AFRICA UNIVERSITY
A United Methodist-Related Institution

"Investing in Africa's Future"

COLLEGE OF ENGINEERING AND APPLIED SCIENCES

NCIS307: DATA COMMUNICATIONS AND COMPUTER NETWORKS

END OF FIRST SEMESTER EXAMINATIONS

NOVEMBER 2024

LECTURER: DR. TENDAI ZENGENI

TIME: 3 HOURS

INSTRUCTIONS

You are required to answer questions as instructed.

Start **each** question on a new page in your answer booklet

Answer ***3 (THREE)*** *questions* **ONLY**

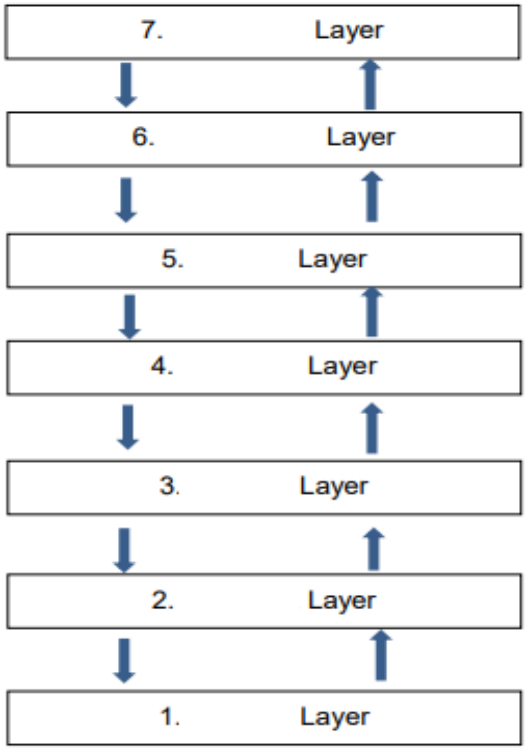
Credit will be awarded for logical, systematic and neat presentations

Total = 75 marks

1. Explain the concept of network topology and discuss the various types of network topologies, such as bus, star, ring, mesh, and hybrid topologies. Compare and contrast these network topologies, highlighting their advantages, disadvantages, and typical use cases. Provide examples of real-world applications where each type of network topology is commonly implemented. Additionally, discuss the factors that influence the selection of a specific network topology for a given networking environment and the implications of topology choice on network performance and scalability.

a) Bus topology **[5]**
b) Star topology **[5]**
c) Ring topology **[5]**
d) Mesh topology **[5]**
e) Hybrid topology **[5]**

2. Fill in the blanks to complete the 7 layers of the OSI model in the correct order. Explain the functions of each layer and what processes are involved. **[25 marks]**



3. a) Why do we connect or network computers? Give 5 reasons. **[5]**

b) What are the 3 advantages and 3 disadvantages of cables in data transmission and communication? **[12]**

c) Explain the functions of these devices and how they act as end nodes **[8]**

4. Draw and explain the Ecosystem of components that are involved for two devices to communicate from Australia to China. Show all the components of hardware and software and communication mechanisms and signals in that system.
[25]

5. a) Differentiate between half-duplex and full-duplex transmission modes **[4]**

b) Draw and describe how the Token ring topology works. **[10]**

c)What is an internet? What is The Internet? **[2]**

d) Cloud computing, Internet of Things, 5G and Artificial intelligence are all emerging technologies, explain them in terms of data communications and computer networks.

[8]

e) The 802.11 is a standard suite for which networking scheme? **[1]**

END OF EXAMINATION