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State	Finished
Completed on	Wednesday, 8 December 2021, 4:34 PM
Time taken	1 hour 8 mins
Grade	33.75 out of 50.00 (68%)

Question **1**

Correct

Mark 1.00 out of 1.00

CSMA cannot avoid collisions because of

Select one:

- ☐ a. Receiver is sleeping
- ☒ b. Hidden node problem
- ☐ c. Nodes try to send data without sensing
- ☐ d. Congestion in the routers



Your answer is correct.

The correct answer is: Hidden node problem

Question **2**

Correct

Mark 1.00 out of 1.00

UDP is a commonly used protocol at

Select one:

- ☐ a. Application layer
- ☒ b. Transport layer
- ☐ c. Network layer
- ☐ d. None of the above



Your answer is correct.

The correct answer is: Transport layer

Question **3**

Correct

Mark 1.00 out of 1.00

Overhearing is a major issue in

Select one:

- ☐ a. Channel partitioning protocols
- ☒ b. Random assignment protocols
- ☐ c. Both (a) and (b)
- ☐ d. None of the above



Your answer is correct.

The correct answer is: Random assignment protocols

Question **4**

Incorrect

Mark -0.25 out of 1.00

Average throughput for a node in the network consisting of M (assume large number) nodes on a channel of capacity R bps using Aloha is

Select one:

- ☐ a. $0.18 \cdot R$ bps
- ☐ b. R bps
- ☐ c. $0.37 \cdot R$ bps
- ☒ d. R/M bps



Your answer is incorrect.

The correct answer is: $0.18 \cdot R$ bps

Question **5**

Correct

Mark 1.00 out of 1.00

Polling protocol is used in

Select one:

- ☐ a. LoRaWAN
- ☐ b. 3G
- ☐ c. Zigbee
- ☒ d. Bluetooth



Your answer is correct.

The correct answer is: Bluetooth

Question **6**

Correct

Mark 1.00 out of 1.00

Which one of the following is the best physical layer technology for all IoT applications?

Select one:

- ☐ a. Cellular
- ☒ b. Depends on the application
- ☐ c. WiFi
- ☐ d. LoRaWAN



Your answer is correct.

The correct answer is: Depends on the application

Question **7**

Correct

Mark 1.00 out of 1.00

Which one of the following protocol has the highest data-rate?

Select one:

- ☒ a. IEEE 802.11ah
- ☐ b. IEEE 802.15.4
- ☐ c. LoRaWAN
- ☐ d. Cat-M1



Your answer is correct.

The correct answer is: IEEE 802.11ah

Question **8**

Correct

Mark 1.00 out of 1.00

Which technology does not have transmission bands in Sub-1 GHz

Select one:

- ☐ a. IEEE 802.11ah
- ☐ b. LoRaWAN
- ☐ c. IEEE 802.15.4
- ☒ d. IEEE 802.15.1



Your answer is correct.

The correct answer is: IEEE 802.15.1

Question **9**

Correct

Mark 1.00 out of 1.00

Which one of the following protocol has the lowest data-rate?

Select one:

- ☒ a. LoRaWAN
- ☐ b. Cat-M1
- ☐ c. IEEE 802.15.4
- ☐ d. IEEE 802.11ah



Your answer is correct.

The correct answer is: LoRaWAN

Question **10**

Correct

Mark 1.00 out of 1.00

Mesh topology is not possible in

Select one:

- ☐ a. WiFi
- ☐ b. Zigbee
- ☒ c. LoRaWAN
- ☐ d. BLE



Your answer is correct.

The correct answer is: LoRaWAN

Question **11**

Correct

Mark 1.00 out of 1.00

Which statements are TRUE with respect to the IEEE 802.15.4 standard?

Select one:

- ☐ a. It is a low data-rate standard
- ☐ b. Used for architecting wireless PANs
- ☐ c. Uses only two layers - PHY and MAC
- ☒ d. All of the above



Your answer is correct.

