1a. Explain activity life cycle?(5)

Ans:

Let's see the 7 lifecycle methods of android activity.

onCreate called when activity is first created.

onStart called when activity is becoming visible to the user.

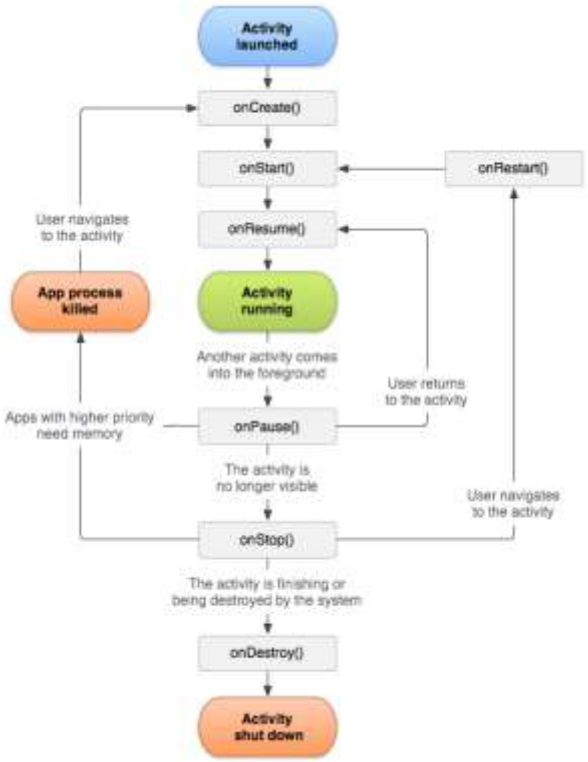
onResume called when activity will start interacting with the user.

onPause called when activity is not visible to the user.

onStop called when activity is no longer visible to the user.

onRestart called after your activity is stopped, prior to start.

onDestroy called before the activity is destroyed.



1b. What is emulator?explain?(5)

The Android Emulator is fast, powerful, and feature-rich. It can transfer information faster than using a connected hardware device, speeding up the development process. The multi-core feature lets the emulator take advantage of multiple core processors on your development computer to improve emulator performance even more.

The Android Emulator supports most features of a device, but doesn't include virtual hardware for:

- WiFi
- Bluetooth
- NFC
- SD card insert/eject
- Device-attached headphones
- USB

The watch emulator for Android Wear doesn't support the Overview (Recent Apps) button, D-pad, and fingerprint sensor.

While most end users of phones and tablets tend to use earlier API levels, Android Wear and Android TV users tend to use the latest releases. Using recent releases can give you a better experience using the emulator.

The panel on the right side of the emulator lets you perform various tasks. You can also drag files onto the emulator to install apps and download files.

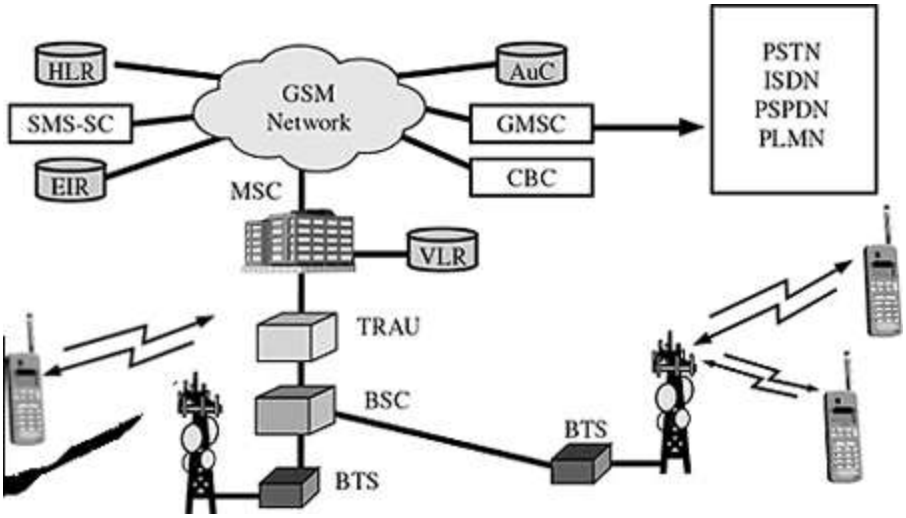
Feature	Description	Keyboard Shortcut
Close 	Close the emulator.	
Minimize	Minimize the emulator window.	
Resize	Resize the emulator as you would any other operating system window. The emulator maintains an aspect ratio appropriate for your device.	Command+Up and Command+Down
Power 	Click to turn the screen on or off. Click and hold to turn the device on or off.	Control+P Command+P
Volume Up 	Click to view a slider control and turn the volume up. Click again to turn it up more, or use the slider control to change the volume.	Control+= Command+=
Volume	Click to view a slider control and turn the volume down. Click again to turn it down more, or	Control+-

