

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

**EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN
APPLIED COMPUTER SCIENCE**

ACSC 261: DATA COMMUNICATION AND NETWORKS

STREAMS: BSC ACSC Y2S1

TIME: 2 HOURS

DAY/DATE: MONDAY 16/12/2024

2.30 P.M – 4.30 P.M.

INSTRUCTIONS

- **Attempt question ONE (Section A) and any other TWO from SECTION B.**
- **Marks are awarded for clear and concise answers.**
- **ONLY the first THREE Questions attempted will be marked (Question one inclusive).**

SECTION A-COMPULSORY

QUESTION ONE (30 MARKS)

- a) Name two well-known data transport protocols provided by the Internet Transport Layer (2 marks)
- b) Provide a brief description of each protocol and indicate what type of application might use that service (6 marks)
- c) Define the role of a firewall and draw a diagram that shows where a firewall should be positioned with relation to protecting a local network (6 marks)
- d) Discuss the techniques that a firewall uses at different levels to prevent external attacks on the network and control traffic flow through the firewall (4 marks)

- e) Describe the physical construction characteristics of the following transmission media

Note• If there is more than one type of each media then present the choices of type, and identify the differences between them

- i. Twisted pair (3marks)
 - ii. Coaxial cable (3marks)
 - iii. Optical Fibre cable (3marks)
- f) Distinguish between a LAN and a WAN in terms of infrastructure, coverage, and speed (3 marks)

QUESTION TWO (20 MARKS)

- a) Discuss the 3 modes of data communication (9marks)
- b) Describe at least three devices used in data communication (6marks)
- c) Using a real life scenario, differentiate between multiplexing and de-multiplexing (5marks)

QUESTION THREE (20 MARKS)

- a) Joyce has 12 computers and 1 printer. She wants to start a cybercafé that also offer printing services.
 - i. Advise her by explaining to her the type of network to implement in the cybercafé including two merits and demerits in each case. (4 marks)
- b) Using a well labelled diagram, design for joyce the cybercafé network layout describing in details the following:
 - i. The topology to use and how it works (2 marks)
 - ii. The access method the topology will use (2 marks)
 - iii. One advantage and one disadvantage of the chosen topology (2 marks)
- c) Explain the seven layers of the OSI reference model, in each layer, highlight the protocols that facilitate the functioning of each layer. (7 marks)
- d) List any three services that computer networks provide. (3 marks)

QUESTION FOUR (20 MARKS)

- a) Assume that you have been employed as a network administrator in a company that deals with online trading. Discuss any five security threats that you would address in order to make the organization safe when transacting business. (10 marks)

- b) Computer networks are designed in a highly structured way to reduce their design complexity. This is achieved by designing series of layers or level for the networks. One of the most important designs implemented in the current networks is TCP/IP model. Describe the model and state the protocols and network devices in each layer.
(10 marks)

QUESTION FIVE [20 MARKS]

- a) A business firm has contracted you to design their local area network (LAN) as an expert describe four network design goals that you would put into consideration during the design.
(8 marks)
- b) As a consultant in network designs you have been awarded a contract by Nairobi Water and Sanitation Company to design its network. You have determined to use hierarchical network design model to design their network. With aid of diagram illustrate the design.
(12 marks)
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