



(Knowledge for Development)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS 2017/2018 ACADEMIC YEAR

SPECIAL/SUPPLEMENTARY EXAMINATIONS YEAR THREE SEMESTER TWO EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF SCIENCE COMPUTER SCIENCE

COURSE CODE : CSC 322

COURSE TITLE : COMPUTER NETWORKS

DATE: 11/10/2018 TIME: 11:30 A.M – 1:30 A.M

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE (COMPULSORY) [30 MARKS]

- a) Differentiate the following terminologies as used in computer networks
- (i) Protocol and Standard [2 marks]
 - (ii) Router and Switch [2 marks]
 - (iii) De facto and De jure [2 marks]
- b) In computer networks, communication occurs between entities in different systems. An entity is anything capable of sending or receiving information. However, two entities cannot simply send bit streams to each other and expect to be understood. For communication to occur, the entities must agree on a protocol. Identify and explain the Three (3) key elements of a protocol. [6 marks]
- c) An Internet standard is a thoroughly tested specification that is useful to and adhered to by those who work with the Internet. Briefly explain the functionalities of the following bodies.
- i. ISOC [2 marks]
 - ii. IAB [2 marks]
 - iii. IETF [2 marks]
 - iv. IRTF [2 marks]
- d) Define the term Connection-oriented communication and Connection-less communication. [4 marks]
- e) A company is granted a site address 201.70.64.0. The company needs six subnets. Design the subnets. [6 marks]

QUESTION TWO [20 MARKS]

- a) What is difference between Distance Vector Routing Protocols and Link State Routing Protocols. [6 marks]
- b) Explain broadcast network, point to point network and Multipoint networks. [6 marks]
- c) What is the difference between TCP and UDP? [8 marks]

QUESTION THREE [20 MARKS]

A company, example.org, has a webserver (ws.example.org) and several workers, each of which have a desktop computer. The company's network has the following hostnames and IP addresses:

Hostname	IP Address
router.example.org	192.168.223.1
ws.example.org	192.168.223.5
desktop1.example.org	192.168.223.8
desktop2.example.org	192.168.223.9

In the beginning, the company wanted to make sure that their webserver was accessible to potential customers over the Internet. To accomplish this, they purchased a leased line (or other permanent connection), put a router on their premises, and then hooked their webserver up to the Internet. Then their

problems started. The first thing they noticed was that their webserver received lots of traffic, but much of that traffic was not to the web server process itself. They also noticed slowdowns on their server, and they found processes running on it that the System Administrators were not familiar with. Furthermore, they noticed that their desktop systems suddenly got slower and started behaving erratically.

- a) Explain the probable course of this problem. **[6 marks]**
- b) The Network Administrators were not happy with the situation, though: while the only system that needed to be accessible to the Internet was the web server, internal systems were also visible to the Internet. They needed to somehow stop that access. After some searching, they found some layer 3 and layer 4 firewall products to solve their problems.
- i. Identify an appropriate layer 3 firewall that the System admin may use and explain how it can be used to protect the internal systems (i.e., the desktop systems). **[4 marks]**
- ii. Explain how the layer 4 firewall would help the system administrator to do port filtering. Hence state to rule sets that the system administrator would set to restrict network traffic to just the web server **[4 marks]**
- c) The users then called with a request: since the company's web server was such a vital resource, the users thought they should use the Internet, too. After all, they needed to find product information from other companies, and by looking on the Internet, they were able to research others' products faster. The system administrators discussed the problem, and determined that a safe firewall rule would allow the internal desktops to talk to a web server on the Internet, but not allow any other traffic. Thus, they came up with a set of rules like this:
- allow desktop*.example.org to send to anyone on destination port 80
 - allow anyone to send to desktop*.example.org, but only if the source port is port 80
- This almost worked, but there is one problem: An attacker can simply use port 80 as the source port and now scan the network.
- Explain how the TCP 3-way handshake may be used to address this problem?
- Other than the TCP three-way handshake solution, state two other firewalls that can be used to address this problem? **[6 marks]**

QUESTION FOUR [20 MARKS]

- a) A critical skill for any network/system administrator that supports a network environment is IP subnetting. Outline FOUR reasons to explain why subnetting is important? **[8 marks]**
- b) You are the network administrator for the XYZ Company; you would like to subnet the company's network (198.168.168.0) so that there are five separate subnets with 25 hosts each. Complete the table below to show how you will create the subnets. Include extra subnets that you may create. **[12 marks]**

subnet	Network address	Host addresses	Broadcast address
Subnet mask: 255.255.255.224			

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QUESTION FIVE [20 Marks]

- a) Differentiate the following terminologies as used in internetworking.
 - i. IPv4 and IPv6 **[2 marks]**
 - ii. Static and dynamic addressing **[2 marks]**
 - iii. Private and public addresses **[2 marks]**
- b) Describe the concept of Multiprotocol Label Switching (MPLS) as used in telecommunication networks. **[4 marks]**
- c) Discuss analog/digital data and analog/digital signals as used in data transmission. **[3 marks]**
- d) Discuss any seven (7) network monitoring tools deemed necessary for computer networks troubleshooting today. **[7 marks]**