9 Mobile and Sensor Systems (CM)

A leisure park has decided to adopt a variety of mobile and sensing technologies to monitor the usage of its attractions. An app is offered to customers willing to install it on their smartphone, which tracks customers' location throughout the park and uses the phone accelerometer to monitor activity.

(*a*) Describe how app developers could make sure the app delivers the best accuracy on location and activity tracking while preserving the phone battery as much as possible through system and sensor sampling optimizations. [6 marks]

(*b*) A customer installs the app on their device. They have two other applications on the phone which monitor their physical activity as well as their location throughout the day for clinical reasons. Describe how the phone operating system could optimize the battery efficiency of the sensing across applications. [5 marks]

(*c*) A variety of wireless sensors are scattered throughout the park to monitor the operation of the attractions by continuously gathering temporal data (e.g., mechanical vibration, load, temperature, humidity).

(*i*) Describe a combination of medium access and network layer protocols for infrastructure-less multi-hop networks to aid the sensor data delivery to the park management servers. Discuss advantages and disadvantages of the solution devised. [5 marks]

(*ii*) Describe a solution which uses protocols from the Internet of Things domain to offer a non multi-hop solution. Discuss the advantages and disadvantages of the solution devised. [4 marks]