

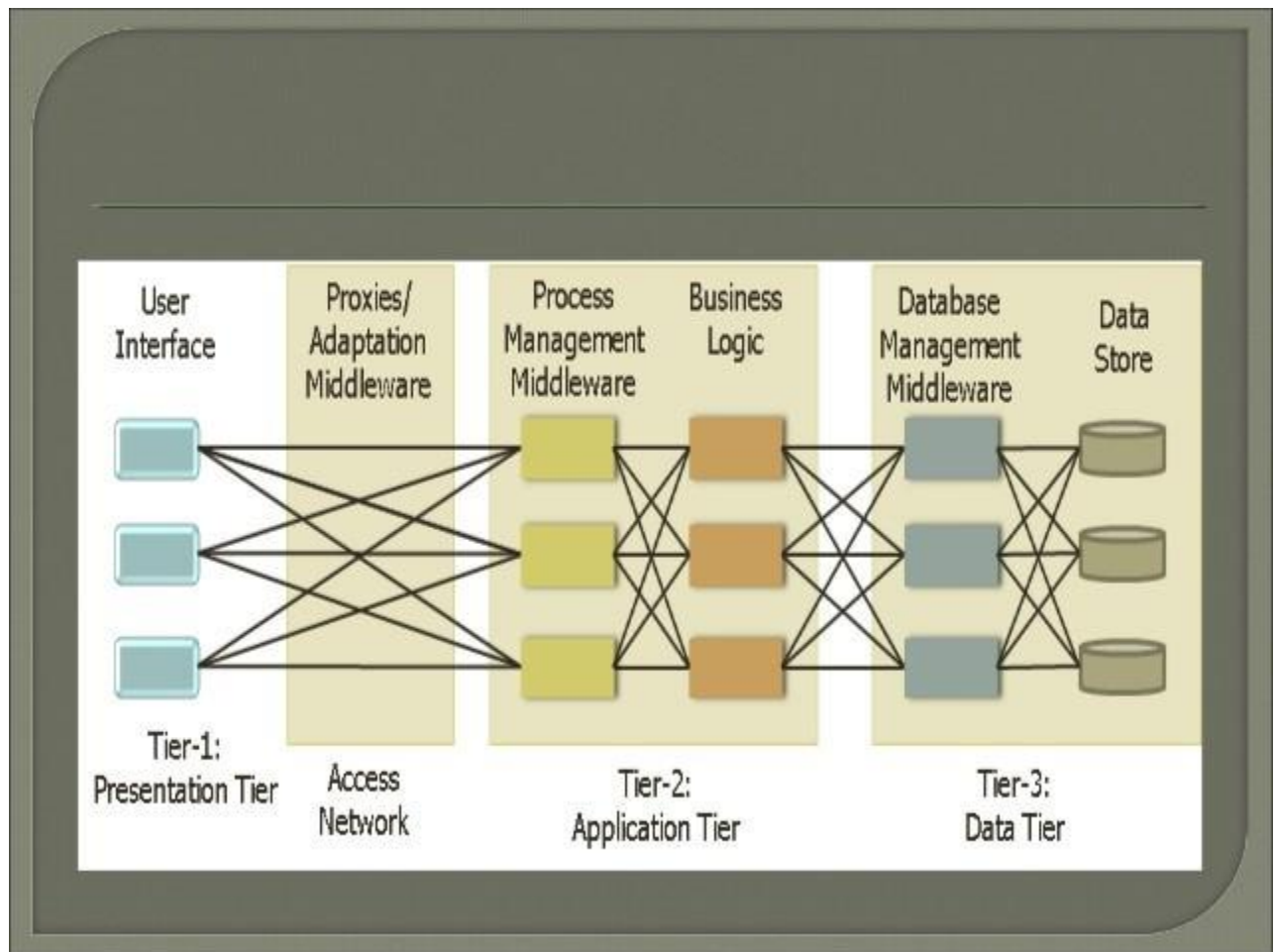
## Mobile application development

### Important Question: 10 marks

1. Write and explain architecture of mobile computing.

Answer :

### Mobile Computing Architecture in detail



A 3-tier architecture is an application program that is organized into three major parts, comprising of:

- *The data access layer tier at the bottom,*
- *The application tier (business logic) in the middle and*
- *The client tier (presentation) at the top.*

**Each tier is distributed to a different place or places in a network.** These tiers do not necessarily correspond to physical locations on various computers on a network, but rather to logical layers of the application.

