UGANDA MARTYRS UNIVERSITY

UNIVERSITY EXAMINATIONS

FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION SYSTEMS

SUPPLEMENTARY ASESSMENT 2023/24

JULY 2024

SECOND YEAR EXAMINATION FOR BACHELOR OF INFORMATION TECHNOLOGY, COMPUTER SCIENCE AND SCIENCE GENERAL

Data Communications and Networks

CSC2104

DATE: 19TH JULY 2024 **TIME: 2:00 – 5:00 PM**

DURATION: 03.00 HRS

Instructions:

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1. *Carefully read through ALL the questions before attempting*
2. *No **names** should be written anywhere on the examination book.*
3. *Avoid one-word answers. Explain your answers in an understandable manner*
4. *Ensure that your **Reg number** is indicated on all pages of the examination answer booklet.*
5. *Leave a space or line before answering the next number.*
6. *Ensure your work is **clear** and **readable**. Untidy work shall be penalized*
7. *Any type of examination Malpractice will lead to automatic disqualification*
8. *Do not write anything on the question paper.*

(Attempt any **Five** Questions)

Question One

(a) Highlight the types of Wireless transmission media. For each type of transmission media, explain its characteristics, how and where it is utilized in the data communication field. (6 marks)

(b) Discuss the types of Wireless Networks that are mainly applied in data communication. For each type of network, explain its characteristics and where it is mainly applied or employed. (9 marks)

(c) Ssebunya, a network engineer is designing a computer network for a university campus. He has chosen you as his partner to advise him on how to set up a wireless network. How would you advise him on where and how to install

(i) Omni directional antennas

(ii) Directional antennas

(iii) MIMO antennas (5 marks)

Question Two

(a) Explain how the Fiber Optic cable successfully transmits data from the source node to the destination node. (8 marks)

(b) Discuss the types of Fiber Optic cables and how each transmits data. Highlight where each type is regularly used in the communication industry. (6 marks)

(c) (i) Mention any **Four** reasons you would choose Fiber Optic cable over other transmission media? (4 marks)

(ii) Mention any **Two** disadvantages you think Fiber Optic cable has over other transmission media. (2 marks)

Question Three

(a) Identify and discuss the components of the Data Communications System. (5 marks)

(b) A Communications network is characterized by interconnected nodes that necessitate sharing of network resources. Briefly explain how the combinations below operate to form a communications network;

(i) Cell Phone networks. (3 marks)

(ii) A laptop and a wireless connection (3 marks)

(b) Discuss any three reasons why we can't do without a computer network in today's operations. (5 marks)

(c) With examples, explain the difference between half-duplex and full-duplex modes of transmission. (4 marks)

Question Four

(a) With examples, explain the following terms as used in Data communications and Networks

(i) Physical address
(ii) Logical address
(iii) Port address
(iv) Specific address (8 marks)

(b) Differentiate the terms Analog transmission and Digital transmission. Draw diagrams where possible to help explain your points. (4 marks)

(c) (i) Outline **four** advantages of Digital transmission. (4 marks)

(ii) Outline any **two** disadvantages of digital transmission. (2 marks)

(ii) Outline any **two** advantages of analog transmission (2 marks)

Question Five

(a) With examples, discuss the differences between guided media and unguided media. In your discussion, explain why you would use one type of media over the other. (5 marks)

(b) With examples and/or diagrams where necessary explain the following terms as used in Data transmission.

i. Network media
ii. Near-End crosstalk
iii. Thermal noise
iv. Amplitude and frequency
v. Multiplexing (15 marks)

Question Six

Explain the following concepts. For each concept, outline how it impacts either negatively or positively to the data communication process.

(i) Signal Distortion

(ii) Signal Attenuation

(iii) Bandwidth

(v) Latency (20 marks)

Question Seven

(a) Explain why the OSI reference model is necessary in Data Communications and Networks. (2 marks)

(b) Starting with the lowest layer, list down the layers of the OSI model. Explain the roles or functions of each of the layers you have listed. For each layer, mention at least two protocols that operate there. (14 marks)

(c) The OSI model was not readily taken up as a usable communication model. This was due to some challenges. Explain at least **four** challenges that the OSI model has faced. (4 marks)

END