Midterm Questions

You first need to download the files and then use docker to start Android Studio along with the Virtual device and SDK already built in. To do so, please use the following commands on a terminal:

1. wget https://faculty.iiitd.ac.in/~arani/midterm.tar.gz --no-check-certificate
2. wget https://faculty.iiitd.ac.in/~arani/studio-data.tar.gz --no-check-certificate
3. tar -xvzf studio-data.tar.gz
4. sudo docker load < midterm.tar.gz
5. sudo docker run -i $AOSP_ARGS -e DISPLAY=$DISPLAY -v /tmp/.X11-unix:/tmp /.X11-unix -v `pwd`/studio-data:/studio-data -v android_studio:/androidstudio-data --privileged --group-add plugdev deadolus/android-studio:latest $@
6. On Android Studio, use custom installation and refuse to install new SDK. On the setting of SDK location, point to Android/Sdk directory. Android Studio will detect automatically. Avoid downloading the SDK. Similarly, the Android Virtual Device is already installed, and additional downloads are not necessary.
7. Finally, **please ensure that you create the Project directory within the Android directory. This will automatically map to your studio-data/Android directory, so that you can access your projects from the host machine.**

The programming questions have 15 marks each, whereas the short answer questions have 3 marks each. For the programming questions, you need to zip the source code, a screenshot of the app running on virtual device and then upload it (From bash: zip -r [file_name.zip] [directory_name]).

1. Email *

2. Create a calculator that accepts only binary numbers (both integers and decimals), and can only add and subtract them. The calculator must have the suitable buttons and textboxes in it. (15 marks)
   5 marks for basic binary numbers, decimal and addition and subtraction UI buttons
   5 marks for textbox and proper logic for addition and subtraction
   5 marks for compiling and building of code via Android device

   Files submitted:

3. Design an app for an instructor who wishes to keep track of the courses they have taught over the years. The app (i) takes a single input textbox for course code, (ii) accepts the semester/year in which they had taken the course, and (iii) stores it in a database. Note that you also need to design the relevant database schema and communication interface.
   5 marks for working textbox
   5 marks for designing database and mapping it to the data model
   5 marks for compiling, building and running of code via Android device

   Files submitted:

4. Consider a problem which utilizes the printf function available in C, in an Android native code. Can this be run on Android? Justify your answer.

5. Consider a banking application that can authenticate users using fingerprints. A malicious app tries to change the stored fingerprint to enable authentication of other users, by changing the stored fingerprint information. Is this possible to do, and why/why not?

6. Suppose we utilize a video streaming service like Youtube from a smartphone. Which application–level and transport-layer protocol is it likely to use?

7. Suppose I want to create a database, create schemas and then enter values from Android. I plan to create an SQL query to create the first schema. Is this a good plan, or is there a better alternative?

8. A Service does not have a user interface. Suppose it needs to inform the user about a task being completed. How will it do so, and which classes needed to be used?

9. Consider a variable name in Kotlin that ends with a question mark. What does it signify?

10. Suppose we have an app that needs to be used on both a smartphone and a smartwatch. Which layer in the app should be added to handle the added complexity?

11. Suppose we utilize a modified version of Android Studio that does not maintain semantic information of the UI elements. Will any functionality be missing in this modified version, and if so, which one and why?

12. Consider two apps that both want to utilize the same sensor of a smartphone. How would both the apps retrieve data from the sensors? Would it lead to too many requests to the sensor?

13. Suppose we define a composable function corresponding to a button in the UI. The button's text alternates between each click. This text is kept as a static variable in the class, and then modified on each click. Is this a valid way of handling the change in the UI, or is there some other alternative technique that is needed, and if so, what is it?