



Machakos University College

[A Constituent College of Kenyatta University]
University Examinations for 2015/2016 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

**FIRST SEMESTER EXAMINATION FOR DEGREE IN BACHELOR OF
SCIENCE IN COMPUTER SCIENCE
SCO300: COMPUTER NETWORKS**

Date: 1/08/2016

Time: 11:00 – 1:00 PM

INSTRUCTION

Answer question **ONE** and **Any** other **Two** among the four selective questions

QUESTION ONE (COMPULSORY)

(a) Explain

- (i) any three different types of computer networks (3 marks)
- (ii) domain with respect to switches and hubs (2 marks)
- (iii) major function of proxies (2 marks)

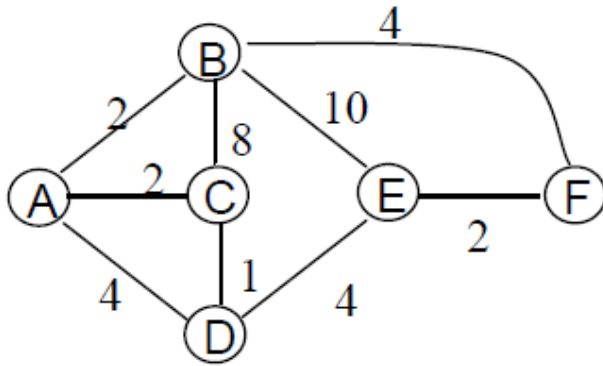
(b) Differentiate between

- (i) Transmission Control Protocol and User Datagram Protocol (2 marks)
- (ii) confidentiality and message integrity (2 marks)

(c) A company is granted a site address 201.70.64.0. The company needs 4 subnets. Design the subnets (4 marks)

(d) Define ATM and state advantages of ATM Network (4 marks)

(e) Consider the network shown below.



- (i) Calculate distance vectors in nodes E, D, and C and find the least cost path from E to A based on the distance vectors in E, D, and C (6 marks)
- (ii) Suppose all distance vectors have been computed in all nodes and now suppose that the link from E to B goes down. Approximately how many distance vector messages will be sent by node E as a result of this link going down? Explain your answer (1 mark)
- (a) You have been assigned the task of setting up a WLAN in Machakos University College.
 - (i) Explain some of the basic components of this network apart from switch and routers (2 marks)
 - (ii) State any two factors to consider which are key to wireless networks (2 marks)

QUESTION TWO

- a) Compare and contrast the advertisements used by RIP and OSPF. (3 marks)
- b) DESCRIBE NETWORK TOPOLOGY AND TOKEN RING (7 marks)
- c) Discuss any three wireless networks threats and their counter measures (6 marks)
- d) Assume that you want to send a message M to your lawyer and give him/her the assurance that it was unchanged from what you sent and it is really from you.
 - (i) Describe how you can achieve message integrity and authenticity using public key encryption. (3 marks)
 - (ii) You have achieved message integrity and authenticity in (i). Describe how you can achieve confidentiality by slightly modifying your solution in (i). (1 mark)

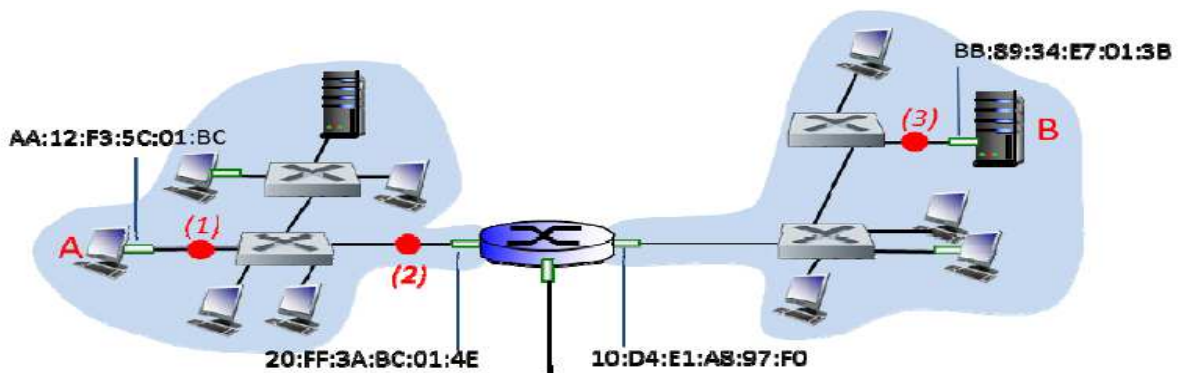
QUESTION THREE

- a) Draw TCP/IP model and indicate the key protocols available in each layer (6 marks)
- b) Give a critic of OSI model and describe cross layer model (6 marks)
- c) You have been requested to design a network for financial organization having four departments located in two different locations with each department having 20 employees who

require high network speed but need to be monitored. Draw the network layout showing all devices and cables bearing in mind that they have two different service providers. (8 marks)

QUESTION FOUR:

- a) Using a simple domain name, explain the function of a DNS (4 marks)
- b) Consider the network shown below. Use it to answer questions that follows
 - (i) Assign IP address ranges to the subnets containing hosts A and B, and assign IP addresses in these ranges to hosts A and B. (You don't have to assign IP addresses to any hosts except A and B, but you do need to specify the address range being used by each subnet). Your subnet addressings should use the smallest amount of address space possible (3 marks)
 - (ii) Does the router interface with link-layer address `20:FF:3A:BC:01:4E` have an IP address? If so, what is the role of the IP address of the router's IP interface in forwarding datagrams through the router. (3 marks)
 - (iii) Suppose all switches in the above example are learning switches. Consider the datagram being sent from A to B; neither A nor B have sent any frames or datagrams in the network before. How many of the 11 hosts in the network receive the frame containing the datagram sent by A? Explain your answer (3 marks)



- c) Explain why IEEE 802.11 uses CSMA/CA and IEEE 802.3 uses CSMA/CD (4 marks)
- d) Differentiate between Firewall and DHCP server (3 marks)

QUESTION FIVE:

- a) Using a well labeled diagram explain the IEEE 802.3 frame format (6 marks)
- b) Consider the network topology shown below. The topology consists of multiple routers interconnected by links. Each link has a static cost associated with it which represents the cost of sending data over that link. Using Dijkstra's shortest-path algorithm
- (i) Compute the shortest path from y to all network nodes (show the table) (12 marks)
- (ii) Draw the forwarding for y (2 marks)

