



MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations for 2014/2015 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

SECOND SEMESTER EXAMINATION BACHELOR OF SCIENCE IN COMPUTER
SCIENCE

SCO 300: COMPUTER NETWORKS

Date: 9/4/2015

Time: 8:30 – 10:30 AM

INSTRUCTIONS:

ANSWER QUESTION ONE AND ANY OTHER TWO

Question 1 (30 Marks)

- a) While describing what sub-netting is, give **TWO** reasons why subnetting is necessary in networking **(6 marks)**
- b) Describe the main differences between
 - a. Local Area Networks and Wide Area Networks (WANs)
 - b. Intranet and Extranet
 - c. Standards, layered model and protocol**(12 marks)**
- c) You are tasked with designing a LAN for the new university campus. Using a labeled diagram, draw a network with three types of servers and two devices required for your network to be fully connected to the Internet. **(3 marks)**
- d) You are a systems administrator for IAT College and you want to create four more Labs each with 15 computers. You have been provided with the address 192.168.170.0/26.

- i. What is the network address? (2 marks)
- ii. Calculate the broadcast address. (show your calculations) (2 marks)
- iii. Give the first and last usable addresses (2 marks)
- iv. Explain what you understand by the term “subnet mask”. Calculate the subnet mask for the above address. (3 marks)

Question 2 (20 Marks)

- a) You are tasked to lead a team in maintaining the Co-operative Bank, Machakos branch network. Draw a LAN diagram then state and explain the network management functions your team will undertake. (8 marks)
- b) Draw a diagram showing an implementation of a firewall and a NAT. Explain how they provide security to an organization. (4 marks)
- c) Explain main goals in providing data security measures to the Kenya Commercial Bank computer network. (2 marks)
- d) You studied the seven-layer model and clearly differentiated the functionalities of each layer.
Using a diagram, compare and contrast the functions of the transport Layer and network layers. (4 marks)
- e) Explain what it meant by a Domain Name System (DNS). What is it important? (2 marks)

Question 3 (20 Marks)

- a) Draw a diagram showing how an employee working from home can use three types of broadband services to connect to the Masaku University internal network? (4 marks)
- b) There are several different cabling options for implementing a Local Area Network (LAN). Draw diagrams of three media types and explain where each can be used. (6 marks)
- c) Network controls are mechanisms that reduce or eliminate the threats to network security. State and explain three types of controls. (4 marks)

- d) Application layer provides the interface between networks and users. State and explain three critical applications your network will provide to users. **(6 marks)**

Question 4 (20 Marks)

- a) **Machakos University** has two Labs one for undergraduate, postgraduate and a staff room and has plans to redesign the network accordingly. The networking team received 192.168.177.0 to use for the addressing for entire network. Each network has 12 computers. Draw the network and answer the following
- i. What subnet mask and slash will be suitable for this need? **(1 mark)**
 - ii. Postgraduate Lab is in subnet number three. What is its first and last usable IP address? **(2 marks)**
 - iii. What would be required for a host on one lab to communicate with a host in the staff room subnet? **(1 mark)**
 - iv. State three configurations that each computer must be configured to access the network? **(3 marks)**
- b) Wired networks are expensive to develop due to infrastructure. WI-FI and WIMAX standards can provide better services through wireless connectivity. Describe the two and explain where they should be applied. **(4 marks)**
- c) IPv4 is used for addressing in today's TCP/IP networks. How many bits are there in an IPv4 address? **(9 marks)**

QUESTION 5 (20 Marks)

- a) Understanding the seven-layer model is the key to understanding computer networks interoperability. This means you can trace the process a document will take to reach the required destination. You are required to:
- i. Draw the seven-layer model
 - ii. Explain the functionality of each layer by explaining how an email is created from the sender and passed to the receiver.
 - iii. Name one protocol in each layer.
- (14 marks)**
- b) Explain two ways in which the unavailability of enough IP addresses is/has been addressed. **(6 marks)**