Vavuniya Campus of the University of Jaffna

Second Examination in Information Communication Technology - 2018

Second Semester - April/May - 2020

TICT2222 - Introduction to Computer Networks

Answer Four Questions Only

Time Allowed: Two hours

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1. (a) Briefly state what is meant by a *computer network*. List three advantages of a computer network. [15%]

   (b) Briefly describe each of the following transmission methods with the aid of a diagram:

   i. Simplex

   ii. Half-duplex

   iii. Duplex [25%]

   (c) Discuss each of the following networks using a diagram and give two advantages of each network:

   i. Local Area Network (LAN)

   ii. Wide Area Network (WAN) [30%]

   (d) State the functions of each of the layer in the *Open System Interconnection* (OSI) reference model and draw the structure of the OSI model. [30%]

2. (a) Briefly describe each of the following multiplexing techniques with the aid of diagrams:

   i. Frequency Division Multiplexing (FDM)

   ii. Time Division Multiplexing (TDM) [30%]

   (b) Consider nine channels, each with 200 MHz bandwidth that are going to be multiplexed together. Find the minimum bandwidth of the link, that needs guard band of 10 MHz between the channels to prevent interference. [15%]

   (c) Consider a subnet shown in Figure 1. Explain how a packet is routed from a node 1-A (Region 1 - node A) to all other nodes using a *Hierarchical routing* algorithm.

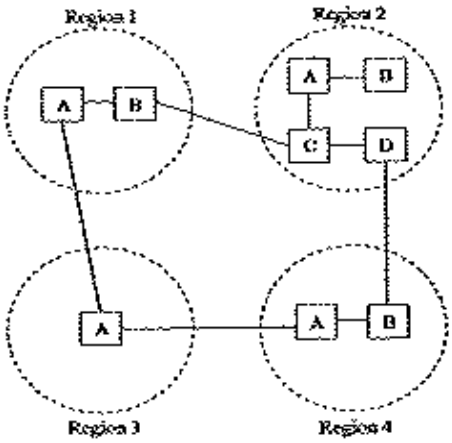

Figure 1: A subnet

[30%]

   (d) State the techniques used in *Flooding* routing algorithm. [25%]

3. (a) Clearly state what is meant by the term *Bandwidth* which is used in Analog and Digital signal data transmission. [10%]

[*This question is continued on the next page*]

(b) Briefly describe each of the following modulation techniques with the suitable examples:

i. Amplitude Shift Keying (ASK)

ii. Phase Shift Keying (PSK) [30%]

(c) Draw the equivalent frequency-domain graph for the time-domain graph shown in Figure 2:

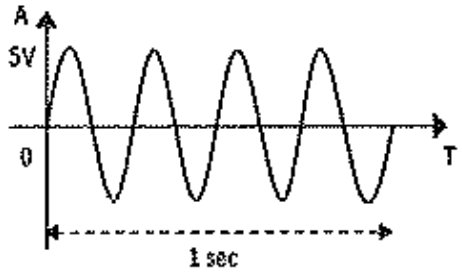

Figure 2: A Time-domain graph

[10%]

(d) Compare and contrast the following methods used in *Carrier Sense Multiple Access (CSMA)*:

i. Persistence strategy

ii. Non-persistence strategy [20%]

(e) Briefly describe the *CSMA* with *Collision Detection* technique using a diagram. [30%]

4. (a) Create the stuffed character for each of the following original character using Flag bytes with byte stuffing framing method.

i. [X][ESC][Y]

ii. [X][ESC][FLAG][Y]

iii. [X][ESC][ESC][Y]

iv. [X][ESC][FLAG][FLAG][ESC][Y] [20%]

[This question is continued on the next page]

(b) Explain what you understand by *Sliding window protocol?* [15%]

(c) Suppose that a sender is ready with a 5-bit original data such as 10101, perform the following tasks using Hamming code:

i. Calculate the required number of redundant bits

ii. Write a procedure to detect the error, if receiver receives the original data as 10001 (Assume that no corruption is occurred in redundant bits) [30%]

(d) Briefly describe *Ethernet* networking technology using a diagram. [15%]

(e) Distinguish the network architecture *Fiber Distributed Data Interface (FDDI)* from *Token ring.* [20%]

5. (a) State the advantages and disadvantages of *Fiber optic cable* using a diagram. [30%]

(b) Briefly describe each of the following methods using a diagram:

i. Ground propagation

ii. Sky propagation [20%]

(c) Discuss each of the following components that are used in the telephone network system:

i. Trunk

ii. Switch [20%]

(d) Explain how two devices A and B are communicating with each other through four routers (shown in Figure 3) using packet switching technique.

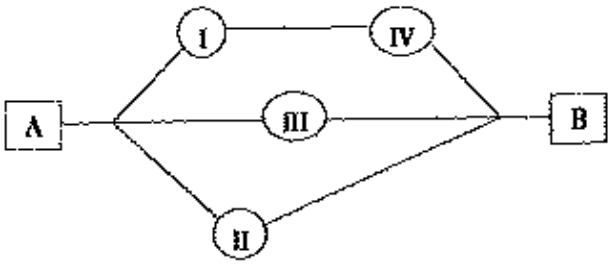

Figure 3: Connection diagram of devices and routers

[30%]