The correct answer is: All of the above

Question **12**

Correct

Mark 1.00 out of 1.00

Which one of the cellular technology has the best data rates

Select one:

- ☐ a. Cat-M1
- ☐ b. NB-IoT
- ☐ c. Cat-0
- ☒ d. Cat-1



Your answer is correct.

The correct answer is: Cat-1

Question **13**

Correct

Mark 1.00 out of 1.00

Which one of the following protocols do not have physical layer

Select one:

- ☐ a. IEEE 802.11a
- ☒ b. Zigbee
- ☐ c. IEEE 802.15.4
- ☐ d. Bluetooth



Your answer is correct.

The correct answer is: Zigbee

Question **14**

Correct

Mark 1.00 out of 1.00

Which one of the following protocols do not have MAC layer

Select one:

- ☐ a. IEEE 802.15.4
- ☒ b. Zigbee
- ☐ c. Bluetooth
- ☐ d. IEEE 802.11a



Your answer is correct.

The correct answer is: Zigbee

Question **15**

Correct

Mark 1.00 out of 1.00

Applications supported by classic Bluetooth technologies (Basic Rate or Enhanced Data Rate) are

Select one:

- ☐ a. Mesh network of devices
- ☐ b. Location services
- ☒ c. Audio streaming
- ☐ d. Broadcasting data



Your answer is correct.

The correct answer is: Audio streaming

Question **16**

Correct

Mark 1.00 out of 1.00

Which of the following is not an example of a transducer?

Select one:

- ☐ a. LED light
- ☐ b. Human eyes
- ☒ c. Capacitor
- ☐ d. DC Motor



Your answer is correct.

The correct answer is: Capacitor

Question **17**

Correct

Mark 1.00 out of 1.00

Which pre-scaler will generate the most delayed timer?

Select one:

- ☒ a. 1024
- ☐ b. 64
- ☐ c. 8
- ☐ d. No pre-scalar



Your answer is correct.

The correct answer is: 1024

Question **18**

Correct

Mark 1.00 out of 1.00

A pressure sensor has an initial zero offset of +0.5 V and zero drift of -0.1 V per month. After four months, the output for no applied pressure is

Select one:

- ☐ a. +0.7 V
- ☐ b. +0.3 V
- ☐ c. +0.9 V
- ☒ d. +0.1 V



Your answer is correct.

The correct answer is: +0.1 V

Question **19**

Correct

Mark 1.00 out of 1.00

Hotwire anemometers measure

Select one:

- ☐ a. Temperature
- ☒ b. Wind speed
- ☐ c. Wind direction
- ☐ d. Both (b) and (c)



Your answer is correct.

The correct answers are: Wind speed, Wind direction, Both (b) and (c)

Question **20**

Correct

Mark 1.00 out of 1.00

What is the value of OCR1 if we need to count 500 μ s using a 16 MHz clock with a pre-scaler of 8?

Select one:

- ☐ a. 0x9F
- ☒ b. 0x3E7
- ☐ c. 0x1000
- ☐ d. 0x999



Your answer is correct.

The correct answer is: 0x3E7

Question **21**

Complete

Mark 1.00 out of 1.00

[State if the following statement is **True of False along with the reason** in a few sentences. Correctly stating True or False with incorrect reasoning will fetch no marks]

Statement: Simple sensors such as temperature, CO, and light do not reveal any private data.

[FALSE]

They have some backend channels from which data can be accessed which the users dont know

Comment:

Question **22**

Complete

Mark 1.00 out of 1.00

[State if the following statement is **True of False along with the reason** in a few sentences. Correctly stating True or False with incorrect reasoning will fetch no marks]

Statement: In a BLE connection, the advertiser is always the master while the scanner is the slave.

[FALSE]

MASTER DEVICES SCAN FOR OTHER DEVICES AND SLAVE DEVICES ADVERTISE FOR CONNECTIONS.

Comment:

Question **23**

Complete

Mark 1.00 out of 1.00

[State if the following statement is **True of False along with the reason** in a few sentences. Correctly stating True or False with incorrect reasoning will fetch no marks]

Statement: In CDMA, different users can transmit on the same frequency and time, but it is still a fixed assignment protocol.

