MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

P.O. Box 972-60200 – Meru-Kenya
Tel: 020-2069349, 061-2309217. 064-30320 Cell phone: +254 712524293, +254 789151411
Fax: 064-30321
Website: www.must.ac.ke Email: info@must.ac.ke

University Examinations 2013/2014

SECOND YEAR, SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR
OF BUSINESS IN INFORMATION TECHNOLOGY

HBT 2204: NETWORK SYSTEM DESIGN AND MANAGEMENT

DATE: APRIL 2014   TIME: 2 HOURS

INSTRUCTIONS: *Answer question* **one** *(Section one) and any other* **two** *questions*

QUESTION ONE – 30 MARKS

a. Differentiate between:
   i. Network availability and network reliability   (2 marks)
   ii. Throughput and response time   (2 marks)
   iii. Ping and trace route commands   (2 marks)

b. Give TWO differences between a MAC address and an IP address   (4 marks)

c. Give the FOUR areas of network management as suggested by ISO.   (4 marks)

d. Diagrammatically show the OSI network management architecture model   (5 marks)

e. Transport layer protocols provide end to end delivery of application data. Give the ONE
   transport layer protocol used by SNMP to achieve this task.   (1 marks)

f. Give TWO examples of network monitoring tools available for each of the following categories.

   i. Active tools   (2 marks)
   ii. Passive tools   (2 marks)
   iii. Automated tools   (2 marks)
   iv. Network & service monitoring tools   (2 marks)
   v. Critical network services monitoring tools   (2 marks)

SECTION TWO – 20 MARKS
You have been contracted by a busy telecommunications company to perform capacity planning for
their network.
a. What do you understand from the term capacity planning.   (2 marks)

b. Give THREE issues capacity planning is concerned with.   (3 marks)

c. Why is capacity planning important when designing a network. (5 marks)

d. Briefly describe THREE key elements that describe adequate system capacity. (6 marks)

e. Consider a large portal service that offers free email services to its users. Suppose the number of registered users is two million. During the peak period, 30% of the users send email through the portal. Assume each email takes 5.0 seconds to be processed and delivered to the destination's mail box. Assume also that during this period each user sends 3.5 emails on average. Analysis of the mail log file shows that the average message is 7,120 bytes. Determine the capacity of the spool for outgoing email during the peak period. (4 marks)

QUESTION THREE – 20 MARKS
You head an organization that critically depends on internet sources, and management wants you to come up with a solution that will reduce users' complaints regarding the slowness of the internet. You consider that web caching will go along in addressing the problem.
a. With the aid of the basic architecture of your solution, briefly explain how web caching works.
(6 marks)

b. Identify all possible benefits that web caching would bring. (4 marks)

c. Identify and describe THREE principal administrative groups that are classified as network management functional groups. (6 marks)

d. Network troubleshooting is an essential part of network management. Explain under what functional area(s) troubleshooting belongs. Explain using a diagram/flow-chart or otherwise the general fault management process. (4 marks)

QUESTION FOUR – 20 MARKS
It is well known that tracking and ensuring accuracy of every configuration essential to a network is an enormous task with modern networks having several devices.
a. Suggest the key features you will look for in a tool needed for network configuration management. (6 marks)

b. Different applications have different requirements and different protocols have been developed to meet them. Differentiate between jitters and latency. Explain the impact of each in network performance. (4 marks)

c. Briefly describe THREE kinds of network monitoring systems and tools. (6 marks)

d. Describe the operation of SNMP. (4 marks)

QUESTION FIVE – 20 MARKS
An autonomous system in a medium-sized organization consisted of fifty personnel all with personal computers or workstations. The entire group was on a single Ethernet LAN segment connected to one port if a six-port bridge. The single logical segment consisted of five (5) physical segments connected by four repeaters. The topology was thus a bus configuration and the cable drop to the desktop was with a coax T. most of the activities of the group were internal to the segment, as were the servers, except the mail server, which was common to the entire corporation. Thus, most of the traffic was internal to the LAN segment, except for email and backup operations, which were across the bridge.

a. Capture the network topology described above diagrammatically, showing all information described and explaining the purpose of each network element. (5 marks)

As the volume of activities increased, the network segment would go down frequently. The problem was especially severe during heavy data bursts such as code compilation. Initially, the problem was attributed to people disturbing the cable or to the failures of the repeaters because only one group's segment went down. In an attempt to solve the problem, the cables and repeaters were replaced. However, the problem did not go away.

b. Based on your knowledge of networking and interconnection devices, trace the problem.
(5 marks)

Every time the network went down, the bridge had to be reset. This involved all the host in the segment going down and when the bridge came up, it needed to acquire all the addresses for routing purposes. To solve the problem, the LAN segment was split into two and used two ports of the bridge.

c. Capture the new network topology described above diagrammatically. (3 marks)
The problem was not however, eliminated by the action described above.

d. As the network manager, and on the basis of your networking knowledge, purpose and implement a permanent solution to the problem in a cost-effective manner. Diagram your solution. (7 marks)