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. 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 and then upload it (From bash: zip -r [file_name.zip] [directory_name]).

(1) Consider a program that transposes a 100x100 matrix. Write it first using native code and then using ordinary Kotlin/Java code. In both cases, convert it into a proper app that reads the information from the file given, and mention the amount of time required in each case.
(2) Create an Android app that reads content from a file, and shows it in a Textbox. Use Talkback Service to read it aloud. If the content of the file is more than 100 words, then do not read any further than 100 words; otherwise read the entire content.
(3) Consider a system like FLUID. What is the mechanism by which it shows the user interface on a different device?
(4) Assume that there are a number of sensors available on a device, such as GPS, but not luminance. A developer wants to write an app that adjusts the view settings based on ambient light. Is this possible for a user to still do?
(5) Assume that you have two smartphones in your pocket, both of which are counting your steps. You walk for a total of 10000 steps. Would both the smartphones show the same number of steps, or would they be different, and why?
(6) Suppose a user refuses to give permission to a contact-tracing app to use location information when it is in background. Can the app still function as expected?
(7) Assume that the GPS and the WiFi-based localization services disagree with the location. How would Android's LocationService's getFusedLocationServiceClient work to give the location in this case?

(8) Suppose you are trying to design an app that utilizes a neural network to predict your next stop. However, training based on your data on the smartphone is not possible due to compute resources, and you are not willing to let all your location data be accessed by a cloud service. Is there a way to still design such a neural network?

(9) Assume that a computation offloading system like MAUI is used to split a neural network. Is it a good idea to train a neural network using it? Justify.

(10) Suppose a smartphone with an NPU is about to run a deep neural network. Is there a chance that offloading it for execution on the cloud is better than running it on the NPU? If so, why?

(11) Suppose we release an app into the Google Play Store that does not utilize TLS encryption to access the server. Is this app still downloadable from the play store? What if it uses TLS but not end-to-end encryption?

(12) Suppose my app uses a library for which a vulnerability is found. What is the best way for me to resolve this vulnerability?