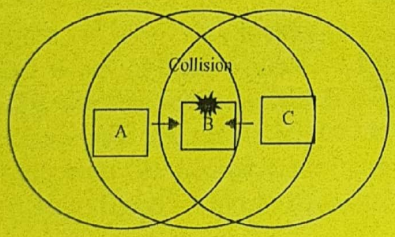
Institute of Information Technology
Jahangirnagar University
Professional Masters in IT

1st Trimester Final Examination, Fall 2019 | **Intake: Fall 2019 & Summer 2019**
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) Mention Wireless Link Characteristics which indicate the important differences from wired link 3
   b) "Three alternative transmission techniques are used for infrared data transmission". Mention those transmission techniques and Explain one of them 3
   c) "To reduce the packet dropping probability or to enhance throughput of wireless LAN exponential binary backoff algorithm is widely used". Explain the algorithm 6

2. a) Explain Linear-Feedback Shift Register. Now draw a 4-bit Fibonacci LFSR with its state diagram. 5
   b) Mention and explain the problem that causes collision at node B. 5



   c) "Sometimes software is not aware of mobility" Explain with example 2

3. a) Explain Gaussian frequency-shift keying 3
   b) Explain DS Spectrum Spreading Technique with example. 4
   c) 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 3%. 5

4. a) Considering a baseband OFDM transmission model where x_q is the received subcarrier and x_k represents the local oscillator. When integrating received power over one symbol period, T_U, the output of the correlators is zero for any combination, except when $k = q$. Now proof the following equation. 4

$$\sum_{q=0}^{N_C-1} \frac{a_q}{T_U} \int_0^{T_U} e^{j2\pi(q-k)\frac{1}{T_U}t}\, dt = \begin{cases} a_k, & k = q \\ 0, & k \neq q \end{cases}$$

b) Let Shift Parameters are i = 2, j = 1 taking number of co-channel interference j=6, propagation constant γ=4. Calculate Carrier Interference C/I.

c) An urban area has a population of two million residents. Two computing trunked mobile networks (A and B) provide cellular service in this area. System A has 394 cells with 19 channels each, system B has 98 cells with 60 channels each. Find the number of users that can be supported at 2% blocking. If each user averages two calls per hour at an average call duration of three minutes. Also compute the market penetration of each cellular provider. 6

5. a) What is Peak to Average Power Ratio (PAPR) 2

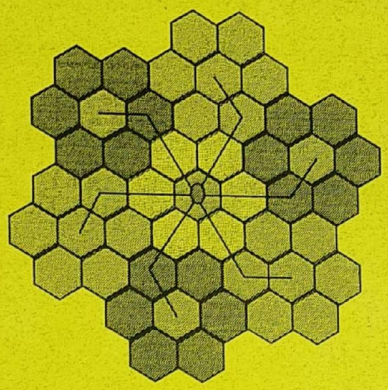
b) Ad-hoc networks have several types of applications. Explain four of them. 4

c) Explain Cluster-Head Gateway Switch Routing Protocol 6

6. a) Draw and describe three main component of Sensor Node Structure 4

b) Show the steps of DEEP Clustering Algorithm 4

c) Calculate Reuse Distance from the given cellular network using Pythagoras formula. 4



7. a) Draw GSM Architecture. 2

b) Describe the steps of relevant call flows in case of authentication. 2

c) A certain city has an area of 1400 square miles and is covered by a cellular system using a seven cell reuse pattern. Each cell has a radious of 3 miles and the city is allocated 30 MHz of spectrum with a full duplex channel bandwidth of 60 KHz. Assume a GOS of 2% for an Erlang B system is specified. If the offered traffic per user is 0.03 Erlangs, compute (i) the number of cells in the service area, (ii) the number of channels per cells, (iii) Traffic intensity of each cell, (iv) the maximum carried traffic 8