

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE AWARD OF DEGREE OF MASTER OF
SCIENCE IN COMPUTER SCIENCE

COSC 821: COMPUTER NETWORKS MANAGEMENT

STREAMS: MSC COM SCI Y1S1 P/T

TIME: 3 HOURS

DAY/DATE: TUESDAY 6/08/2019

2.30 P.M - 5.30 P.M.

INSTRUCTIONS

- Answer question 1 in section A and any other **TWO** from section B
- Marks are awarded for clear and concise answers
- Note that only Question ONE (Section A) and the first TWO attempted questions in section B will be marked.

SECTION A-COMPULSORY

QUESTION ONE [30 MARKS]

- (a) Highlight **FIVE** issues of concern in the design of data link layer protocols **[5 Marks]**
- (b) What are the distinguishing features of Frame relay and ATM technologies/protocols **[4 Marks]**
- (c) 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 **FOUR** main parameters associated to every flow **[4 Marks]**
- (d) Quality of service is fundamental for many applications .Two complementary, yet fundamentally different, traffic management frameworks have evolved. In this regard differentiate between integrated services and differentiated services **[4 Marks]**
- (e) With the emergence of wireless networks, the original IP was enhanced to support the requirements of the mobility associated with wireless computing. Briefly describe the mobile IP concept **[4 Marks]**
- (f) Five components are used to backup a component whose reliability is 0.95.Determine the overall reliability of the system **[4 Marks]**

- (g) Give **FIVE** main components of IT resource planning **[5 Marks]**

SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION TWO [15 MARKS]

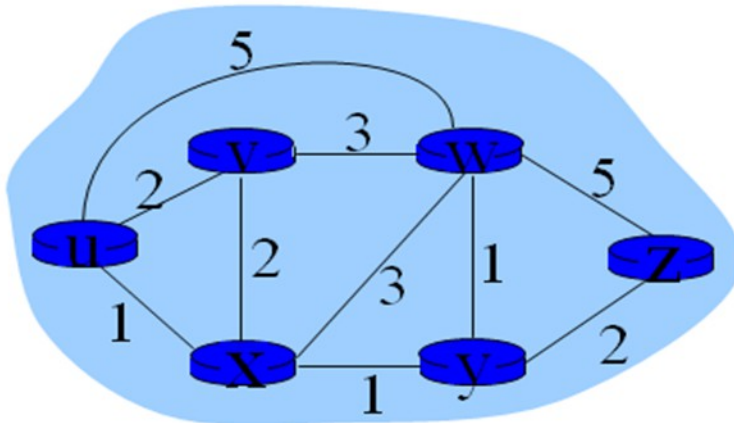
One of the most challenging aspects of the design of internet protocols was the construction of schemes for naming and addressing computers and for routing packets to their destinations.

- (a) Discuss the changes that have occurred to the IP addressing scheme over the years and the issue addressed by each change **[10 Marks]**
- (b) Good networks are as a result of hard work by network designers and technicians. Highlight the steps required to design a good network **[5 Marks]**

QUESTION THREE [15 MARKS]

- (a) Briefly highlight key concerns addressed by each of the five **FCAPS** of network management **[5 Marks]**

- (b) The figure below shows an arrangement of routers in a certain area.



- (i) Using Distance Vector Protocol's Bellman-Ford equation, compute $D_u(w)$ and $D_u(y)$ **[4 Marks]**
- (ii) Using Dijkstra algorithm, compute the shortest path and the cost from u to z **[6 Marks]**

QUESTION FOUR [15 MARKS]

A distributed system supports network applications and a key aim of management of such a system is to result in a system (network) whereby user requests are services within a user-defined quality of service (QoS).

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- (i) Give your understanding of quality of service **[3 Marks]**
- (ii) Identify and give your understanding of **FOUR** parameters that can be used to measure QoS **[4 Marks]**
- (iii) Identify any **FOUR** network applications and show the sensitivity of each application to each of the following system performance measures: Packet loss, bandwidth, delay and jitter **[8 Marks]**

QUESTION FIVE [15 MARKS]

You are the administrator of a content distribution network. During a measurement interval of 1200 sec, the number of requests that arrived at the content distribution server was 24000 and the number of requests executed by the content distribution server was 23,700 and the processor of content distribution server was busy for 1040 seconds.

Determine:

- (i) Request arrival rate (λ) **[3 Marks]**
- (ii) Request completion rate (X) **[3 Marks]**
- (iii) Processor means service time(s) per request **[3 Marks]**

Due to the criticality of the content and the desire to provide a high level of service to the content consumers, the administrator decides to replicate the service by adding five more replica servers to add to the primary server.

- (iv) Identify and discuss the benefits that this approach will bring to your users **[6 Marks]**

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