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B. Sc. in EEE
Semester: 6th

Date: 05 March 2024
Time: 10.00 AM – 11:30 AM

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

Mid-Semester Examination
Course Number: EEE 4651
Course Title: Data Communication and Networking II

Summer Semester: 2022 - 2023
Full Marks: 75
Time: 90 minutes

There are **3 (three)** questions. Answer **all 3 (three)** questions. Marks of each question and the corresponding CO and PO are written in brackets.

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1. You have been given the responsibility of creating a smart agriculture system for a large field. Discuss the appropriateness of Wi-Fi, LoRA, and Zigbee as communication methods. Give examples of particular situations where each approach performs exceptionally well. **10 (CO1) (PO1)**

   Consider factors like range, power consumption, and data transfer speed when choosing a communication method for different components of the system.

2. Investigate the potential challenges and solutions associated with implementing Wi-Fi in an industrial IoT environment. Provide examples of how Wi-Fi can be optimized for reliable and secure communication within a factory setting. **10 (CO1) (PO1)**

   Challenges may include interference and security concerns. Solutions may include using Wi-Fi 6 for improved efficiency and implementing robust encryption protocols. Consider the unique challenges of industrial setups, such as machinery interference and the need for secure communication.

3. Imagine yourself being hired by the Ministry of Environment and Agriculture of Bangladesh as the Networking expert. Utilize Wireless Data Communications and Networking technologies to address the following issues in the Environmental and Agricultural Contexts of Dhaka city areas.

   To improve your understanding of your ideas, include flowcharts, tables, diagrams, and images as much as possible. Ensure that each image is clearly labeled with corresponding explanations.

   a) Develop an air quality monitoring system for Dhaka City Corporation areas utilizing IoT sensors. Describe the process of analyzing data from these sensors to pinpoint pollution sources. **15 (CO2) (PO2)**

   Implement air quality sensors throughout the city. Provide outline measures and discuss the technologies to utilize data analytics to identify locations with elevated pollution levels, assisting in focused interventions. Use clustering methods to categorize pollution sources and provide methodological guidelines to display data on interactive maps to improve citizen comprehension.

b) Develop a river flood detection system utilizing IoT sensors placed along waterways beside Dhaka city in order to provide early warnings of floods during heavy rainfall events. Describe the benefits of utilizing real-time data collection for predicting floods. **20 (CO2) (PO2)**

Provide proper outline measures and discuss the method to install water level sensors at key points along water bodies so that the central monitoring platform examines patterns, sends alerts, and identifies when levels reach critical points. Use Internet-based cloud analytics tools to handle large amounts of data.

c) Create a sophisticated irrigation system for the farming fields beside the Purbachal areas by utilizing IoT sensors. Describe how these sensors can enhance water usage by monitoring soil moisture levels. **20 (CO2) (PO2)**

Provide outline measures and discuss the technologies to implement IoT soil moisture sensors that can communicate with irrigation systems in order to provide water only when necessary, thus helping to save resources. Provide methodological guidelines on how to use information from weather predictions and past crop water needs to adapt irrigation timing as needed.