MASENO UNIVERSITY

UNIVERSITY EXAMINATIONS 2016/2017

THIRD YEAR SECOND SEMESTER EXAMINATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

MAIN CAMPUS

CIT 306: WIRELESS AND MOBILE COMPUTING

Date: 20th June, 2017   Time: 8.30 - 11.30 am

INSTRUCTIONS:

- SECTION A: Attempt question ONE which is compulsory (30 marks)
- SECTION B: Attempt any TWO questions (20 marks each)
- Start each question on a new page
- Mobile phones WHETHER ON OR OFF are <u>prohibited</u> in the Examination room
- DO NOT WRITE on the question paper.

QUESTION ONE (30 MARKS)

(a) Explain the difference between the terms "Wireless" and "Mobility".(2 Marks)

(b) Explain the term Global Positioning System (GPS) (2 Marks)

(c) Define the following terms
- i. wireless communication
- ii. ZigBee
- iii. Wi-Fi (4 marks)

(e) Differentiate between GPRS and GSM   (4 marks)

(f) A transmitter produces 50W of power.

    i) Express the transmitted power in dBm

    ii) Express the transmitted power in dBW

    iii) If d0 is 100m and the received power at that distance is 0.0035mW, then find the received power level at a distance of 10km. Assume that the transmit and receive antennas have unity gains.(6 marks)

(g) A satellite at a distance of 40,000 km from a point on the earth's surface radiates a power of 10 W from an antenna with a gain of 17 dB in the direction of the observer. The satellite operates at a frequency of 11 GHz. The receiving antenna has a gain of 52.3 dB. Find the received power (5 marks).

(h) Determine the height of an antenna for a TV station that must be able to reach customers up to 80 km away (4 marks).

(i) What is the thermal noise level of a channel with a bandwidth of 10 kHz carrying 1000 watts of power operating at 50°C? Compare the noise level to the operating power (3 marks).

QUESTION TWO (20 MARKS)

(a)A microwave transmitter has an output of 0.1 W at 2 GHz. Assume that this transmitter is used in a microwave communication system where the transmitting and receiving antennas are parabolas, each 1.2 m in diameter.

    i. What is the gain of each antenna in decibels?

    ii. Taking into account antenna gain, what is the effective radiated power of the transmitted signal?

    iii. If the receiving antenna is located 24 km from the transmitting antenna over a free space path, find the available signal power out of the receiving antenna in dBm units(9 marks)

(b)State and Explain THREE different ways of classifying satellite orbits(6 marks)

 (c)What are the primary causes of atmospheric attenuation for satellite communications (5 marks)

QUESTION THREE (20 MARKS)

a) A cellular system uses FDMA with a spectrum allocation of 12.5 MHz in each direction, a guard band at the edge of the allocated spectrum of 10 kHz, and a channel bandwidth of30 kHz. What is the number of available channels(7 marks)

b) Compare Bluetooth and Wi-Fi in terms of data rates, application, and security.   (6 Marks)

c) List three different ways of categorizing communications satellites(3 marks)

d) What are some key differences between satellite-based and terrestrial wireless communications(4 marks)

QUESTION FOUR (20 MARKS)

a) Using a diagram, explain the Principles of Wireless LANs(5 Marks)

b) Explain any five benefits of Wireless LANs to business(5 Marks)

c) Explain the following the key wireless technologies: (10 Marks)

  i) LAN adapters,

  ii) Access points

  iii) Microcells

  iv) Roaming

  v) Wi-Fi

QUESTION FIVE (20 MARKS)

a) Explain the term the cellular networks (2 Marks)

b) What is the principle of frequency reuse in the context of a cellular network(3 marks)

c) List five ways of increasing the capacity of a cellular system. (5marks)

d) Explain the following terms as used in cellular telephony(10 marks)

I. Handoff

II. Base Transceiver Station (BTS),

III. Mobile Switching Center (MSC),

IV. Home Location Register (HLR)

V. Visitor location Register (VLR)