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(Knowledge for Development)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS 2021/2022 ACADEMIC YEAR

END OF SEMESTER EXAMINATIONS YEAR TWO SEMESTER TWO EXAMINATIONS

FOR THE DEGREE OF (COMPUTER SCIENCE)

COURSE CODE : CSC 223
COURSE TITLE : DATA COMMUNICATION

DATE: 12/5/2022 TIME: 02.00 P.M – 04.00 P.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) Data and Communication [2 marks]
 - (ii) Bit rate and bit [2 marks]
- b) Using diagrams, distinguish between analog and digital signal [2 marks]
- c) 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. Explain Three (3) key elements of a protocol. [6 marks]
- d) Discuss Four (4) components of a data communication system. [8 marks]
- e) Explain any TWO factors that determine effective data communication system. [4 marks]
- f) Explain the factors that can be considered in the design of transmission media. [4 marks]
- g) A user wants to upload a text document at the rate of 10 pages per 20 second. What will be the required data rate of the channel? (Assume that 1 page contains 1600 characters and each character is of 8 bits). [2 marks]

QUESTION TWO [20 MARKS]

- a) Differentiate between physical topology and logical topology. [2 marks]
- b) Kibabii University has adopted '*Computer networks*' as a key driver in the development of technology and innovation for its internal processes. Discuss any Four (4) advantages of developing networks in Kibabii University Clinic. [8 marks]
- c) Describe the following types of topologies highlighting the advantages and disadvantages of each.
- i. Star topology [3 marks]
 - ii. Token – Ring topology [3 marks]
- d) Networks must be able to transfer data from one device to another with accuracy. Explain any TWO types of errors that may be encountered in the transmission of data. [4 marks]

QUESTION THREE [20 MARKS]

- a) There are two methods of transmitting digital data. Explain the TWO methods. [6 marks]
- b) There are four modes of transmission for data communications circuits. Briefly explain each mode of transmission. [8 marks]
- c) Signals travel through transmission media, which are not perfect. The imperfections causes signal impairment. Explain the THREE causes of impairment. [6 marks]

QUESTION FOUR [20 MARKS]

- a) i. Distinguish between the following terms as used in data communication.
- i. Bandwidth and Jitter [2 marks]
 - ii. Bit rate and Baud rate [2 marks]
- ii. International Standard Organization (ISO) established a committee in 1977 to develop architecture for computer communication and the OSI model was the result of this effort. Explain the layers in the OSI reference model. [14 marks]
- ii. An analog signal has a lower frequency of 10 Hz and a higher frequency of 150 Hz. Calculate the bandwidth of this signal. [2 marks]

QUESTION FIVE [20 MARKS]

- a) Describe the following layers of the OSI model as used in data communication.
- i. Physical layer [4 marks]
 - ii. Data link layer [4 marks]
- b) i. What are the advantages of the message switching technique? [2 marks]
- ii. There are three phases data goes through in the *circuit switching* technique. Explain these phases. [6 marks]
- c) For reliable communication to take place, errors must be detected and corrected. Explain any TWO error detection mechanisms that are usually used to correct the detected errors. [4 marks]