### **1. Presentation Layer (UI):**

- This layer presents data to the user and optionally permits data manipulation and data entry, also this layer requests the data from Business layer.
- This layer accomplished through use of Dynamic HTML and client-side data sources and data cursors.

### **2. Business Logic Layer:**

- The business logic acts as the server for client requests from workstations. It acts according Business rules fetch or insert data through the Data Layer.
- In turn, it determines what data is needed (and where it is located) and acts as a client in relation to a third tier of programming that might be located on a local or mainframe computer.
- Because these middle-tier components are not tied to a specific client, they can be used by all applications and can be moved to different locations, as response time and other rules require.

### **3. Data Access Layer:**

- The third tier of the 3-tier system is made up of the DBMS that provides all the data for the above two layers.
- This is the actual DBMS access layer.
- Avoiding dependencies on the storage mechanisms allows for updates or changes without the application tier clients being affected by or even aware of the change.

## 2. Explain GSM, GPRS?

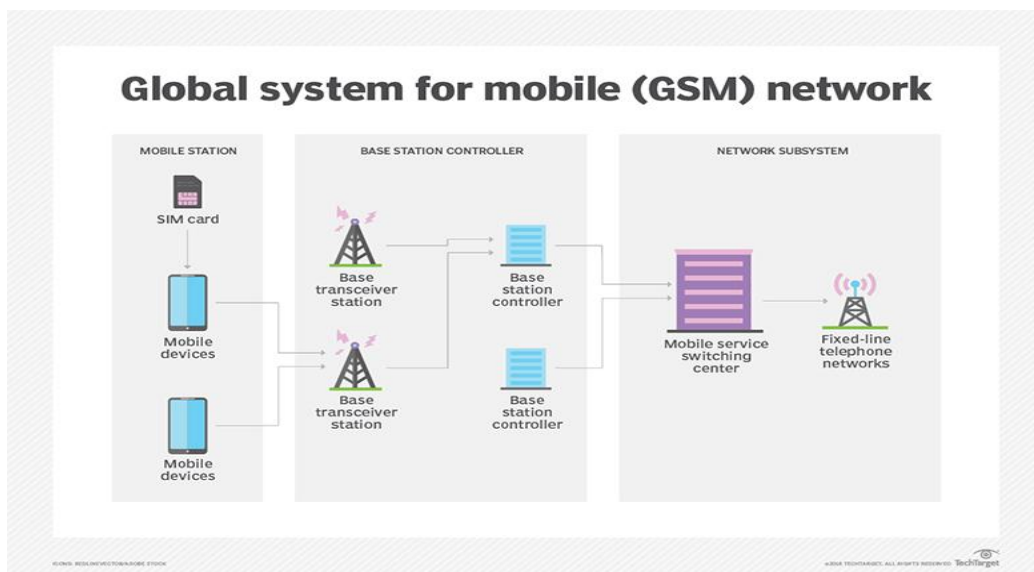
Answer;

### **GSM**

- GSM stands for **G**lobal **S**ystem for **M**obile Communication. It is a digital cellular technology used for transmitting mobile voice and data services.
- The concept of GSM emerged from a cell-based mobile radio system at Bell Laboratories in the early 1970s.

- GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard.
- GSM is the most widely accepted standard in telecommunications and it is implemented globally.
- GSM is a circuit-switched system that divides each 200 kHz channel into eight 25 kHz time-slots. GSM operates on the mobile communication bands 900 MHz and 1800 MHz in most parts of the world. In the US, GSM operates in the bands 850 MHz and 1900 MHz.
- GSM owns a market share of more than 70 percent of the world's digital cellular subscribers.
- GSM makes use of narrowband Time Division Multiple Access (TDMA) technique for transmitting signals.
- GSM was developed using digital technology. It has an ability to carry 64 kbps to 120 Mbps of data rates.
- Presently GSM supports more than one billion mobile subscribers in more than 210 countries throughout the world.
- GSM provides basic to advanced voice and data services including roaming service. Roaming is the ability to use your GSM phone number in another GSM network.

GSM digitizes and compresses data, then sends it down through a channel with two other streams of user data, each in its own timeslot.