Down 	use the slider control to change the volume.	Command+-
Rotate Left 	Rotate the phone 90 degrees counterclockwise.	Control+Left Command+Left
Rotate Right 	Rotate the phone 90 degrees clockwise.	Control+Right Command+Right
Take Screenshot 	Click to take a screenshot of the device. The default save location is your computer desktop. To change the save location, select **…** > **Settings**. The emulator creates a file with the name `Screenshot_yyyymmdd-hhmmss.png` using the year, month, day, hour, minute, and second of the capture, for example, `Screenshot_20160219-145848.png`.	Control+S Command+S
Enter Zoom Mode 	Click so the cursor changes to the zoom icon: • Left-click the screen to zoom in by 25%, up to a maximum of about twice the screen resolution of the virtual device. • Right-click to zoom out. • Left-click and drag to select a box-shaped area to zoom in on. • Right-click and drag a selection box to reset to default zoom. • Control-click to touch the screen while in zoom mode. Click Enter Zoom Mode again to return to normal screen size.	Control+Z Command+Z While in zoom mode Control+Up Control+Down Control+Shift+Up Control+Shift+Down Control+Shift+Left Control+Shift+Right Command+Up and Command+Down Command+Shift+Up Command+Shift+Do Command+Shift+Le Command+Shift+Rig
Back 	Return to the previous screen, or close a dialog box, an options menu, the Notifications panel, or the onscreen keyboard.	Control+Backspace Command+Backspa
Home 	Return to the Home screen. Press and hold to open the item specific to your API level.	Control+H Command+H
Overview  (Recent Apps)	Tap to open a list of thumbnail images of apps you've worked with recently. To open an app, tap it. To remove a thumbnail from the list, swipe it left or right. This button isn't supported for Android Wear.	Control+O Command+O
Menu	Type the keyboard shortcut to simulate the Menu button, for example, to open the menu for the selected app.	Control+M Command+M
More 	Click to access other features and settings, described in the next table.	
Install an APK	Drag an APK file onto the emulator screen. An APK Installer dialog appears. When the installation completes, you can view the app in your apps list.The app didn't install if a dialog appears that says "APK failed to install."	

Add a file	Drag any file onto the emulator screen. It's placed in the `/sdcard/Download` directory. Navigate to the file using the method for the API level. For example, for API 22, this is the navigation path: **Settings** > **Device: Storage & USB** > **Internal Storage** > **Explore** (Virtual SD Card).	
Toggle trackball mode		F6

2.Explain GSM Architecture with diagram?(10)

Ans: The following diagram shows the GSM network along with the added elements:



Network Switching Subsystem: The NSS is responsible for performing call processing and subscriber related functions. The switching system includes the following functional units:

 Home location register (HLR): It is a database used for storage and management of subscriptions. HLR stores permanent data about subscribers, including a subscribers service profile, location information and activity status. When an individual buys a subscription from the PCS provider, he or she is registered in the HLR of that operator.

 Visitor location register (VLR): It is a database that contains temporary information about subscribers that is needed by the MSC in order to service visiting subscribers. VLR

is always integrated with the MSC. When a MS roams into a new MSC area, the VLR

connected to that MSC will request data about the mobile station from the HLR. Later if the mobile station needs to make a call, VLR will be having all the information needed for call setup.

