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(Knowledge for Development)

KIBABII UNIVERSITY

(KIBU)

**UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR**

**END OF SEMESTER EXAMINATIONS
YEAR FOUR SEMESTER ONE EXAMINATIONS**

**FOR THE DEGREE OF
(COMPUTER SCIENCE)**

COURSE CODE : CSC 472E

COURSE TITLE : WIRELESS SENSOR NETWORKS

DATE: 17/05/2022

TIME: 09.00 A.M – 11.00 A.M.

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

QUESTION ONE (COMPULSORY) [30 MARKS]

- a. Middleware solutions are usually software-only, with hardware components very rarely in the mix. Define middleware **[2marks]**
- b. Describe the Zigbee network as used in WSN's **[5marks]**
- c. PAN is very useful in homes, offices and small network areas due to its high performance in terms of flexibility and efficiency. State any three Characteristics of PAN [3marks]
- d. The global middleware market size is projected to reach \$8,400 million in 2025 and for good reasons. While designing architecture from scratch, or even during a rehaul, it makes sense to design for middleware requirements as well. State and explain Five key entities of each generic middleware component that is deployed across any system **[10marks]**
- e. Bluetooth and Wi-Fi (Wi-Fi is the brand name for products using IEEE 802.11 standards) have some similar applications. Compare and contrast Bluetooth and Wi-Fi. **[4 marks]**
- f. Directional antennas provide increased performance over dipole antennas or omnidirectional antennas in general. Define a directional Antenna. **[2marks]**
- g. One of the challenges of using Directional Antennas is 'Deafness'. Explain two other challenges associated with using directional Antennas **[4 marks]**

QUESTION TWO [20 MARKS]

- a. Directional antennas provide increased performance over dipole antennas—or omnidirectional antennas in general when greater concentration of radiation in a certain direction is desired. However, it also has limitations. Mention two limitations of associated with them **[2 marks]**
- b. Wireless sensor networks have been useful in a variety of areas. Describe the primary areas in which these networks are deployed **[5 marks]**
- c. A wireless networking is a computer networking technology that enables user devices to communicate and access applications and information without connecting by wires of any kind. Concerning the access area of a wireless network, wireless networking technology is divided into four major categories. Describe them **[8 marks]**
- d. State two advantages of using directional antennas **[2 marks]**

- e. If two people want to communicate who are at longer distances, then the sound waves have to be converted into electromagnetic waves using an Antenna. Define an Antenna [2 marks]
- f. State any three characteristics of WSN's [3 marks]

QUESTION THREE [20 MARKS]

- a. PAN has got numerous merits and demerits in the course of its use. Explain 3 advantages and two disadvantages of using PAN [5 marks]
- b. Describe Bluetooth and what it's used for, citing its range of operation [5 marks]
- c. Antennas may be divided into various types depending upon, The physical structure of the antenna, The frequency ranges of operation, and The mode of applications, etc. In each of the aforementioned classes, state two types of antennas [6 marks]
- d. The routing protocols define how nodes will communicate with each other and how the information will be disseminated through the network. Discuss the two types of Classifications of routing protocols. [4 marks]

QUESTION FOUR [20 MARKS]

- a. Personal Area Network can be of 2 types depending upon its connection. Explain the two types of PAN [4 marks]
- b. Most Bluetooth applications are for indoor conditions, where attenuation of walls and signal fading due to signal reflections make the range far lower than specified line-of-sight ranges of the Bluetooth products. List any four applications of blue tooth [4marks]
- c. The most common example of middleware in action is online shopping sites. When users shop, they browse through catalogs, get personalized recommendations, buy desired products, receive intimations about delivery status, and finally receive their products. This is all done with the help of middleware. Middleware connects the payment, accounting, production shipping, and notification systems, providing the shopper with a seamless user experience. Middleware has got many principles that enable it to perform all this. Describe any six principles of middleware [12 marks]

QUESTION FIVE [20 MARKS]

- a. Describe the following examples of PAN, body area network, offline network and home office. **[3 marks]**
- b. Any Bluetooth device in discoverable mode transmits some following information on demand. Which information is this? **[3 marks]**
- c. There are basic communication parameters when using wireless communication using antennas. These are Frequency, Wavelength, Impedance matching, VSWR & reflected power, Bandwidth, Percentage bandwidth and Radiation intensity. Explain any five of the aforementioned parameters **[10 marks]**
- d. Differentiate between Structured and Randomized Deployment of WSN's **[4 marks]**