Assignment 1
Wireless Network: Marks: 22+2

1. Connect your laptop to IIITD access point. Identify the SSID and BSSID of the AP connected to. Take measurements of your current received signal strength, bit-rate, transmission power, and operating frequency band. Now make your phone a WiFi Hotspot and connect your laptop to the phone. Take measurements of your current received signal strength, bit-rate, transmission power, and operating frequency band. Are there any differences between previous and current measurements, if yes tell the reason.(Hint use iwconfig) [1+2+2+1]

2. Put your laptop in monitor mode (promiscuous mode). Collect a pcap trace of 5min duration. Make sure you collect during busy hours, many devices are connected to that AP and the devices are active. Now answer the following, [1]
    a. Identify #unique MAC addresses, #of APs, #of clients [2]
    b. Compute the average signal strength of each client. [1.5]
    c. Compute the average bitrate of each client [1.5]
    d. Identify the number of clients of different standard 802.11 b/g/n or 802.11n/ac [1]
    e. Compute the aggregate throughput of the network and plot with time. [2]
    **Hint How to calculate aggregate throughput with time: Take all the data packets, find out the length of the packets, take a 2-sec window say, sum up the length of all data packets say that is D bytes. Then the aggregate throughput at that 2-sec window is =D*8/2 bps. Now you will have many such 2 sec windows for a 5 min collection, plot the aggregate throughput with time.

3. Now make your phone a WiFi Hotspot, and connect your laptop to the phone. Before making your phone a Hotspot, make it open (Go to settings->connections->Mobile Hotspot->configure->security->open). Now connect your laptop to your phone and put your laptop in managed mode. Collect a packet trace for 5 min while you do the next step. Make sure you forget the credentials stored before. Now try to connect and start watching a Youtube video. [2]
    a. Find out from your laptop pcap what are the frames exchanged between your phone and AP before actual data transmission starts. [1]
    b. Find out number of TCP packets [2]
    c. Find out number of QUIC/udp packets [2]

Bonus question: Compute 3a and 3b only for YouTube packets (findout the IP addresses which belong to YouTube server from the other IP addressed you see in the pcap.) [2]

Submit: a single zip file containing the packet captures, scripts written to analyze the packet captures and a report containing the the answers.