- Authentication center (AUC): A unit called the AUC provides authentication and

encryption parameters that verify the users identity and ensure the confidentiality of each call.

- Equipment identity register (EIR): It is a database that contains information about the identity of mobile equipment that prevents calls from stolen, unauthorized or defective mobile stations.

- Mobile switching center (MSC): The MSC performs the telephony switching functions of

the system. It controls calls to and from other telephone and data systems.

Radio Subsystem (RSS): the radio subsystem (RSS) comprises all radio specific entities, i.e., the mobile stations (MS) and the base station subsystem (BSS). The figure shows the connection between the RSS and the NSS via the A interface (solid lines) and the connection to the OSS via the O interface (dashed lines).

- Base station subsystem (BSS): A GSM network comprises many BSSs, each controlled by

a base station controller (BSC). The BSS performs all functions necessary to maintain radio connections to an MS, coding/decoding of voice, and rate adaptation to/from the wireless network part. Besides a BSC, the BSS contains several BTSs.

- Base station controllers (BSC): The BSC provides all the control functions and physical links between the MSC and BTS. It is a high capacity switch that provides functions such as handover, cell configuration data, and control of radio frequency (RF) power levels in BTS. A number of BSC's are served by and MSC.

- Base transceiver station (BTS): The BTS handles the radio interface to the mobile

station. A BTS can form a radio cell or, using sectorized antennas, several and is connected to MS via the Um interface, and to the BSC via the Abis interface. The Um interface contains all the mechanisms necessary for wireless transmission (TDMA, FDMA etc.)The BTS is the radio equipment (transceivers and antennas) needed to service each cell in the network. A group of BTS's are controlled by an BSC.

Operation and Support system: The operations and maintenance center (OMC) is connected to all equipment in the switching system and to the BSC. Implementation of OMC is called operation and support system (OSS). The OSS is the functional entity from which the network operator monitors and controls the system. The purpose of OSS is to offer the customer cost-effective support for centralized, regional and local operational and maintenance activities that are required for a GSM network. OSS provides a network overview and allows engineers to monitor, diagnose and troubleshoot every aspect of the