## **GPRS**

General Packet Radio Service (GPRS) is a packet-based mobile data service on the global system for mobile communications (GSM) of 3G and 2G cellular communication systems. It is a non-voice, high-speed and useful packet-switching technology intended for GSM networks.

GPRS can be used to enable connections depending on Internet protocols that support a wide variety of enterprises, as well as commercial applications. It enables the sending and receiving of compact data bursts and large data volumes across mobile phone networks. Prior to sending the data, it is broken into individual packets and shifted through the core network and radio. The data is then reassembled at the recipient's end.

GPRS provides computer and mobile users with a steady Internet connection. The packet-oriented characteristic enhances the data transfer speed. In order to make use of GPRS, users should possess a terminal or mobile phone that has GPRS support, and a GPRS-compatible mobile network subscription.

Advantages of GPRS include:

- High-speed: GPRS offers an optimum speed of 171.2 kbps, which is almost three times quicker than the data transfer speed of fixed telecommunications networks. Also, it is ten times faster than the existing GSM network services
- Instant connection and immediate data transfer: GPRS provides instantaneous and steady connections, which permit data to be sent wherever and whenever required
- Cost-effective solution: Minimizes the incremental expenditure required for providing data services. This in turn enables increase in the penetration of data services amongst business and consumer users
- Innovative and superior applications: GPRS facilitates usage of Internet applications over mobile networks. This includes Web browsing, IM messages, e-commerce and location oriented applications. In addition, it allows for file transfer and the ability to remotely gain access for monitoring or controlling machines and house appliances

### 3. Feature and architecture of Android.

Answer:

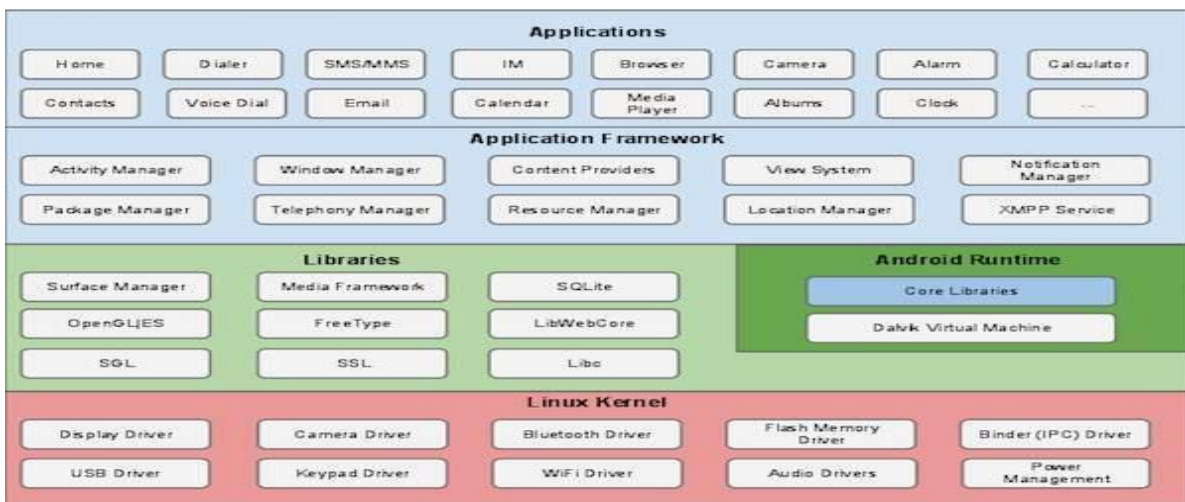
## Features of Android

Sr.No.	Feature & Description
1	<b>Beautiful UI</b> Android OS basic screen provides a beautiful and intuitive user interface.
2	<b>Connectivity</b> GSM/EDGE, IDEN, CDMA, EV-DO, UMTS, Bluetooth, Wi-Fi, LTE, NFC and WiMAX.
3	<b>Storage</b> SQLite, a lightweight relational database, is used for data storage purposes.
4	<b>Media support</b> H.263, H.264, MPEG-4 SP, AMR, AMR-WB, AAC, HE-AAC, AAC 5.1, MP3, MIDI, Ogg Vorbis, WAV, JPEG, PNG, GIF, and BMP.
5	<b>Messaging</b> SMS and MMS
6	<b>Web browser</b> Based on the open-source WebKit layout engine, coupled with Chrome's V8 JavaScript engine supporting HTML5 and CSS3.
7	<b>Multi-touch</b> Android has native support for multi-touch which was initially made available in handsets such as the HTC Hero.
8	<b>Multi-tasking</b> User can jump from one task to another and same time various application can run simultaneously.

