UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2017/2018

COURSE NAME	:	PERVASIVE COMPUTING
COURSE CODE	:	BIW 33403
PROGRAMME CODE	:	BIW
EXAMINATION DATE	:	JUNE 2018/ JULY 2018
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWERS **ALL** QUESTION

THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES

SECTION A

Q1 Match each definition provided in **Q1(a)** to **Q1(e)** with appropriate keyword given in **Table Q1**.

Table Q1

Wireless Session Protocol	Wireless Application Environment
Wireless Transport Layer Security	Wireless Transaction Protocol
Wireless Application Protocol	Wireless Telephony Application
Wireless Markup Language	Wireless Datagram Protocol
Wireless Protocol Stack	Wireless Network Interface

(a) _____ provides shared state between client and server and optimizes content transfer.

(1 mark)

(b) _____ provides reliable message transfer mechanisms, based on ideas from Transmission Control Protocol/Remote Procedure Call (TCP/RPC).

(1 mark)

(c) _____ uses transport mechanisms of different bearer technologies and offers a common interface for higher layer protocols.

(1 mark)

(d) _____ employs special adapted mechanisms for wireless usage such as long lived secure sessions and optimised handshake procedures.

(1 mark)

(e) _____ supports peer-to-peer, client/server and multicast applications.

(1 mark)

SECTION B

Q2 State **TRUE** or **FALSE** for each of the following statement.

(a) Least Recently Used (LRU) in cache replacement is easy to be implemented with a stack of response time or second chance algorithm.

(1 mark)

(b) Cache hit ratio is defined as the percentage of total volume of data retrieved from cache to total volume of requested data.

(1 mark)

(c) In leased-based cache coherence, lease can be renewed either from server via broadcast or from client via request.

(1 mark)

(d) Exponentially Weighted Moving Average (EWMA) computes an access score to each item based on the inter-arrival time of consecutive accesses.

(1 mark)

(e) Access Response Time inclusive of time to retrieve message from broadcast channel or requesting message from server over dedicated request channel.

(1 mark)

SECTION C

Q3 (a) Explain **TWO (2)** basic modes of data accessing mechanism in mobile data delivery. (5 marks)

(b) Discuss **FIVE (5)** performance metrics that can be used in mobile data delivery. (10 marks)

Q4 (a) Discuss **FOUR (4)** applications of Global Positioning System (GPS) for civilian. (10 marks)

(b) (i) Identify **TWO (2)** types of satellite that suitable to be placed in Low Earth Orbit (LEO). (2 marks)

(ii) Give **TWO (2)** reasons for each of your answers in **Q4(b)(i)**. (3 marks)

Q5 Consider the following scenario.

> The farming and agricultural industry relies on innovative ideas and technological advancements to help increase yields and better allocate resources. The late 19th century and the 20th century brought a number of mechanical innovations, like tractors and harvesters. Today, a driving force behind increased agricultural production at a lower cost is the Internet of Things (IoT), which leaves the door wide open for engineers looking to bring a smart farming solution or IoT agricultural sensor to market.
>
> Internet of Things applications in agriculture include farm vehicle tracking, livestock monitoring, storage monitoring, and much more. For example:
>
> - Livestock sensors can notify ranchers when animals have roamed from the herd so that ranch hands can round them up.
> - Soil sensors can alert farmers to irregular conditions like high acidity, giving the farmer time to reconcile the issue and produce better crops.
> - Self-driving tractors can be controlled remotely.

(a) Identify **FIVE (5)** benefits of smart farming implementation to the farmers. (10 marks)

(b) Based on the given scenario, construct a suitable diagram to show how smart farming works. (5 marks)

Q6 Consider the following scenario.

> According to the most recent data from the International Labor Organization, every 15 seconds a worker dies from a work-related accident or disease. On top of 2.3 million deaths per year from work injuries. The great human cost also has an economic impact: For employers, on-the-job accidents cost billions of dollars annually due to production downtime and workers' compensation fees.
>
> The majority of workplace injuries are easily preventable through real-time monitoring of workers. After all, connected workers – aware of (and sensed by) their environment through wearable technologies – are inherently safer.
>
> For example, Smart wrist or smart band and sensors embedded in clothing and gear can be used to monitor workers' health and wellbeing by tracking such factors as heart rate, respiration, heat stress, fatigue and exposure. Notifications can be sent to workers' wearable devices when critical levels are reached.
>
> Machine and environmental sensors can provide contextual information to field workers to help keep them informed and aware of their surroundings; and wearable Global Positioning System (GPS) tracking can ensure they keep out of hazardous areas.
>
> Smart glasses and other HUDs allow employees to access work instructions and manuals in the field, in addition to enabling remote guidance. This aids their productivity and makes them safer, since accuracy (doing a job correctly) and safety go hand-in-hand.
>
> Camera-equipped wearable can also be used to document a job or incident for later review. Such data can be utilized for safety training and to identify safety issues in the work environment.
>
> In addition to providing real-time safety information and alerts to workers, wearable devices make for a safer workplace simply by the way in which they are used, i.e. hands-free.

(a) Based on the above case study, propose **FIVE (5)** ideas on how context-aware computing concept can be implemented when you design smart wrist device.

(10 marks)

(b) Based on **Q6(a)**, justify whether the design of your smart wrist device is an active or passive context-aware application. Give **TWO (2)** reasons for your justification.

(5 marks)

Q7 Consider the following scenario.

> Mobile health (m-Health) involves the clearest sense of e-Health evolution. The term mobile health was coined early in the 2000s and can easily be defined as using wireless technology to deliver health services and information through mobile communication devices, such as mobile phones, Personal Digital Assistants (PDAs), smartphones, monitoring devices, e-book readers and iPODs (i.e. any device with wireless connectivity that is capable of storing health information accessible by health professionals, if necessary, or having the ability to access the information remotely).

(a) Discuss **THREE (3)** types of Wireless Personal Area Network (WPAN) that can be implemented in m-Health.

(9 marks)

(b) Explain **THREE (3)** challenges in designing m-Health.

(9 marks)

(c) Propose **FOUR (4)** activities that can be done to overcome the challenges in **Q7(a)**.

(12 marks)

- END OF QUESTION -