COLLEGE OF BUSINESS, PEACE, LEADERSHIP AND GOVERNANCE

COURSE CODE: COURSE TITLE: CSC302 – ADVANCED NETWORKS AND TELECOMMUNICATIONS

END OF SECOND SEMESTER EXAMINATIONS

JANUARY/MAY 2020

LECTURERS:MR B.MUKHALELA

DURATION: 3 HOURS

INSTRUCTIONS

You will need **Computer** for this Examination. Internet connection is needed for uploading of final answer.

Answer only ONE questions**.**

The marks allocated to **each** question are shown at the end of the section.

Credit will be awarded for logical, systematic and neat presentations.

Question 1

You are interested in starting your own Music Store, QualitySounds, in a suburban area of your town. You need to design and build a network and computing solution for your stores. You have done some initial planning and you will start with two stores (but you plan to add two more stores across town within one year). Your store will sell new and used music and allow customers to get "online" in your stores and download music. You also will offer classes on how to setup music downloads and configure MP3 devices. You took computer networking courses in college and you feel you can tackle this solution yourself. Upon initial planning, you have identified the following requirements for your network:

- Connects three office computers and one computer used for Point-of-Sale (POS) services at each of your stores. You also want six (6) computers in the lobby/store where patrons can download music and you can run "training classes" for people to learn about using MP3 players and get other basic information. The two offices have to be connected into one cohesive network, sharing POS services and other critical company information. You also need to provide a "hand out" casual area for people to stop in and discuss music and connect wirelessly to the Internet (you might even offer free coffee to entice people to come in to your store).
- Provides adequate security for all of the company communications and documents (especially sensitive sales documents). All POS services must be protected. All general network access should be segmented from the company POS services.
- Fast and have additional capacity as the company grows.
- Provides for centralized printing Supports the eventual addition of other stores to the network
- Provides customers with a general information Website and a secure Website where clients can buy services, and products.
- Provides for limited downtime (24 hour downtime maximum) Provides for centralized management and control of the computers in the two stores, so that you can maintain the network from off-site
- Provides for long-term cost effectiveness
- Provides a suite of software tools for the employees to effectively communicate and a POS solution for the stores
- The company does not have any equipment. Your plan should include a complete network and computer system that meets these requirements and future expansion plans.

- The two store locations will (eventually) be within a five-mile radius of each other. The locations are within a suburban area that has current technological infrastructures and related technology offerings. The stores will need a sales system and print services for invoices.

- Complete your proposal including costs for computing equipment, network infrastructure, network servers, printers, and related hardware, software, and accessories. Include as much detail as possible as well as justification as to your selections. Diagram and explain your physical network and computer design as well as the logical network design (server installation, domain layout, etc.). As you are a small business, cost is a major factor and should be minimized.

Required.

a) Draw a detailed network diagram including some virtual configurations on the chosen architecture for the proposed network. Your simulation should be able to ping one computer in one subnet using another computer in another subnet.
   Some of the required details from the case study can either be hand written (using the provided answer booklet) or type or submit as a soft copy.   [35]
b) Imagine the public IP address given by the IP address is 192.186.1.0 and each of the stores should have a subnet IP address. Indicate your Subnet Id IP addresses and its allowable host address ranges.   [15]

Question 2

Imagine you have been appointed to design the network to be deployed in three new buildings on a new university campus. Building A contains a dedicated computer room containing 10 very high performance dedicated servers. The servers provide services to students and staff who may need to gain access from the Internet as well as from within the university's own network. Building B contains the offices of 12 lecturers and 8 administrators who only use medium power desktop computers located on fixed desks. Building C contains two lecture rooms and a lounge/coffee shop. The lecture rooms have a desktop computer at the front for use by the lecturers, but some lecturers prefer to use their own laptop or tablet computer. All the students use laptop or tablet computers to take notes and keep in touch with their friends. An underground duct exists between building A and building B which are only 30 metres apart. Building C is 30 metres from building A but no ducts exist and installing one is not possible.

a. Briefly explain type of network that should be deployed in the building that houses the dedicated computer room and what equipment should be installed?   [15]
b. Describe briefly the type of network that should be deployed in the second office building and what equipment should be installed?   [15]
c. Briefly describe how Ethernet RJ45 Connectors are to be terminated onto some Cat6e raw cables that should be deployed in the teaching building and what tools and safety precautions should you observe while doing this part of the project?   [10]
d. What type of network connections should be used to link the buildings together and where and how should the university's Internet connection be made?   [10]

Question 3

Based on the video send on the online teaching platform (and tentatively via WhatApp) on Artificial Internet of Things (AIoT), write an elaborate essay on the future of all societal activities mentioned like law enforcement, teaching, etc are going to transform. In your answer fuse in how modern technologies are to facilitate the transition of such autonomous network of things in our everyday life. In your essay first introduce the concept of IoT and how our African economies' telecommunication enterprises are trying to cope up with the expectations proposed and already happening in the first world, are we anywhere near and what could be the challenges hindering us as economies?   [50]