Question Group A

1. Explain the difference between M2M and IoT systems.
2. Analyze the following case study, and draw the architecture diagram of the given IoT system. Label all components in diagram.
3. A sensor measurement is reported as 60 units. Upon testing, the sensor was found to contain a bias of 3 units. Vendor stated that sensor has precision of 0.7 units. What could be the actual value of that quantity?

A restaurant installs food-supplies monitoring devices in their cold storage room. The system provides reports on current stock levels, predicts the stock ending dates, and recommends when new orders to be placed.

Question Group B

1. Explain the difference between CPS and IoT systems.
2. Analyze the following case study, and draw the architecture diagram of the given IoT system. Label all components in diagram.
3. An item that actually weighs 32 kg, is placed on a weight scale that has a bias of 0.4kg and resolution of 0.2kg. How much would be the reading on scale?

On a modern cattle farm, animals are equipped with multiple wearable sensors. Animals developing sickness symptoms are quickly identified and isolated in order to prevent the spread of bacterial or viral infections.

[3 + 4 + 2 marks]

A

1

Lec 1 slide 19

2

A general architecture is given in Lec 1 slides 29-30. Students should adapt it to given case study. At the very least, they need to include 2-3 sensors in sensor layer, one device in edge layer and a cloud layer. Furthermore, 1/4 mark for mentioning the functions performed in cloud and edge layers (e.g stock prediction algorithm in cloud layer)

3

Since precision is 0.7, the sensor reading could deviate from 60-0.35 to 60+0.35 in multiple readings. So ignoring the bias, possible results could be [59.65, 60.35]. Now also take into account the bias, the actual value might be [56.65, 57.35] for positive bias, or [62.65, 63.35] for negative bias.

Note:

- it's also ok if students do 60-0.7 and 60+0.7 for precision adjustment.
- Sign of bias was unspecified in question, so either a positive or negative bias adjustment is correct.

B

1

Lec 1 slide 22

2

See A2

3

Since resolution is 0.2, the reading on scale (ignoring the bias) could be in [31.8, 32.2] interval. Now factor in the bias, sensor reading will be shifted up (positive bias) or down (negative bias) by 0.4 units.

For -ve bias, possible reading would be in [32.2, 32.6] range.

For +ve bias, possible reading would be in [31.2, 31.8] range.

Note: Mark either sign of bias as correct.