Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2021/2022

COURSE NAME	:	INTERNET OF THINGS (IOT)
COURSE CODE	:	BIW 33803
PROGRAMME CODE	:	BIW
EXAMINATION DATE	:	JULY 2022
DURATION	:	3 HOURS
INSTRUCTION	:	1. ANSWER ALL QUESTIONS
		2. THIS FINAL EXAMINATION IS AN **ONLINE** ASSESSMENT AND CONDUCTED VIA **CLOSED BOOK.**
		3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK.

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

Q1 Based on the given case study, answer **Q1(a)-Q1(d)**.

"One of the most alarming issues in modern cities is the air quality level, where air pollution has caused 120 deaths out of 100,000 per year based on a worldwide study (Green Car Congress, 2019). The World Health Organization emphasized that 97% of cities in low- and middle- income countries with more than 100000 inhabitants do not meet World Health Organization (WHO) air quality guidelines. Due to poor air quality, it will increase potential health risks such as risk of stroke, heart disease, lung cancer, and others as well. Hence, there is a need to install an air quality monitoring system in cities to ensure the air is not polluted."

(a) Propose the necessary IoT components suitable for developing a real-time air quality monitoring system based on IoT.

(8 marks)

(b) Explain briefly **TWO (2)** types of IoT communication model.

(4 marks)

(c) Discuss **THREE (3)** types of sensed data errors. Support your answer with examples.

(6 marks)

(d) Write a C-Arduino code segment to send the values of the selected sensors to the IoT ThingSpeak cloud platform.

(6 marks)

Q2 (a) Discuss **THREE (3)** benefits of IPv6 for the IoT.

(6 marks)

(b) Explain the importance of real-time data collection strategies in the field of IoT.

(5 marks)

(c) In your opinion, should we consider security aspects when developing an IoT-based system? Support your answer with examples.

(4 marks)

Q3 Based on the circuit given in **Figure Q3,** answer **Q3(a)-Q3(c).**

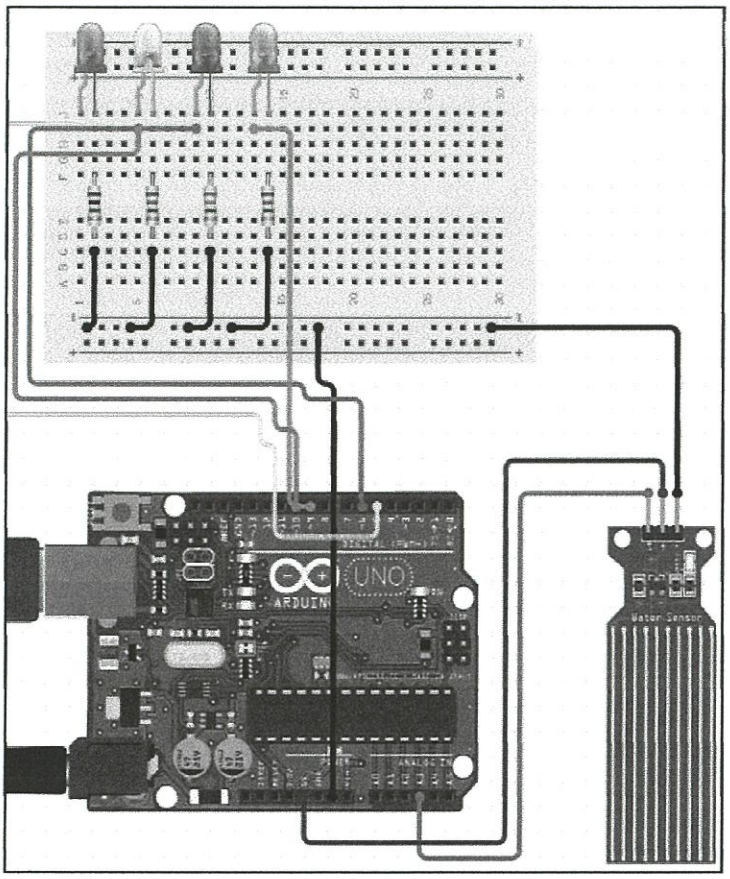

Figure Q3

Table Q3

Water level sensor Value	Status of the water level
0	Water Level : **EMPTY,** Turn ON **read** LED
1 - 300	Water Level : **LOW** , Turn ON **yellow** LED
301 - 500	Water Level : **MEDIUM,** Turn ON **blue** LED
> 500	Water Level : **FULL,** Turn ON **green** LED