9	<p><b>Multi-Language</b></p> <p>Supports single direction and bi-directional text.</p>
10	<p><b>Wi-Fi Direct</b></p> <p>A technology that lets apps discover and pair directly, over a high-bandwidth peer-to-peer connection.</p>

### Architecture:

Android operating system is a stack of software components which is roughly divided into five sections and four main layers as shown below in the architecture diagram.



### Linux kernel

At the bottom of the layers is Linux - Linux 3.6 with approximately 115 patches. This provides a level of abstraction between the device hardware and it contains all the essential hardware drivers like camera, keypad, display etc. Also, the kernel handles all the things that Linux is really good at such as networking and a vast array of device drivers, which take the pain out of interfacing to peripheral hardware.

### Libraries

On top of Linux kernel there is a set of libraries including open-source Web browser engine WebKit, well known library libc, SQLite database which is a useful repository for storage and sharing of application data, libraries to play and record audio and video, SSL libraries responsible for Internet security etc.

## Android Libraries

This category encompasses those Java-based libraries that are specific to Android development. Examples of libraries in this category include the application framework libraries in addition to those that facilitate user interface building, graphics drawing and database access. A summary of some key core Android libraries available to the Android developer is as follows –

- **android.app** – Provides access to the application model and is the cornerstone of all Android applications.
- **android.content** – Facilitates content access, publishing and messaging between applications and application components.
- **android.database** – Used to access data published by content providers and includes SQLite database management classes.
- **android.opengl** – A Java interface to the OpenGL ES 3D graphics rendering API.
- **android.os** – Provides applications with access to standard operating system services including messages, system services and inter-process communication.
- **android.text** – Used to render and manipulate text on a device display.
- **android.view** – The fundamental building blocks of application user interfaces.
- **android.widget** – A rich collection of pre-built user interface components such as buttons, labels, list views, layout managers, radio buttons etc.
- **android.webkit** – A set of classes intended to allow web-browsing capabilities to be built into applications.

Having covered the Java-based core libraries in the Android runtime, it is now time to turn our attention to the C/C++ based libraries contained in this layer of the Android software stack.

## Android Runtime

This is the third section of the architecture and available on the second layer from the bottom. This section provides a key component called **Dalvik Virtual Machine** which is a kind of Java Virtual Machine specially designed and optimized for Android.

The Dalvik VM makes use of Linux core features like memory management and multi-threading, which is intrinsic in the Java language. The Dalvik VM enables every Android application to run in its own process, with its own instance of the Dalvik virtual machine.

The Android runtime also provides a set of core libraries which enable Android application developers to write Android applications using standard Java programming language.

## Application Framework

The Application Framework layer provides many higher-level services to applications in the form of Java classes. Application developers are allowed to make use of these services in their applications.

The Android framework includes the following key services –

- **Activity Manager** – Controls all aspects of the application lifecycle and activity stack.
- **Content Providers** – Allows applications to publish and share data with other applications.
- **Resource Manager** – Provides access to non-code embedded resources such as strings, color settings and user interface layouts.
- **Notifications Manager** – Allows applications to display alerts and notifications to the user.
- **View System** – An extensible set of views used to create application user interfaces.

## Applications

You will find all the Android application at the top layer. You will write your application to be installed on this layer only. Examples of such applications are Contacts Books, Browser, Games etc.

