

UNIT 3 – User Interface and Design

Assignment 3

Q1. What are Android User Interface (UI) components? Explain their importance in app development.

UI components are the visual elements that make up the layout of an Android application. They include widgets like **TextView**, **Button**, **EditText**, **ImageView**, and layout containers like **LinearLayout**, **ConstraintLayout**, etc.

Importance

1. **User Interaction:** UI components allow users to interact with the app (click buttons, enter text, scroll lists).
 2. **Visual Structure:** They define how information is displayed on the screen.
 3. **User Experience (UX):** A clean and intuitive UI improves usability and retention.
 4. **Consistency:** Helps maintain a standard look and feel across different screens.
 5. **Responsiveness:** Layout components help build UIs that adjust to different screen sizes.
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Q2. Compare LinearLayout and ConstraintLayout with examples.

1. LinearLayout

- Arranges elements **in a single direction**: vertical or horizontal.
- Simple and easy to use.
- Not efficient for complex UIs.

Example Usage:

A vertical form with **TextView** → **EditText** → **Button**.

XML Example:

```
<LinearLayout  
    android:orientation="vertical">  
    <TextView />  
    <EditText />  
    <Button />  
</LinearLayout>
```

2. ConstraintLayout

- Allows positioning of UI elements using **constraints** (left, right, top, bottom).
- Supports complex layouts with fewer nested views.
- More efficient and recommended for modern UI design.

Example Usage:

Place a button at the center of the screen.

XML Example:

```
<ConstraintLayout>  
    <Button  
        app:layout_constraintTop_toTopOf="parent"  
        app:layout_constraintBottom_toBottomOf="parent"  
        app:layout_constraintStart_toStartOf="parent"  
        app:layout_constraintEnd_toEndOf="parent"/>  
</ConstraintLayout>
```

Q3. What is the purpose of TextView and ImageView? Give one example of each.

TextView

Used to display text to the user.

Example:

Showing “Welcome to MyApp”.

```
<TextView  
    android:text="Welcome to MyApp"/>
```

ImageView

Used to display images such as icons, photos, and logos.

Example:

Displaying the app logo.

```
<ImageView  
    android:src="@drawable/app_logo"/>
```

Q4. Explain the role of RecyclerView and why it is preferred over ListView.

Role of RecyclerView

RecyclerView is a powerful view used to display **large lists or grids** of data efficiently.

Why preferred over ListView

1. **ViewHolder pattern built-in** → Better performance.
2. **Recycling of views** → Smooth scrolling.
3. **Supports multiple layouts** (linear, grid, staggered).
4. **Highly customizable** using Adapters and LayoutManagers.
5. **Animation support** for adding/removing items.

ListView is older, less flexible, and not optimized for modern apps.

Q5. What is meant by Data Persistence in Android applications? Why is it important?

Data Persistence

Data persistence means **storing data so that it remains available even after the app is closed.**

Importance

1. **Saves user data** such as login info, settings, history.
 2. **Improves user experience** by keeping data across sessions.
 3. **Reduces network usage** by caching data locally.
 4. Necessary for offline availability.
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Q6. Steps to create and manage a SQLite database in Android.

Steps

1. **Create a class extending SQLiteOpenHelper**
 - Override `onCreate()` to create tables.
 - Override `onUpgrade()` to manage updates.
 2. **Define database name, version, and table schema.**
 3. **Use `getWritableDatabase()` or `getReadableDatabase()`** to open the database.
 4. **Perform CRUD operations:**
 - Insert (`insert()`)
 - Read (`query()`/`rawQuery`)
 - Update (`update()`)
 - Delete (`delete()`)
 5. **Close the database** after operations (handled by helper class).
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Q7. What are Content Providers in Android? How do they work with Cursors?

Content Providers

A Content Provider manages **shared app data** and provides a standard interface for other apps to access it.

Examples:

- Contacts
- MediaStore
- Call Logs

How they work with Cursors

- When an app requests data (query), the Content Provider returns a **Cursor**.
 - A Cursor is a pointer to the result set of the query.
 - Apps use the Cursor to read data **row-by-row and column-by-column**.
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Q8. Explain the role of Firebase Real-time Database in Android development.

Firebase Real-time Database

A cloud-based NoSQL database from Google that stores data in **JSON format** and syncs it **in real time**.

Role in Android Apps

1. **Real-time synchronization** → Data updates instantly across all devices.
2. **Online + Offline support** → Caches data when offline.
3. **No need for backend servers** → Firebase handles all server-side operations.
4. **Ideal for apps like:**
 - Chat apps
 - Live tracking apps

- Collaborative apps
- Notifications/feeds