Question A

Assuming you have been appointed the consultant responsible to setting-up the network for a medium sized company which has established a headquarters and four other branches located within a fifty kilometers radius. The owner of the company has identified and requested several requirements pertaining to the network to be implemented. Answer the following questions which contribute to the success in commissioning the entire network:

a) Explain to the owner what category of network should be established giving details of criteria used to differentiate the type of network. Subsequently, describe the purpose of essential components needed for successful data communications.

(20 marks)

b) The owner of the company request that all branches be connected to the Headquarters at all times to facilitate transferring company data, as well facilitating staff communications via e-mail, therefore, speed and integrity of the communications is essential. Propose to the company your choice of the best suited wide area network technology with substantial explanations and justifications.

(14 marks)

c) The management has established a policy that all branches and Headquarters require redundant links in case of failures and privacy of communications to ensure the integrity of information transmitted over the network. With the use of an appropriate diagram, illustrate with proper labeling the type of topology that is suitable for the company and discuss why the chosen topology is recommended.

(10 marks)

d) Discuss the difference between the concept of physical and logical network topologies.

(6 marks)

(Total = 50 marks)

Question B1

a) Discuss the characteristics of the 'layer' concept adopted by the Open System Interconnect (OSI) model. Compare the *Transmission Control Protocol/Internet Protocol (TCP/IP)* to the OSI model by giving **one (1)** example of protocol and indicating which layer of the OSI model it relates to.

(13 marks)

b) Compare and contrast the process involve in *Stop-and-Wait* and *Sliding windows* flow control techniques. Focus on the differences adopted in each technique.

(12 marks)

(Total = 25 marks)

Question B2

a) Discuss appropriate error checking techniques that can detect burst and multiple-bit errors that can affect data transmission.

(9 marks)

b) Discuss the algorithm performed by the selective reject - *automatic repeat request (ARQ)* error control technique and explain the advantage and disadvantage of such an algorithm.

(6 marks)

c) Describe how the *random* routing algorithm works differently compared to other routing techniques.

(10 marks)

(Total = 25 marks)

Question B3

a) Discuss **five (5)** factors that should be considered to determine whether the *Distance vector* routing algorithm or the *Link state* routing algorithm is suitable to be implemented.

(10 marks)

b) Compare and contrast between the following networking and internetworking devices; *Repeater*, *Hub*, *Switch*, *Router*, and *Gateway*. Produce short discussions of each device focusing on the unique characteristics and identify which of the OSI layers the device is specifically associated with.

(15 marks)

(Total = 25 marks)