### 4. Differentiate TMDA, FDMA, and CDMA.

Answer:

<b>BASIS OF COMPARISON</b>	<b>SDMA</b>	<b>TDMA</b>	<b>FDMA</b>	<b>CDMA</b>
<b>Idea</b>	Segment spaced into cells or sectors.	Segments sending time into disjoint time slots demand driven or fixed patterns.	Segment the frequency band into disjoint sub-bands.	Spread the spectrum using orthogonal codes.
<b>Signal Separation</b>	Cell structure, directed antennas.	Synchronization in time domain.	Filtering in the frequency domain.	Code plus special receivers.
<b>Cell Capacity</b>	Depends on the cell area.	Limited	Limited	No absolute limit on channel capacity but it is an interference limited system.
<b>Terminals</b>	Only one terminal can be active in one cell or	All terminals are active for short periods of time on same	Every terminal has its own frequency uninterrupted.	All terminals can be active at the same place at the same



	one sector.	frequency.		moment uninterrupted.
<b>Transmission Scheme</b>	Continuous	Discontinuous	Continuous	Continuous
<b>Advantages</b>	Very simple & increases performance capacity.	Flexible & established fully digital.	Simple, established, robust.	Flexible, less frequency planning needed, soft handover.
<b>Disadvantages</b>	It is inflexible as antennas are typically fixed.	Guard space needed (multipath propagation), synchronization difficulty.	Inflexible, frequencies are a scarce resource.	Complex receivers, needs more complicated power control for senders.
<b>What To Note</b>	Only useful in combination with TDMA, FDMA or CDMA.	It is a standard in fixed networks. Also together with FDMA or SDMA used in many mobile networks.	Typically combined with TDMA and SDMA.	Still faces some problems such as higher complexity. It can be integrated with TDMA or FDMA.

5. How to link activities and indent?

Answer:

6. What do you mean view and viewgroup?

Answer:

### Views:-

The basic building block for user interface is a View object which is created from the View class and occupies a rectangular area on the screen and is responsible for drawing and event handling. View is the base class for widgets, which are used to create interactive UI components like buttons, text fields, etc.

### ViewsGroup:-

The ViewGroup is a subclass of View and provides invisible container that hold other Views or other ViewGroups and define their layout properties.

At third level we have different layouts which are subclasses of ViewGroup class and a typical layout defines the visual structure for an Android user interface and can be created either at run time using View/ViewGroup objects or you can declare your layout using simple XML file main\_layout.xml which is located in the res/layout folder of your project.

7. Write a program textbox and Radio button .

Answer:

8. What do you mean by view? Explain Image view, gallery view and grid view.

Answer:

### Views:-

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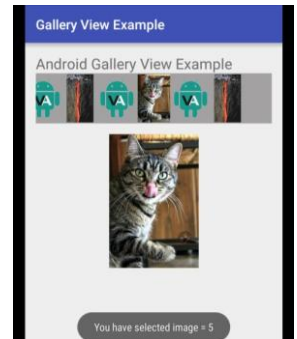
### Image View:-

Android ImageView is used to display an image file. Android also has an Image button. As the name suggests, the ImageButton component is a button with an image on. The ImageButton is represented by the Android class android.widget.ImageButton. In this tutorial we're going to implement both android ImageView and ImageButton in our application



## GALLERY VIEW:-

In Android, Gallery is a view used to show items in a center locked, horizontal scrolling list and user will select a view and then user selected view will be shown in the center of the Horizontal list. The items in Gallery are added using Adapter just like in ListView or GridView.



## GRID VIEW:-

In android GridView is a view group that display items in two dimensional scrolling grid (rows and columns), the grid items are not necessarily predetermined but they are automatically inserted to the layout using a ListAdapter. Users can then select any grid item by clicking on it. GridView is default scrollable so we don't need to use ScrollView or anything else with GridView.



GridView is widely used in android applications. An example of GridView is your default Gallery, where you have number of images displayed using grid.

Adapter Is Used To Fill Data In Gridview: To fill the data in a GridView we simply use adapter and grid items are automatically inserted to a GridView using an Adapter which pulls the content from a source such as an arraylist, array or database. You can read full Adapter tutorial here.

Answer:

SMS Stands for "Short Message Service." SMS is used to send text messages to mobile phones. The messages can typically be up to 160 characters in length, though some services use 5-bit mode, which supports 224 characters. SMS was originally created for phones that use GSM (Global System for Mobile) communication, but now all the major cell phone systems support it.

