

University of Ruhuna - Faculty of Technology
Bachelor of Information and Communication Technology Honours Degree
Level 3 (Semester II) Examination, November/December 2023
Academic year 2021/2022

Course Unit: ICT3233 Mobile Application Development (Written)

Duration: 2 hours

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- Answer all Four (04) questions.

1)

a) In the field of software development, conventional software development and mobile application development are two distinct but interconnected domains.

i) Distinguish between *conventional software development* and *mobile software development* with three (03) key features.

[09 marks]

ii) Briefly discuss two (02) *interlinked core components* of a mobile application.

[12 marks]

b) *“Among many key approaches to mobile development, a developer argues that Android native app development is more popular than iOS native app development”.*

Do you agree with that argument? Justify your answer with three (03) reasons.

[20 marks]

c) i) Demonstrate the function of the *Linux kernel* with a neat diagram.

[12 marks]

ii) Provide three (03) important *native libraries* with their usage included in Android platform architecture.

[12 marks]

iii) Android SDK provides Java API framework with a comprehensive set of *key services*. Summarize three (03) such key services that help to build functionalities.

[15 marks]

d) *“Each Android app lives in its’ own security sandbox, protected by multiple advanced security features to employ a robust security model”.*

Do you agree with the above statement? Justify your answer.

[20 marks]

2)

a) Some app components depend on others while each type serves a distinct purpose and has a distinct life cycle.

- i) How do you activate app components except content providers? Hence, comment on *using ContentResolver in content providers*.

[10 marks]

- ii) Apply the given code below and imply the function of manifest file.

```
<manifest ...>
    <uses-feature android:name= "android.hardware.camera.any"
                Android:required= "true"/>
    <uses-sdk android: minSdkVersion= "7" android:targetSdkVersion="19"/>
    ...
</manifest>
```

[16 marks]

- b) To navigate transitions between stages of the activity lifecycle, the Activity class provides a core set of seven callbacks. Briefly explain the three (03) *callbacks* that the system invokes when the activity is running on the application.

[15 marks]

- c) An intent is a messaging object you can use to request an action from another app while facilitating communication between components in several ways.

- i) Distinguish between *implicit intent* and *explicit intent* with two (02) key features.

[12 marks]

- ii) Write down two (02) *native actions* available as static string constants in the intent class and mention their usage.

[12 marks]

- iii) Use two (02) types of *LinkifyMasks* to create hyperlinks within Text View as web URLs and email id. Thus, provide a code example to show the linkify views directly within a layout.

[15 marks]

- d) Among many processes, intent resolution is vital in deciding which activity is there to start when an implicit intent passes into startActivity. Hence, briefly report how Android resolves intents using intent filters.

[20 marks]

3)

a) The Android SDK includes a number of layout classes. In most cases, building your UI will include many Views contained within one or more nested layouts.

i) Suppose that you have decided to use frame layout over linear layout in your Android UI design. Show three (03) *frame layout attributes* in a sample Android code where it can set the color of foreground as Green, gravity as top and horizontally centered and view as visible.

[10 marks]

ii) Write an *XML code* to display the output shown in Figure 01 using a Linear layout in Android.

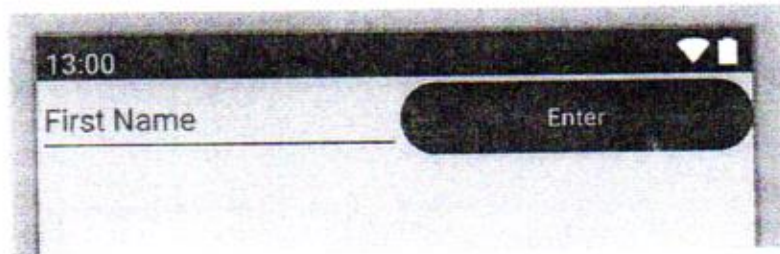


Figure 01: Desired output in the Android application

[20 marks]

b) Android fragments have their own life cycle very similar to an Android activity. Thus, sketch the *fragment life cycle* which includes all the methods from fragment start to fragment end.

