

PAMIBIA 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 2019	SESSION: 2
DURATION: 3 HOURS	MARKS: 100

SUPPLEMENTARY/SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	PROF DHARM SINGH JAT
MODERATOR:	DR GUY LUSILAO 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.

SECTION A [40Marks]

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). Wireless LANs implement security measures in the
 - a) System Layers
 - b) Data Link Layers
 - c) Sub Layers
 - d) Multi Layers

- (ii). What is WPA?
 - a) wi-fi protected access
 - b) wired protected access
 - c) wired process access
 - d) d) wi-fi process access**

- (iii). The IEEE standard _____ specifies the most famous family of wireless local area network.
 - a) 800.00
 - b) 802.11
 - c) 802.1X
 - d) none of these

- (iv). Garage door opener is a
 - a) Transmitter
 - b) Receiver
 - c) Transceiver
 - d) d. None of the above

- (v). Carrier frequency of a TV remote control is in the range
 - a) < 100 MHz
 - b) < 1 GHz
 - c) of Infrared
 - d) < 2 GHz

- (vi). What is the access point (AP) in wireless LAN?
 - a) device that allows wireless devices to connect to a wired network
 - b) wireless devices itself
 - c) both (a) and (b)
 - d) none of the mentioned

- (vii). Which multiple access technique is used by IEEE 802.11 standard for wireless LAN?
 - a) CDMA
 - b) CSMA/CA
 - c) ALOHA
 - d) d) None of the mentioned

- (viii). What is Wired Equivalent Privacy (WEP)?
 - a) security algorithm for ethernet
 - b) security algorithm for wireless networks
 - c) security algorithm for USB communication
 - d) none of the mentioned

- (ix). Which of the following wireless standards has the highest maximum data rate?
 - a) 802.11n
 - b) 802.11b
 - c) 802.11a
 - d) 802.11g

- (x). The shape of the cellular region for maximum radio coverage is
 - a) circular
 - b) square
 - c) oval
 - d) hexagon

- 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). Assume a spectrum of 480KHz is allocated over a base frequency for wireless communication between station A and B. [4]
- (i) Divide the entire bandwidth into 4 sub bands.
 - (ii) Why we divide the entire bandwidth into sub-bands?
- (v). Should we allocate a guard band in FDM? Explain your answer. [4]

SECTION B [60Marks]

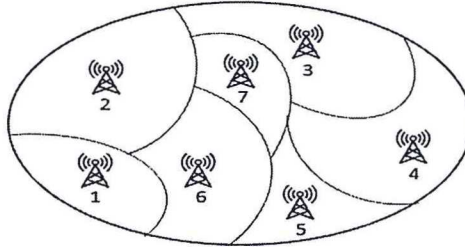
This section contains **FOUR** questions

Attempt any **THREE** questions.

- Q3 a) (i) Draw and explain the architecture of an infrastructure-based IEEE 802.11 WLAN with two access points or Basic service Sets (BSSs). [5]
- (ii) Draw and explain the architecture of IEEE 802.11 ad-hoc wireless LANs with two independent Basic service Sets (IBSSs). [5]
- one mark for each correct event in figure (i) [2]
 - one mark for each correct statement in figure (i) [3]
 - one mark for each correct event in figure (ii) [2]
 - one mark for each correct statement in figure (ii) [3]
- b) (i). Given an 802.11 WLAN, draw a medium access and inter-frame spacing that shows the three different parameters that define the priorities of medium access. [4]
- (ii). Explain the following inter-frame spacing:
- (a) Short inter-frame spacing (SIFS) [2]
 - (b) PCF inter-frame spacing (PIFS) [2]
 - (c) DCF inter-frame spacing (DIFS) [2]
- Q4 (i). What are the main functions of the medium access control layer in a WLAN? Explain your answer. [8]
- (ii). Describe how a man-in-the-middle attack may be performed on a Wi-Fi network and the consequences of such an attack. [8]
- (iii). Explain how a man-in-the-middle attack on a Wi-Fi network can be defeated. [4]
- Q5 a) What is the frequency reused concept in GSM? Explain. [8]

- b) Consider a simple high-power transmitter that can support 100 voice channels covering given a service area. Let the service area be divided into seven smaller area cells. As shown in figure below, each supported by lower power transmitters. The available spectrum of 100 voice channels is divided into 4 groups of 25 channels each. The cells (1,7) (2,4) (3,5) and six are assigned distinct four channel groups.

What is the total number of voice channels the new cellular networks can carry? Explain your answer.



- Q6 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, compute the number of channels available per cell if a system uses:
- (i). four-cell reuse [3]
 - (ii). seven-cell reuse, and [3]
 - (iii). 12-cell reuse. [4]
- 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 three systems. [3]
- (i). four-cell reuse [3]
 - (ii). seven-cell reuse, and [4]
 - (iii). 12-cell reuse.

GOOD LUCK!