#### 10. Displaying a Google Map in your Android Phone.

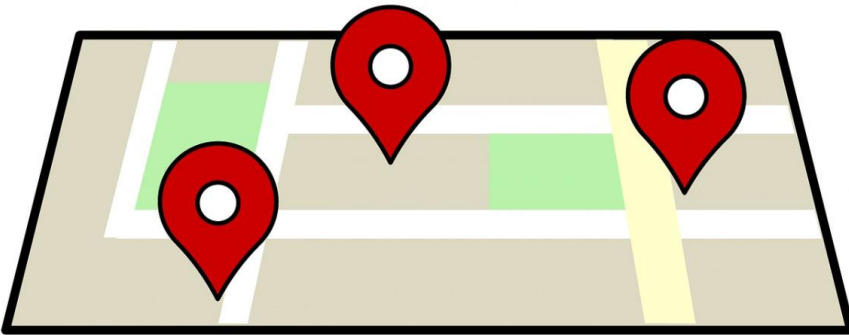
Answer:

Google Maps is one of the most widely used services nowadays. It is an incredibly versatile tool which is quick and easy to handle. Starting from measuring the distance between any two locations to providing directions to the drivers, bikers, walkers, and users of public transportation it helps users in a variety of ways.

Google Maps have made our life much easier and now it's difficult to imagine a life without it. Do you know how to use it? Here is a step-by-step instruction on how to use Google Maps. Before you start using Google Maps, you need to do the following:

- Turn on GPS
- Let Google Maps access your current location and audio speakers

Here's a guide to get you started using Google Maps



**Step 1:** At first you need to open the Google Maps app.

**Step 2:** Search for a place or tap it on the map.

**Step 3:** In the bottom right, tap directions. (You can even add the destinations)

**Step 4:** To add destination you have to go to the top right and tap more and then add a stop.

**Step 5:** Choose one of the following:

- Driving
- Transit

- Walking
- Ride Services
- Cycling

**Step 6:** If other routes are available, they will be shown in gray on the map. To follow an alternate route, tap the grayline.

**Step 7:** To start navigation, tap Start.

**Step 8:** To stop or cancel navigation, go to the bottom left and tap Close

## 11. What is Geo coding and Reverse coding ?

Answer:

**Reverse geocoding** is the process of back (reverse) coding of a point location (latitude, longitude) to a readable address or place name. This permits the identification of nearby street addresses, places, and/or areal subdivisions such as neighbourhoods, county, state, or country. Combined with **geocoding** and **routing** services, reverse geocoding is a critical component of mobile **location-based services** and **Enhanced 911** to convert a coordinate obtained by **GPS** to a readable street address which is easier to understand by the end user.

Geocoding is the process of transforming a description of a location—such as a pair of coordinates, an address, or a name of a place—to a location on the earth's surface. You can geocode by entering one location description at a time or by providing many of them at once in a table. The resulting locations are output as geographic features with attributes, which can be used for mapping or spatial analysis.

## 12. In SQLite creating and using database.

Answer:

### SQLite CREATE Database:

Unlike other database management systems, there is no **CREATE DATABASE** command in SQLite. In SQLite, here is how you can create a new database:

- Open the Windows Command Line tool (cmd.exe) from the start, type "**cmd**" and open it.
- The "**cmd**" will open in the default user folder, on my machine, it is "**C:\Users\MGA**":

```
Administrator: Command Prompt
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\MGA>
```

- From the Installation and packages tutorial, you should now have created an SQLite folder in the "C" directory and copied the sqlite3.exe on it.
- After that we should navigate to where the sqlite3.exe is located by the following command:

```
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\MGA>cd C:\sqlite
C:\sqlite>
```