(a) Write a C-Arduino code segment to define the input and output pins.

(5 marks)

(b) Write a C-Arduino code segment to read the value of the water level sensor.

(2 marks)

(c) Write a complete C-Arduino code to monitoring the water level status as in **Table Q3**.

(8 marks)

Q4 (a) Explain briefly by using a suitable diagram of the sensing process.

(3 marks)

(b) Do you think it is important to consider the environment of measurement when selecting IoT sensors? Support your answer with examples.

(4 marks)

(c) In your opinion, do all IoT sensor boards have the same General-Purpose Input/output (GPIO)? Justify your answer.

(4 marks)

Q5 Based on the circuit given in **Figure Q5,** answer **Q5(a)-Q5(b).**

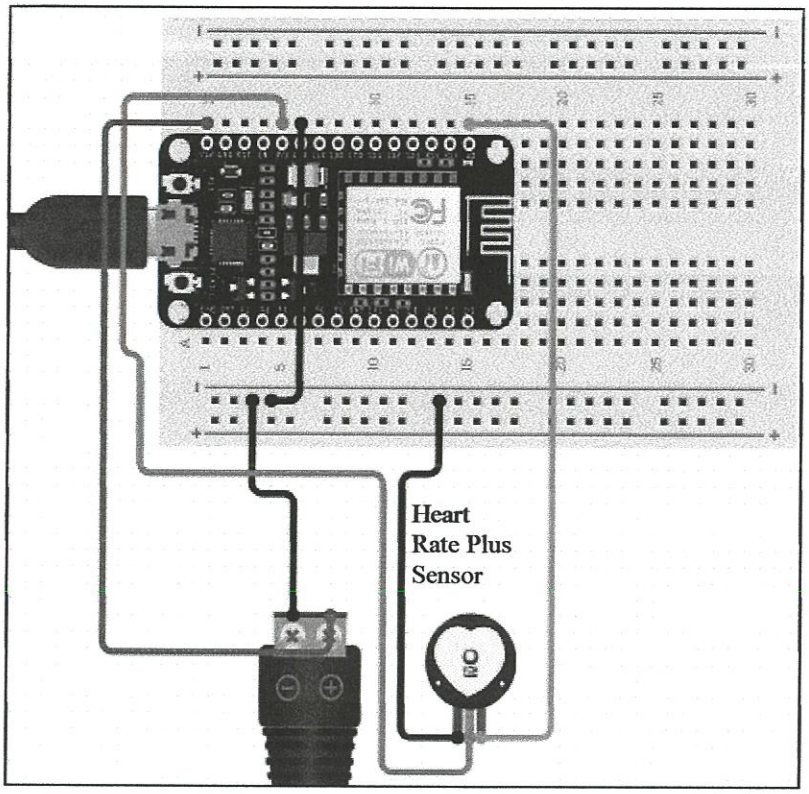

Figure Q5

(a) Write a complete C-Arduino code to send the value of heart rate sensor to IoT ThingSpeak cloud platform. Using the following info: Wireless `network name="BIWIoT"`, `Password =" yourname@2022"`, `Channel ID = "4105187"` and `WRITEAPIKEY =" DA0IW9AVW5Y8GWYJ"`.

(10 marks)

(b) Do you think it is possible to add another heart rate sensor to the given circuit? Give reasons for your answer.

(5 marks)

-END OF QUESTIONS-