COSC 821

CHUKA   UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF MASTERS DEGREE IN COMPUTER SCIENCE

COSC 821: COMPUTER NETWORKS DESIGN AND MANAGEMENT

STREAMS: MSC. COMP. SCI (Y1S1)   TIME: 3 HOURS

DAY/DATE: TUESDAY 06/04/2021   2.30 P.M. – 5.30 P.M.

INSTRUCTIONS
- Attempt **Question ONE (Section A)** and any other **TWO** from **Section B**
- Marks are awarded for clear and concise answers

SECTION A-COMPULSORY

QUESTION ONE [30 MARKS]

(a)   The figure below shows a packet captured and analyzed by wireshark. Study it and provide the following information.


(i)   The transport layer protocol used to carry the packet   **[2 Marks]**

(ii)   The destination IP address of the packet   **[2 Marks]**

(iii)   The destination port of the packet   **[2 Marks]**

(iv)   The TTL of the packet   **[2 Marks]**

(v)   The source MAC address of the packet   **[2 Marks]**

(b)   The figure below shows an arrangement of routers in a certain area. Using Dijkstra algorithm, compute the shortest path and the cost from u to z   **[6 Marks]**
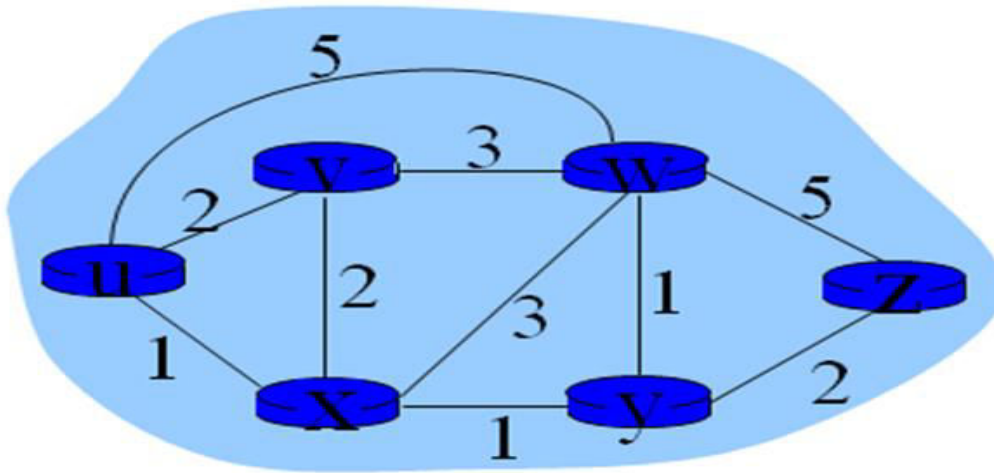
(c) Discuss **THREE** Key issues in the use of network measurement tools   **[6 Marks]**

(d) Network Measurement Experiments are divided into two major categories: Live measurements and Controlled-traffic measurements.

    (i)   Give a clear distinction between these approaches   **[4 Marks]**

    (ii)   Give one strength and one limitation of each approach   **[4 Marks]**

SECTION B: ANSWER ANY TWO QUESTIONS
QUESTION TWO [15 MARKS]

(a)   Researchers utilize knowledge about the interactions of network components to understand and explain the workings of a computer network via a conceptual models. Briefly describe the Salient features of the following models.

    (i)   Analytic models   **[3 Marks]**

    (ii)   Simulation Models   **[3 Marks]**

(b)   Consider a router that interconnects three subnets: X, Y, and Z. Suppose all of the interfaces in each of these subnets are required to have the prefix 13.2.80.0/21. Suppose subnet X is required to support 1000 interfaces, and subnets Y and Z are each required to support 500 interfaces. Compute network addresses for X, Y and Z to satisfy these constraints   **[9 Marks]**

QUESTION THREE [15 MARKS]

(a)   Differentiate between bandwidth and throughput   **[4 Marks]**

(b)   Explain **THREE** approaches of decreasing traffic to reduce congestion in computer Networks   **[6 Marks]**

(c)   Ten components are used to backup a component whose reliability is 0.95.Determine the overall reliability of the system   **[5 Marks]**

QUESTION FOUR [15 MARKS]

Compare and contrast ethernet (IEEE 802.3) and wireless LAN (IEEE 802.11) in relation to the way they implement the following data link layer issues:

    (i)   Media access Control   **[5 Marks]**

    (ii)   Error handling   **[5 Marks]**

    (iii)   MAC addressing   **[5 Marks]**

QUESTION FIVE [15 MARKS]

(a)   Network management involve managing faults, configuration, accounting, performance and security. Briefly highlight key concerns addressed by each

                                                                               [10 Marks]

(b)   A flow is defined as a unidirectional series of IP packets with unique source/destination addresses, port numbers (assuming TCP or UDP to be the transport layer protocol) and protocol number. Highlight the key parameters associated to every flow   **[5 Marks]**