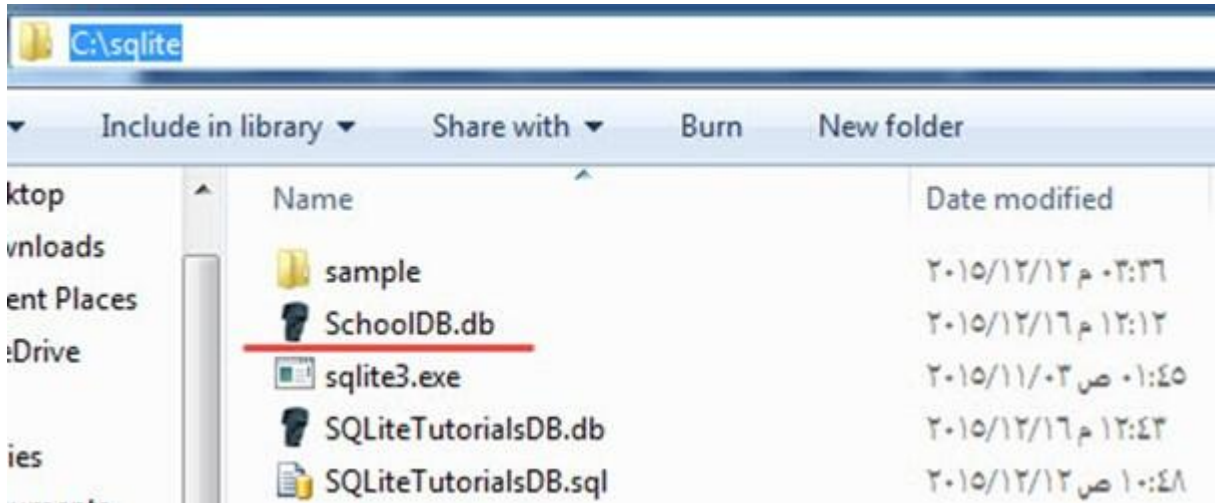
- Following is the basic syntax of sqlite3 command to create a database

```
sqlite3 SchoolDB.db
```

- This will create a new database with the name "**SchoolDB.db**" in the same directory where you have copied your .exe file.

```
C:\sqlite>sqlite3 SchoolDB.db
SQLite version 3.9.2 2015-11-02 18:31:45
Enter ".help" for usage hints.
sqlite>
```

- If you navigate to the directory: "**c:\sqlite**", you will find the file "**SchoolDB.db**" is created as the following screen shot:



- You can ensure that the database is created by writing the following command:

```
.databases
```

This will give you the list of databases created, and you should see the new database "SchoolDB.db" listed there:

```
sqlite> .databases
seq  name          file
----  -
0    main             C:\sqlite\SchoolDB.db
sqlite>
```

## USING DATABASE:

In the following example, we will create the sample database. We will use this sample database throughout the SQLite tutorials, with the name "SQLiteTutorialsDB" and populate it with the tables. As following:

- Open a text file and paste the following commands on it:
- CREATE TABLE [Departments] (  
• [DepartmentId] INTEGER NOT NULL PRIMARY KEY,  
• [DepartmentName] NVARCHAR(50) NOT NULL

```

• );
• CREATE TABLE [Students] (
• [StudentId] INTEGER PRIMARY KEY NOT NULL,
• [StudentName] NVARCHAR(50) NOT NULL,
• [DepartmentId] INTEGER NULL,
• [DateOfBirth] DATE NULL
• );
• CREATE TABLE [Subjects] (
• [SubjectId] INTEGER NOT NULL PRIMARY KEY,
• [SubjectName] NVARCHAR(50) NOT NULL
• );
• CREATE TABLE [Marks] (
• [StudentId] INTEGER NOT NULL,
• [SubjectId] INTEGER NOT NULL,
• [Mark] INTEGER NULL
• );

```

The code above will create four tables as following:





- **"Departments"** table with the following columns:
  - **"DepartmentId"** an integer number indicates the department id, and it is declared as a PRIMARY KEY (explained later in Column Constraints Section).
  - **"DepartmentName"** – a string name for the department, and it doesn't allow null values using NOT NULL constraint.
- **"Students"** table with the following columns:
  - **"StudentId"** an integer number, and it is declared as a PRIMARY KEY.
  - **"StudentName"** – the name of the student and it doesn't allow a null value using NOT NULL constraint.
  - **"DepartmentId"** Integer number that refers to the department Id to the department id column in the departments table.
  - **"DateOfBirth"** The date of birth of the student.
- **"Subjects"** table with the following columns:
  - **"SubjectId"** an integer number and it is declared as a PRIMARY KEY.
  - **"SubjectName"** a string value and it doesn't allow null values.
- **"Marks"** table with the following columns:
  - **"StudentId"** integer indicates a student id.
  - **"SubjectId"** integer indicates a subject Id.
  - **"Mark"** the mark a student gets in a specific subject it is also integer and it does allow null values.