3. List and explain various mobile services of gsm?how privacy is provided in gsm?(5+5)

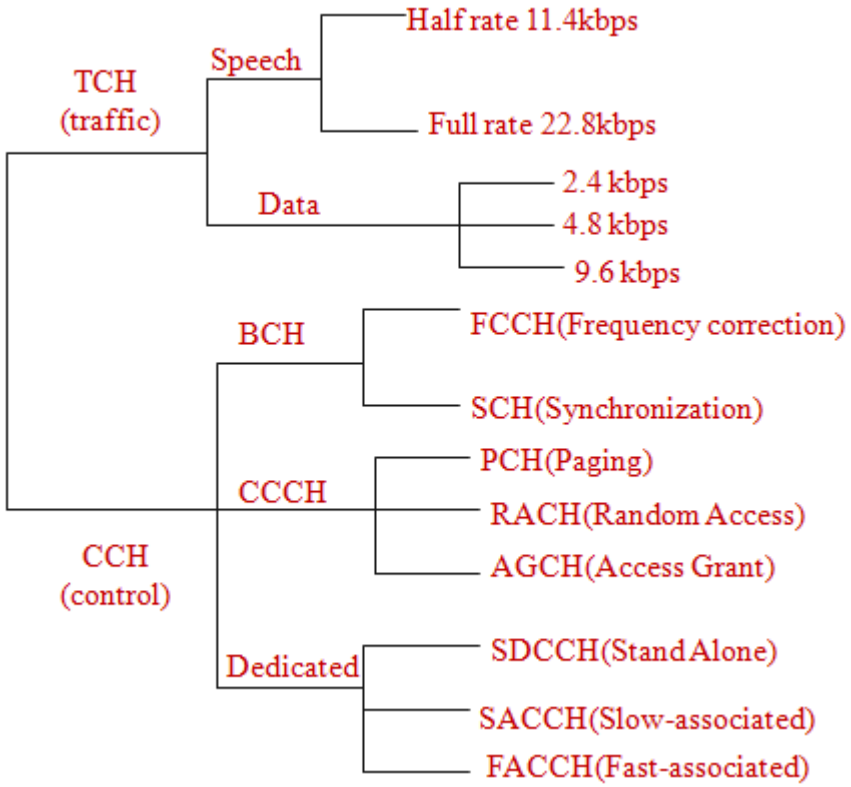
Ans: Gsm services

Bearer services: GSM specifies different mechanisms for data transmission, the original GSM allowing for data rates of up to 9600 bit/s for non-voice services. Bearer services permit transparent and non-transparent, synchronous or asynchronous data transmission. Transparent bearer services only use the functions of the physical layer (layer 1) to transmit data. Data transmission has a constant delay and throughput if no transmission errors occur.

Tele services: GSM mainly focuses on voice-oriented tele services. These comprise encrypted voice transmission, message services, and basic data communication with terminals as known from the PSTN or ISDN (e.g., fax). The primary goal of GSM was the provision of high-quality digital voice transmissio The successor of SMS, the enhanced message service (EMS), offers a larger message size, formatted text, and the transmission of animated pictures, small images and ring tones in a standardized way. But with MMS, EMS was hardly used. MMS offers the transmission of larger pictures (GIF, JPG, WBMP), short video clips etc. and comes with mobile phones that integrate small camerasn.

Supplementary services: In addition to tele and bearer services, GSM providers can offer supplementary services. these services offer various enhancements for the standard telephony service, and may vary from provider to provider. Typical services are user identification,callredirection, orforwardingofongoing calls,barringofincoming/outgoing calls, Advice of Charge (AoC) etc. Standard ISDN features such as closed user groups and multiparty communication may be available.

Channels:



Control Channels: Control channels carry system signalling and synchronisation data for control procedures such as location registration, mobile station synchronisation, paging, random access etc. between base station and mobile station. Three categories of control channel are defined: Broadcast, Common and Dedicated. Control channels are multiplexed

into the 51-frame multiframe.

 Broadcast control channel (BCCH): A BTS uses this channel to signal information to all MSs within a cell. Information transmitted in this channel is, e.g., the cell identifier, options available within this cell (frequency hopping), and frequencies available inside the cell and in neighboring cells. The BTS sends information for frequency correction via the frequency correction channel (FCCH) and information about time synchronization via the synchronization channel (SCH), where both channels are subchannels of the BCCH.

 Common control channel (CCCH): All information regarding connection setup

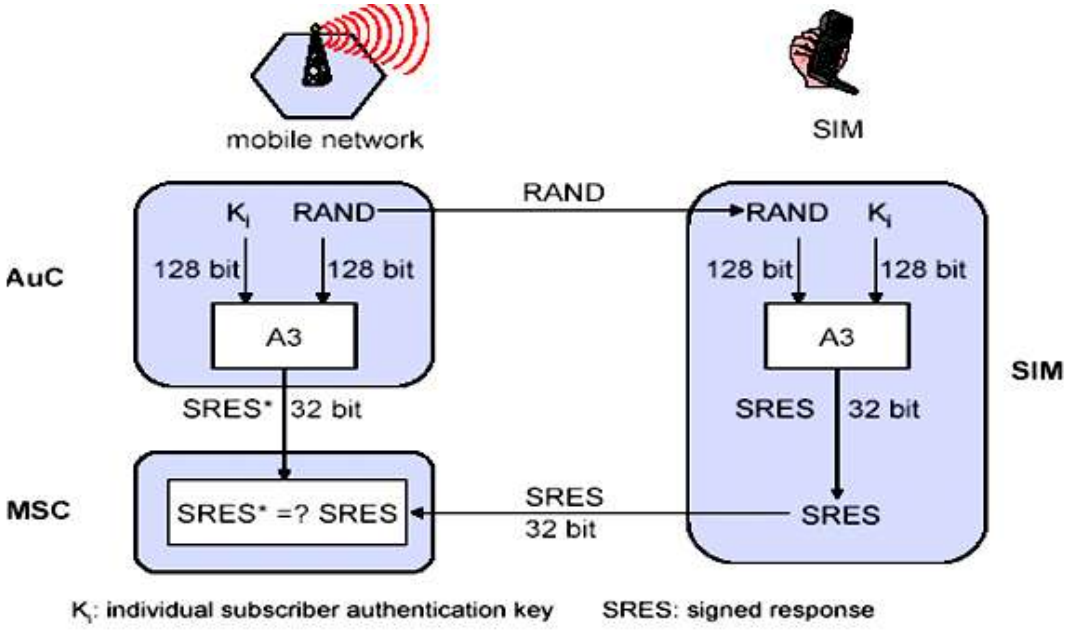
between MS and BS is exchanged via the CCCH. For calls toward an MS, the BTS uses the paging channel (PCH) for paging the appropriate MS. If an MS wants to set up a call, it uses the random access channel (RACH) to send data to the BTS. The RACH implements multiple access (all MSs within a cell may access this channel) using slotted Aloha. This is where a collision may occur with other MSs in a GSM system. The BTS uses the access grant channel (AGCH) to signal an MS that it can use a TCH or SDCCH for further connection setup.

