namibia university
OF SCIENCE AND TECHNOLOGY

Faculty of Computing and Informatics

Department of Computer Science

QUALIFICATION : BACHELOR OF COMPUTER SCIENCE IN CYBER SECURITY : BACHELOR OF COMPUTER SCIENCE IN COMMUNICATION NETWORKS	
QUALIFICATION CODE: 07BCCS & 07BACS	LEVEL: 7
COURSE: WIRELESS TECHNOLOGIES	COURSE CODE: WLT620S
DATE: JANUARY 2020	SESSION: 2
DURATION: 3 HOURS	MARKS: 100

SUPPLEMENTARY/SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	PROF DHARM SINGH JAT
MODERATOR:	PROF GUY-ALAIN ZODI

THIS QUESTION PAPER CONSISTS OF FOUR PAGES
(Excluding this front page)

INSTRUCTIONS

1. Write clearly and neatly.
2. Write all your answers in the answer booklet provided.
3. Number the answers clearly.
4. This paper consists of two sections; Section A and B.
5. Answer ALL questions in section A.
6. Answer any 3 questions in section B.
7. Begin each section on a new page.
8. Marks/scores per question are given in [ ].
9. Do not use or bring into the examination venue books, programmable calculators, mobile devices and other material that may provide you with unfair advantage. Should you be in possession of one right now, draw the attention of the examination officer or invigilator.
10. NUST's examination rules and regulations apply.

*This section contains **TWO** questions.*
*Attempt **ALL** questions.*

Q1   Choose the correct answer for each of the following multiple-choice question
                                                                [20 marks, 2 marks for each]

(i).   In Bluetooth technology radio waves can communicate with other Bluetooth devices upto the range of
   a) 60-100 feet
   b) 15-50 feet
   c) 100-120 feet
   d) None of the above

(ii).   In wireless distribution system
   a) multiple access point are inter-connected with each other
   b) there is no access point
   c) only one access point exists
   d) none of the mentioned

(iii). What device is the wireless equivalent of a wired hub?
   a) bridge
   b) repeater
   c) antenna
   d) access-point

(iv).   In wireless network, an extended service set is a set of
   a) connected basic service sets
   b) all stations
   c) all access points
   d) none of the mentioned

(v).   The wave length is_____ if frequency is 300MHz
   a) 10m
   b) 1m
   c) 100m
   d) 1000m

(vi).   The Electrical and Electronics Engineers (IEEE) standard _____ specifies the most famous family of wireless local area network.
   a) 3G
   b) 802.11
   c) 802.3
   d) 802.5

(vii). What is the maximum data rate for the 802.11g standard?
  a) 6 Mbps
  b) 11 Mbps
  c) 22 Mbps
  d) 54 Mbps

(viii). The garage door opener remote, which uses a radio frequency is a
  a) Receiver
  b) Transmitter
  c) Transceiver
  d) None of the above

(ix). Which of the following is/are the main part(s) of basic cellular system?
  a) A mobile Unit
  b) A cell Site
  c) A mobile Telephone Switching Office
  d) All of the above

(x). State whether True or False
  A) In GSM only TDMA is used.
  B) In GSM only FDMA is used.
    a) 'A' is True and 'B' is False
    b) 'A' is False and 'B' is True
    c) 'A' is False and 'B' is False
    d) 'A' is True and 'B' is True

Q2 (i).   Explain how is the separation of the different channels for wireless communication achieved in Time division multiplexing.   [4]

(ii).   Give the name of any two devices operating in the 2.4 GHz range.   [4]

(iii).   Explain two functions of the Data Layer in a wireless and mobile environment.   [4]

(iv).   Should we allocate a guard band in FDM? Explain.   [4]

(v).   What does SSID stand for when using WiFi network?   [4]

SECTION B   *[60Marks]*
*This section contains **FOUR** questions*
*Attempt any **THREE** questions.*

Q3 a)   What is Multi-path propagation? Explain.   [4]
    b)   (i) Of the following, what values are possible for a cluster size in a cellular topology?   [4]
         Assume a hexagonal geometry: Assume a hexagonal geometry: 5, 8,

2

11, 13, 20, 21.

(ii) Explain your answer in (i). [6]

(iii) What is the Normalised repeat distance for the possible values in (i)? [6]

Q4 a) If a total of 33 MHz of bandwidth is allocated to a particular FDD cellular telephone system which uses two 25 kHz simplex channels to provide full duplex voice and control channels

    (i) find the total number of channels available in the system [3]

    (ii) compute the number of channels available per cell if a system uses: [3]

        (a) four-cell reuse and [4]

        (b) seven-cell reuse

b) A total of 33 MHz of bandwidth is allocated to a particular FDD cellular telephone system which uses two 25 kHz simplex channels to provide full duplex voice and control channels. If 1 MHz of the allocated spectrum is dedicated to control channels, determine an equitable distribution of control channels and voice channels in each cell for each of the following two systems.

    (i). four-cell reuse [4]

    (ii). Seven-cell reuse [6]

Q5 a) With the help of a suitable diagram explain the following inter-frame spacing: [9]
- Short inter-frame spacing (SIFS)
- PCF inter-frame spacing (PIFS)
- DCF inter-frame spacing (DIFS)

b) In an full-rate TDMA system used in United States Digital Cellular (USDC) IS-54 standard the
- duration of a TDMA voice frame = 40ms
- number of time slots in a frame = 6
- number of bits in a voice frame = 1944
- Number of bits in guard band = 6

Calculate
    a) the duration of a time slot of a voice frame [3]
    b) the number of bits in a time slot of a voice frame [3]
    c) the duration of a bit [3]
    d) the duration of guard time [2]

Q6 a) Draw and explain the following Mode in Wireless Networking: [6]
        (i) Infrastructure Mode and
        (ii) Ad-Hoc mode   [6]

    b) Describe how a man-in-the-middle attack may be performed on a Wi-Fi   [4]
        network and the consequences of such an attack.

    c) What is the use of Tethering (Hotspot) in Wireless Networks?   [4]

GOOD LUCK!