- Save the file to SQLite as "SQLiteTutorialsDB.sql" in the same location where sqlite3.exe is located.
- Open cmd.exe, and navigate to the directory where sqlite3.exe is located.
- Write the following command:

```
sqlite3 SQLiteTutorialsDB.db < SQLiteTutorialsDB.sql
```

- Then, a new database "SQLiteTutorialsDB" should be created, and the file "SQLiteTutorialsDB.db" will be located in the same directory. As following:

Name	Date modified
 SchoolDB.db	٢٠١٥/١٢/١٢ م ٠٢:٢٢
 sqlite3.exe	٢٠١٥/١١/٠٣ ص ٠١:٤٥
 SQLiteTutorialsDB.db	٢٠١٥/١٢/١١ م ٠٢:١٩
 SQLiteTutorialsDB.sql	٢٠١٥/١٢/١٢ ص ١٠:٤٨

- You can ensure that this table is created by opening the database we just created like this:

```
.open SQLiteTutorialsDB.db
```

- Then write the following command:

```
.tables
```

- This command will give you the list of tables in the "SQLiteTutorialsDB", and you should see the four tables we had just created:

```
sqlite> .open SQLiteTutorialsDB.db
sqlite> .tables
Departments Marks Students Subjects
sqlite>
```

**4 marks:**

1. Write a short note on WIFI and WIMAX.

Answer:

**WiFi:**

WiFi stands for Wireless Fidelity. WiFi uses Radio waves to provide wireless high-speed internet and network connections. A WiFi connection is established using a wireless adapter to create hotspots. WiFi antennas size small enough to ne placed on a very small router. WiFi can be used to connect with printer, computers, gaming consoles and many more.

**WiMax:**

WiMax stands for Wireless Inter-operability for Microwave Access. WiMax uses licensed or unlicensed spectrum to deliver connection to network. WiMax handle a larger inter-operable network. WiMax can be used to provide internet services such as mobile data and WiFi spots.

2. Function of Mobile computing function.

Answer:

1. User mobility: User should be able to move from one physical location to another location and use same service
2. Network mobility: User should be able to move from one network to another network and use same service
3. Device mobility: User should be able to move from one device to another and use same service
4. Session mobility: A user session should be able to move from one user-agent environment to another.
5. Service mobility: User should be able to move from one service to another.
6. Host mobility: The user should be either a client or server.

The mobile computing functions can be logically divided into following major segments

**1) User with device:** The user device, this could be fixed device like desktop computer in office or a portable device like mobile phone. E.g Laptop Computers, Desktop Computers, Fixed Telephones, Mobile Phones, Digital TV with set top box, palmtop computers, pocket PCs, two way pagers, handheld terminals etc.

**2) Network:** Whenever a user is mobile, he will be using different networks at different places at different time eg GSM, CDMA, iMode, Ethernet, Wireless LAN, and Bluetooth etc.

**3) Gateways:** This is required to interface different transport bearers. These gateways convert one specific transport bearer. These gateways convert one specific transport bearer to another transport bearer.

**4) MiddleWare:** This is more of a function rather than a separate visible node. In the present context middleware handles the presentation and rendering of the context on a particular device. It will also handle the security and personalization for different users.

**5) Content:** This is the domain where the origin server and content is This could be an application, system or even an aggregation of systems. The content can be mass market, personal or corporate content. Origin Server will have some means to accessing the database and the storage devices.

### 3. Feature of 2G and 3G.

Answer:

#### **3G**

- Speed of up to 2 Mbps
- Increased bandwidth and data transfer rates
- Send/receive large email messages
- Large capacities and broadband capabilities

#### **2G**

- Data speeds of up to [64 kbps](#)
- Use of digital signals instead of analog
- Enabled services such as SMS and MMS (Multimedia Message)
- Provided better quality voice calls
- It used a bandwidth of 30 to 200 KHz

### 4. Evaluation of Mobile OS

### 5. What is DVM (Dalvik Virtual machine).

Answer:

**Dalvik** is a discontinued [process virtual machine \(VM\)](#) in [Google's Android operating system](#) that executes applications written for Android.

(Dalvik bytecode format is still used as a distribution format, but no longer at runtime in newer Android versions.) Dalvik was an integral part of the Android software stack in the (now unsupported) [Android versions 4.4 "KitKat"](#) and earlier, which were commonly used on mobile devices such as [mobile phones](#) and [tablet computers](#), and more in some devices such as [smart TVs](#) and [wearables](#). Dalvik is [open-source software](#).

6. Explain Analog and digital view .
7. Consuming Web services using http.

