Assignment -1
Semester: FALL2024
Deadline: 10/11/2024
Total Marks: 40
Total Questions: 10

Q1. Draw a hybrid topology with a star backbone connecting two mesh networks and a ring network.[2]

Q2. For n devices in a network, what is the number of cable links required for a mesh, ring, bus, and star topology? Show the calculation. [4]

Q3. "SMART TECH", a consulting firm in Dhaka, has implemented a network layout where each workstation, printer, and server is connected to a central intermediary device. This setup allows for easy management, and individual device issues don't disrupt the rest of the network. However, a recent issue with the intermediary device caused a complete network outage, affecting all devices until the device was repaired. The firm is now evaluating whether this network structure is optimal for its needs, given its reliance on a single connection point.

Identify the network topology used at "SMART TECH" and justify. [4]

Q4. "TIGER IT" has an office in Chattogram with multiple departments, including finance, HR, and sales. Employees within the office can quickly access shared resources like printers and file servers. Additionally, "TIGER IT" is connected to a partner office in Singapore, allowing both locations to securely share data for joint projects. The connection between the Chattogram and Singapore offices occasionally experiences delays, especially during high-traffic hours.

Based on the network setup at "TIGER IT"., identify the types of networks used within the Chattogram office and between the Chattogram and Singapore offices. Explain briefly. [2+2]

Q5.Rafi is attending an important online video conference for work from his home in Dhaka. During the conference, he noticed that the audio and video quality fluctuated. Sometimes the speaker's voice sounds clear, but at other times, it cuts out or arrives in short bursts. Occasionally, the video freezes momentarily, even though Rafi's internet speed seems adequate.

i) Identify the network performance issue Rafi is experiencing during the video conference. [2]

ii) Explain why this issue impacts the quality of real-time communication and how it differs from other network performance problems like latency or packet loss. [2]

Q6. Shakib: "Hey Zubair, I'm going to send you all the photos from our trip. Are you ready to start receiving them?"
Zubair: "Yes, I'm ready. How many photos are you sending in each batch?"
Shakib: "I'll send them in groups of 10 photos at a time so it's easier to handle."
Zubair: "Could you reduce it to 5 photos per batch? My internet connection is a bit slow."
Shakib: "Sure, I'll send 5 photos at a time."
Shakib (after sending a few batches): "Did you receive the last batch of photos?"
Zubair: "I got most of them, but 2 photos didn't come through. Can you resend those?"
Shakib: "Got it! I'll resend those 2 photos."
Zubair: "Great, all the photos are reassembled and complete now. Thanks!"

Which layer of the OSI model is this interaction most similar to and why? [4]

Q7. A company is experiencing issues with its network, where data transmission speeds are slower than expected, especially during file transfers. Upon investigation, the network administrator discovers that the cables connecting different floors of the building are outdated, and some are damaged.

Identify which OSI model layer is involved and suggest how resolving these issues at this layer could improve network performance. [4]

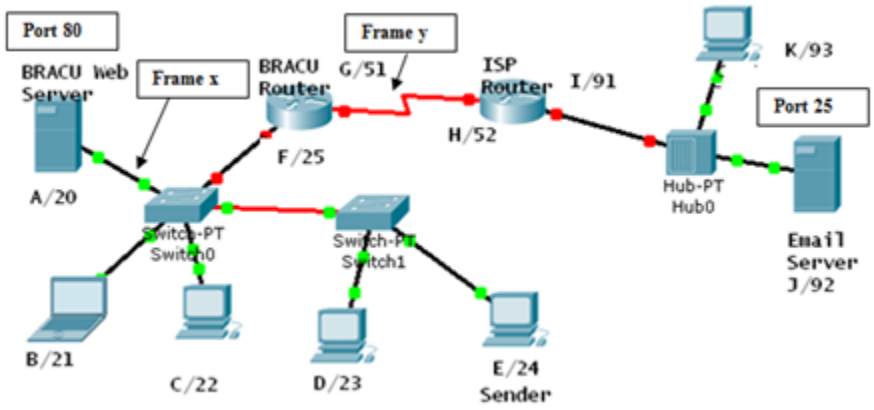
Q8. Which layer(s) are involved in encrypting the data of a packet in the TCP/IP model? Which address(es) do not change at each hop? [3]

Q9. Match the following tasks to one or more layers of the TCP/IP model and explain your reasoning for each choice. [6]

a. Encrypting and decrypting a message
b. Error detection between directly connected devices
c. Breaking down a large file into smaller segments
d. Translating a domain name into an IP address
e. Ensuring reliable data transfer between sender and receiver
f. Deciding the best path for a packet to reach its destination

Q10. Complete the frames (x & y) given below with appropriate port, IP and MAC addresses. The sender Host E has two applications running; one for email with port number 49254 and the other for accessing the web server with port number 52167. The frame x is intended for the BRACU

Web server and frame y is coming from the Email Server. (MAC addresses are alphabets and IP addresses are numbers) [5]



Frame X

D. Mac	S. MAC	D. IP	S. IP	D. Port	S. Port	Data	Trailer

Frame Y

D. Mac	S. MAC	D. IP	S. IP	D. Port	S. Port	Data	Trailer