 Dedicated control channel (DCCH): While the previous channels have all been unidirectional, the following channels are bidirectional. As long as an MS has not established a TCH with the BTS, it uses the stand-alone dedicated control channel (SDCCH) with a low data rate (782 bit/s) for signaling. This can comprise authentication, registration or other data needed for setting up a TCH. Each TCH and SDCCH has a slow associated dedicated control channel (SACCH) associated with it, which is used to exchange system information, such as the channel quality and signal power level. Finally, if more signaling information needs to be transmitted and a TCH already exists, GSM uses a fast associated dedicated control channel (FACCH). The FACCH uses the time slots which are otherwise used by the TCH. This is necessary in the case of handovers where BTS and MS have to exchange larger amounts of data in less time.

4. what is authentication and how it is carried out in Gsm?

GSM offers several security services using confidential information stored in the AuC and in the individual SIM. The SIM stores personal, secret data and is protected with a PIN against unauthorized use. Three algorithms have been specified to provide security services in GSM. Algorithm A3 is used for authentication, A5 for encryption, and A8 for the generation of a cipher key. The various security services offered by GSM are:

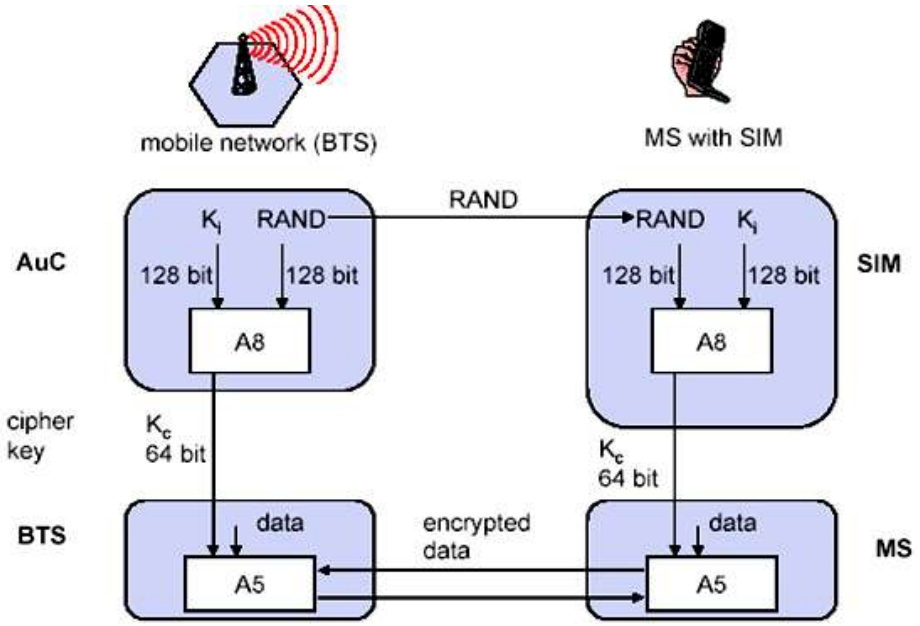
Access control and authentication: The first step includes the authentication of a valid user for the SIM. The user needs a secret PIN to access the SIM. The next step is the subscriber authentication. This step is based on a challenge-response scheme as shown below:



Subscriber Authentication

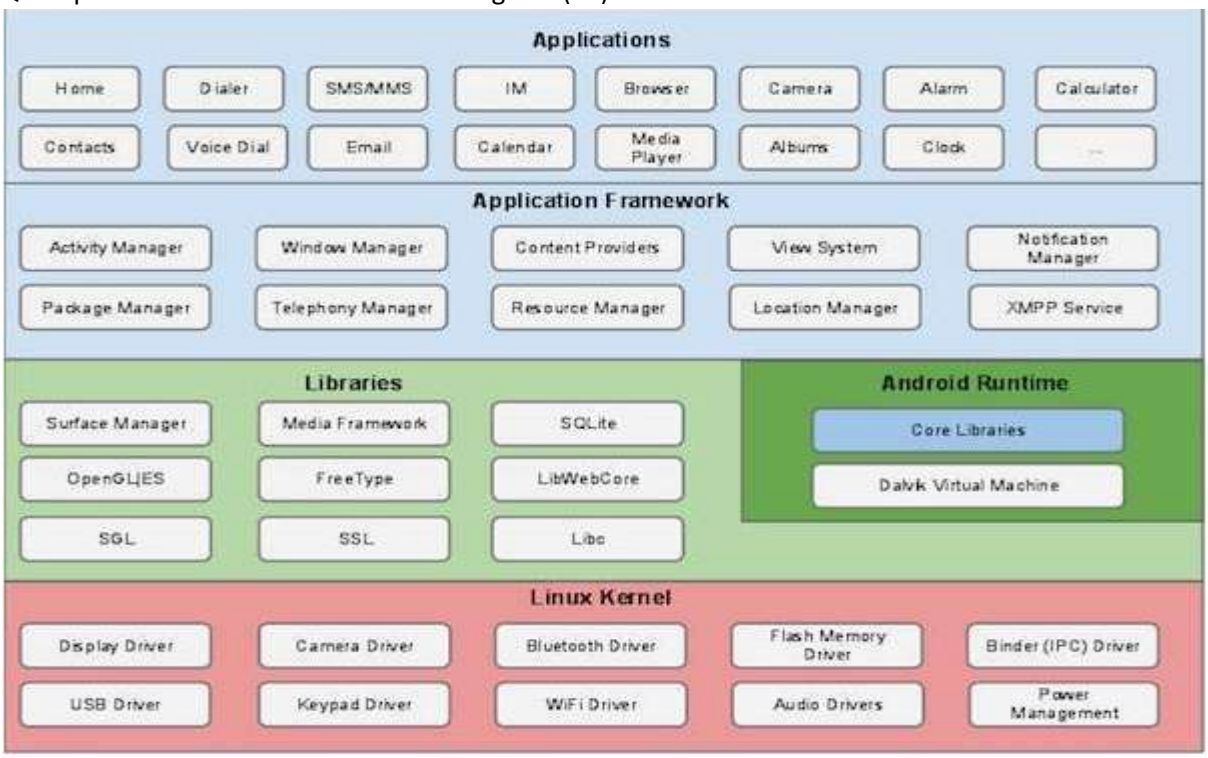
Authentication is based on the SIM, which stores the individual authentication key Ki, the user identification IMSI, and the algorithm used for authentication A3. The AuC performs the basic generation of random values RAND, signed responses SRES, and cipher keys Kc for each IMSI, and then forwards this information to the HLR. The current VLR requests the appropriate values for RAND, SRES, and Kc from the HLR. For authentication, the VLR sends the random value RAND to the SIM. Both sides, network and subscriber module, perform the same operation with RAND and the key Ki, called A3. The MS sends back the SRES generated by the SIM; the VLR can now compare both values. If they are the same, the VLR accepts the subscriber, otherwise the subscriber is rejected.

Confidentiality: All user-related data is encrypted. After authentication, BTS and MS apply encryption to voice, data, and signalling as shown below.