[20 marks]

c) Adapter and Adapter View are so popular, that every time you see any app with a List of items or Grid of items, you can say for sure that it is using Adapter and Adapter View.

i) Determine what an *adapter* and *adapter view* are in Android development.

[10 marks]

ii) "*Adapter is only responsible for taking the data from a data source and converting it into View and then passing it to the AdapterView*".

Do you agree with the above statement? Justify your answer.

[10 marks]

iii) What parameters would you use in *ArrayAdapter*? Provide simple code examples for each parameter declaration in *ArrayAdapter*.

[12 marks]

d) Android *AsyncTask* is an abstract class provided by Android as it streamlines many tasks in the application. Hence, discuss the need of using *AsyncTask* in Android development.

[18 marks]

4)

a) SQLite is a structured query-based, open source and light weight database used in Android database implementation.

i) Briefly explain three (03) distinct *features of SQLite* that would be useful in Android application development.

[12 marks]

ii) Show how SQLite supports the concept of *type affinity* on columns with two examples of type affinities.

[09 marks]

b) SQLiteOpenHelper class supports database abstract methods to get rid common problems in database implementation in Android applications. Hence, prepare two (02) such common problem scenarios which can be eliminated using *SQLiteOpenHelper*.

[10 marks]

c) SQLiteDatabase class has methods to create, delete and execute SQL commands to perform database management tasks.

i) Contrast two (02) *types of queries* which can be used to perform database tasks with an example code for each.

[10 marks]

ii) State whether the following statements are True/False. Justify your answer.

[09 marks]

a. In Update function of database query, there are four parameters and two parameters are similar to insert function.

b. In Delete function of database query, the "where" clause is mandatory.

c. When reading data in a database, Cursor.moveToPrevious() method is used to move the cursor to the previous column relative to the specified position.

iii) Suppose that you have provided the following code snippet in Figure 02 where it creates a SQL table to add course details through the window provided in Figure 03. Based on the details given below, write a code to demonstrate a method which can add a new course to the created table in the database.

[09 marks]

```

@Override
public void onCreate(SQLiteDatabase db) {
    // on below line we are creating
    // an sqlite query and we are
    // setting our column names
    // along with their data types.
    String query = "CREATE TABLE " + TABLE_NAME + " ("
        + ID_COL + " INTEGER PRIMARY KEY AUTOINCREMENT, "
        + NAME_COL + " TEXT, "
        + DURATION_COL + " TEXT, "
        + DESCRIPTION_COL + " TEXT, "
        + TRACKS_COL + " TEXT)";

    // at last we are calling a exec sql
    // method to execute above sql query
    db.execSQL(query);
}

```

Figure 02: Creating a table using SQLiteOpenHelper class

Figure 03: Add Course Window

- d) JSON is the best alternative to XML when the Android app needs to interchange data from server.
- i) Determine why the developers prefer *JSON* over XML in Android application development with three (03) key points.

[09 marks]
 - ii) What are the two classes used in Android SDK to manipulate JSON data? Provide example code to show the initialization of each class and their output.

[20 marks]
 - iii) Assume that you have written a Java code snippet to pass the data written in JSON class in your Android application as shown in Figure 04. Choose three (03) *JSONObject*

parsing methods used in the below code in Figure 04 and briefly discuss the function of chosen methods relevant to the given code.

```
try {  
    String jsonString = "{\"people\": [ {\"name\": \"John Doe\", \"age\": 25, \"city\": \"New York\"}, {\"name\": \"Jane Smith\", \"age\": 30, \"city\": \"Los Angeles\"}]}\"";  
    JSONObject jsonObject = new JSONObject(jsonString);  
    JSONArray peopleArray = jsonObject.getJSONArray("people");  
    for (int i = 0; i < peopleArray.length(); i++) {  
        JSONObject personObject = peopleArray.getJSONObject(i);  
        String name = personObject.getString("name");  
        int age = personObject.getInt("age");  
        String city = personObject.getString("city");  
        Log.d("JSONArrayParsing", "Person " + (i + 1) + ": Name: " + name + ", Age: " + age + ", City: " + city);  
    }  
} catch (JSONException e) {  
    e.printStackTrace();  
}
```

Figure 04: Java Code with JSONObject parsing methods

[12 marks]

.....End of the paper.....