INSTITUTE OF TECHNOLOGY BLANCHARDSTOWN

Year	Year 4
Semester	Semester 1
Date of Examination	
Time of Examination	

Prog Code	BN402	Prog Title	Bachelor of Science in Computing in Information Technology	Module Code	COMP H4025
Prog Code	BN104	Prog Title	Bachelor of Science (Honours) in Computing	Module Code	COMP H4025

Module Title	Ubiquitous Computing

Internal Examiner(s):   *Dr. Simon McLoughlin*
External Examiner(s):   *Mr. Michael Barrett*
                             Dr. Tom Lunney

Instructions to candidates:

1) **To ensure that you take the correct examination, please check that the module and programme which you are following is listed in the tables above.**
2) **Answer <u>any four</u> questions. All questions carry equal marks.**

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Question 1 (25 marks)

a) Briefly describe the area of computing known as Ubiquitous Computing.

[4 marks]

b) List four issues you should bear in mind while developing apps for mobile devices.

[4 marks]

c) Briefly describe four layouts used in Android applications. State which is the most versatile and why.

[8 marks]

d) Describe with the aid of a code example how the AsyncTask is used for doing lengthy operations off the UI thread. In your answer mention the callbacks doInBackground(), onProgressUpdate(), and onPostExecute().

[9 marks]

Question 2 (25 marks)

a) List the main steps involved in writing networked applications in Android.

[4 marks]

b) Write an Android method called downloadURL() to download the content located at the URL passed as a String and return the content as a String also.

[6 marks]

c) Show using Java code how SharedPreferences can be used to read/write values based on supplied keys.

[6 marks]

d) Outline the main differences between internal and external storage on Android devices.

[4 marks]

e) Write the main code statements required to create/open a database, execute an SQL statement and perform a raw query on a SQLite database within Android. What is the role of the Cursor object returned from the raw query?

[5 marks]

Question 3 (25 marks)

a) Describe briefly two challenges in determining the user location using mobile devices.

[4 marks]

b) List the location sources available to Android applications. Describe briefly how each operates and the merits of each.

[8 marks]

c) Describe the steps involved to get the current location of a device when using the Google Play Services API.

[5 marks]

d) Write the main code required to take a location (longitude, latitude) and convert it to an address using a Geocoder.

[4 marks]

e) Explain the concept of device orientation in Android applications, and how you should go about obtaining it. In terms of device orientation, what are roll, pitch and azimuth with respect to the device coordinate system?

[4 marks]

Question 4 (25 marks)

a) List four different types of Android sensor. For each type, state what it measures, whether it is hardware or software and what it is used for.

[8 marks]

b) Describe briefly the four main pieces of data that are provided as part of a Sensor event.

[4 marks]

c) Write Java code to achieve the following in an Android app:

   i.   Get a list of every sensor present on a device in Android and check this list for a particular sensor.
   ii.   Using the SensorManager, retrieve a reference to a particular type of Sensor.
   iii. Register the Sensor listener and implement the two sensor event handlers so you can retrieve new measurements and detect changes in accuracy.

[10 marks]

d) Explain the significance of the getMinDelay() method when using sensors?

[3 marks]

Question 5 (25 marks)

a) Describe briefly three best practices for optimising memory usage in Android applications.

[6 marks]

b) Describe four best practices for optimising the performance of your Android application.

[8 marks]

c) Outline the steps involved in using a Threadpool object to send operations to multiple threads.

[6 marks]

d) Describe using Java code how you can monitor the charging state and battery level of an Android Device.

[5 marks]