To ensure privacy, all messages containing user-related information are encrypted in GSM over the air interface. After authentication, MS and BSS can start using encryption by applying the cipher key Kc, which is generated using the individual key Ki and a random value by applying the algorithm A8. Note that the SIM in the MS and the network both calculate the same Kc based on the random value RAND. The key Kc itself is not transmitted over the air interface. MS and BTS can now encrypt and decrypt data using the algorithm A5 and the cipher key Kc.

Q5: Explain Android Architecture with diagram.(10)



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.

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.

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.

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.

Q6.(a) What is DVM?Expalin it.How it differ from JVM?(5)

Ans:

Dalvik is a virtual machine where every android application runs. Through Dalvik, device is able to run multiple virtual machines through better memory management as Dalvik VMs are register based and hence memory efficient Every android app runs in its own process, with its own instance of Dalvik VM. First, Java files are connverted to .class file by java compiler .class files are given to "dx" tool which converts it to .dex format .dex file is given to DVM to produce machine code Machine code is executed by CPU .apk file contains .dex file in zip format which can be run on Dalvik VMs.

JVM vs DVM

	DVM	JVM
Architecture	Register	Stack
OS Support	Android	Multiple
Re- Tools	few	many
Executables	APK	JAR
Constant-Pool	Per Application	Per class
Memory	Less	More

(b) What is ADM?Explain?(5)

Ans: Android Debug Bridge (adb) is a versatile command-line tool that lets you communicate with a device (an emulator or a connected Android device). The adb command facilitates a variety of device actions, such as installing and debugging apps, and it provides access to a Unix shell that you can use to run a variety of commands on a device. It is a client-server program that includes three components:

A client, which sends commands. The client runs on your development machine. You can invoke a client from a command-line terminal by issuing an adb command.

A daemon (adbd), which runs commands on a device. The daemon runs as a background process on each device.

A server, which manages communication between the client and the daemon. The server runs as a background process on your development machine.

Different commands are :

adb install—aaplication from computer to emulator

adb pull-- Copy files to emulator from computer

adb push-- Copy files to computer from emulator

adb devices—list of devices attached to the computer.

Q7.(a) What are the main components/building blocks of Android?(5)

Android Core Building Blocks

An android component is simply a piece of code that has a well defined life cycle e.g. Activity, Receiver, Service etc.

The core building blocks or fundamental components of android are activities, views, intents, services, content providers, fragments and AndroidManifest.xml.

Activity

An activity is a class that represents a single screen. It is like a Frame in AWT.

View

A view is the UI element such as button, label, text field etc. Anything that you see is a view.

Intent

Intent is used to invoke components. It is mainly used to:

Start the service

Launch an activity

Display a web page

Display a list of contacts

Broadcast a message

Dial a phone call etc.

Service

Service is a background process that can run for a long time.

There are two types of services local and remote. Local service is accessed from within the application whereas remote service is accessed remotely from other applications running on the same device.

Content Provider

Content Providers are used to share data between the applications.

Fragment

Fragments are like parts of activity. An activity can display one or more fragments on the screen at the same time.

AndroidManifest.xml

It contains informations about activities, content providers, permissions etc. It is like the web.xml file in Java EE.

Android Virtual Device (AVD)

It is used to test the android application without the need for mobile or tablet etc. It can be created in different configurations to emulate different types of real devices.

(b) Create an application that will display toast(Message) on specific interval of time.(write java code)(5)

Ans:

```
package com.example.toast;

import android.os.Bundle;

import android.app.Activity;

import android.widget.EditText;

import android.view.View;

import android.widget.Toast;


public class MainActivity extends Activity {

    @Override

      public void onCreate(Bundle savedInstanceState) {

         super.onCreate(savedInstanceState);

         setContentView(R.layout.activity_main);

          }

Public void dispmessage(View v){
```

```
EditText name=(EditText)findViewById(R.id.user_name);
String str=”Welcome”+name.getText().toString();
        Toast.makeText(MainActivity.this,str, Toast.LENGTH_SHORT).show();
    }
}
```