[True]

the portion is not done in time or frequency but done in code.

Comment:

Question **24**

Complete

Mark 1.00 out of 1.00

[State if the following statement is **True of False along with the reason** in a few sentences. Correctly stating True or False with incorrect reasoning will fetch no marks]

Statement: Interoperability is an important issue in IoT.

[true]

Interoperability in iot is ease of communication between devices irrespective of their manufacturer or technical specifications so it is a important factor in iot devices.

Comment:

Question **25**

Complete

Mark 1.00 out of 1.00

[State if the following statement is **True of False along with the reason** in a few sentences. Correctly stating True or False with incorrect reasoning will fetch no marks]

Statement: IEEE 802.11ah does not support low-latency applications.

[False]

It has high data rates

Comment:

Question **26**

Complete

Mark 0.00 out of 1.00

[State if the following statement is **True of False along with the reason** in a few sentences. Correctly stating True or False with incorrect reasoning will fetch no marks]

Statement: In MQTT, clients do not need to know each other's IP addresses.

[True]

Comment:

Question **27**

Complete

Mark 1.00 out of 1.00

[State if the following statement is **True of False along with the reason** in a few sentences. Correctly stating True or False with incorrect reasoning will fetch no marks]

Statement: Data rates increase with increasing spreading factor.

[False]

lower spreading factor gives higher data rate transmission

Comment:

Question **28**

Complete

Mark 0.00 out of 1.00

[State if the following statement is **True of False along with the reason** in a few sentences. Correctly stating True or False with incorrect reasoning will fetch no marks]

Statement: NB-IoT is backwards compatible with LTE Cat-0.

false]

<Your reason here>

Comment:

Question **29**

Complete

Mark 1.00 out of 1.00

[State if the following statement is **True of False along with the reason** in a few sentences. Correctly stating True or False with incorrect reasoning will fetch no marks]

Statement: The channels in WiFi overlap for 2.4 GHz band.

[True]

there are many overlapping channels (8/11) in wifi of 2.4 GHz band

Comment:

Question **30**

Complete

Mark 1.00 out of 1.00

[State if the following statement is **True or False along with the reason** in a few sentences. Correctly stating True or False with incorrect reasoning will fetch no marks]

Statement: IEEE 802.11ah is not backward compatible

[True]

IEEE 802.11ah is not backward compatible and require seperate gateway for it

Comment:

[This is a design problem. **The steps are clearly laid out and expected details are mentioned very clearly.** Understand the problem statement and the answering-guidelines well.]

[Problem Statement - Stray dogs monitoring in IIIT campus] IIIT is an animal-loving place with dogs having a special place. However, having too many stray dogs on the campus can also cause several issues. Design an IoT based system to monitor the location and health of native dogs of the campus while making sure that dogs from outside the campus can be prevented from coming inside.

[Guidelines to answer] You have to write your answer to this question on paper by strictly following the steps given below. Clearly write the step number before answering the particular step.

1. **Step 1 - Selection of components:** Explain which microcontroller, sensors, actuators, type of ADC/DAC (if required) and any other hardware will be required to develop the desired system. Clearly explain the rationale/reason behind selecting every component. Also mention with reason, the physics of the sensor you select.
2. **Step 2 - Block diagram of the circuit:** Draw a neat block diagram of the proposed circuit. Mention the type of interfaces (UART/SPI/I2C/etc.) and any other information deemed important.
3. **Step 3 - Communication Technology:** Clearly explain with reasoning, the choice of PHY layer protocol, topology and any other scheme of communication. What are your selected design parameters such as low power, range, latency, data rate, etc? Explain the rationale behind your selection.
4. **Step 4 - Application layer protocol:** Which application layer protocol would you like to use and why? What QoS is required for the application and why?
5. **Step 5 - Flow Chart:** Draw a neat flow chart of the complete system operation. You might want to include any other system detail not covered in the above steps in this flow chart.

Needless to say that your creativity and reasoning behind every selection at each step is critical for grading in this question. If found feasible, you might see your ideas getting implemented live at IIIT-H campus.

Attach your scanned answer sheets below.



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