International Institute of Information Technology - Hyderabad

EC3.202a Embedded System Workshop

Final Exam (Monsoon 2022 - H1)

22 September 2022 (11 am - 12.30 pm)

- Number of questions: 4; Total points: 30; Time Limit: 90 minutes.
- Use of calculator is NOT permitted.
- This is a closed book exam.
- Write all answers in the answer sheet only. Do not write or mark anything on the question paper.
- Read the questions and marking scheme for each question properly.

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1. **Multiple Choice Question;** Negative marking: 1 point per correct answer; -0.5 per wrong answer; 0 for not attempting! (Total: **10 points**)

   i. Identify the element, which is not considered in the information security triad
   (A) Authenticity (B) Integrity (C) Availability (D) Confidentiality

   ii. An asymmetric-key cipher uses
   (A) 1 key (B) 2 keys (C) 3 keys (D) 4 keys

   iii. In which category does compromising confidential information fall?
   (A) Vulnerability (B) Attack (C) Threat (D) Bug

   iv. Which of the following is/are offered by the Hash functions?
   (A) Authentication (B) Nonrepudiation (C) Data Integrity (D) All of the above

   v. The *transducer* term can be used for
   (A) Sensor (B) Actuator (C) Both (A) and (B) (D) None of the above

   vi. Arrange in the order of lower to higher latency for LoRaWAN classes A, B, and C?
   (A) A, B, C (B) C, B, A (C) C, A, B (D) B, A, C

   vii. You cannot establish your own network in
   (A) LoRaWAN (B) 3G (C) Both LoRaWAN and 3G (D) WiFi

viii. Overhearing is a major issue in
(A) Channel partitioning protocols (B) Random assignment protocols
(C) Both (A) and (B) (D) None of the above

ix. Which one of the following is the best physical layer technology for all IoT applications?
(A) LoRaWAN (B) Cellular (C) WiFi (D) Depends on the application

x. Mesh topology is not possible in
(A) BLE (B) Zigbee (C) LoRaWAN (D) WiFi

2. **True or False (With Reasoning)**: 1 mark per bit only if both the statement (T/F) and reasoning are right; 0 otherwise (Total: **5 points**)

i. Simple sensors such as temperature, CO, and light do not reveal any privacy data.
ii. In CDMA, different users can transmit on the same frequency and time, but it is still a fixed assignment protocol.
iii. NB-IoT is backward compatible with LTE Cat-0.
iv. IEEE 802.11ah is not backward compatible.
v. Data rates increase with increasing spreading factor in LoRaWAN.

3. **Describe different random assignment protocols**: Aloha, Slotted aloha, CSMA, CSMA-CD, and CSMA-CA. (**5 points**)

4. **This question is regarding the lab project you are doing in this course.** Write the title of your project and answer following questions (**Total: 10 points**)

(a) **Motivation and Introduction:** What is the motivation for your project? State and briefly explain the problem statement. (2 points)
(b) **Selection of components**: Explain which microcontroller, sensors, actuators, communication technology, and any other hardware will be required to develop the desired system. Clearly explain the rationale/reason behind selecting every component. (2 points)
(c) **Block diagram of the hardware**: Along with a functional block diagram, explain your IoT-based approach, including hardware and software. What were other possible options, and why are you using this approach over other possible approaches? (2 points)
(d) **Flow Chart**: Draw a neat flow chart of the complete system operation. You might want to include any other system details not covered in the above steps in this flow chart. (2 points)
(e) **Dashboard**: With the help of a block diagram, explain the implementation of the dashboard and its functionalities? (2 points)