Q1. Match the following to one or more layers of the TCP/IP protocol suite:

A. Encryption and Decryption → Application Layer
B. Cookies management → Application Layer
C. Data fragmentation and reassembly → Transport Layer
D. Data translation → Application Layer
E. Hop to hop communication → Data Link Layer
F. Route Discover → Network Layer

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.

Q2.1 If we use simplex communication mode

Q2.2 If we use full-duplex communication mode

Ans:

Mesh Topology

Simplex: Let, n = number of devices

Simplex Links = n*(n-1)

Full Duplex:

Full Duplex Links = (n*(n-1))/2

Ring Topology

Simplex: Let, n = number of devices

Simplex Links = n

Full Duplex:

Full Duplex Links = n

Bus Topology

Simplex: Let, n = number of devices

Simplex Links = 1 (without drop cables), n+1 (Combined)

Full Duplex:

Full Duplex Links = 1 (without drop cables), n+1 (Combined)

Star Topology

Simplex: Let, n = number of devices

Simplex Links = 2n

Full Duplex:

Full Duplex Links = n

Q3. What is the difference between Reliability and Security? Can communication be secured but less reliable?

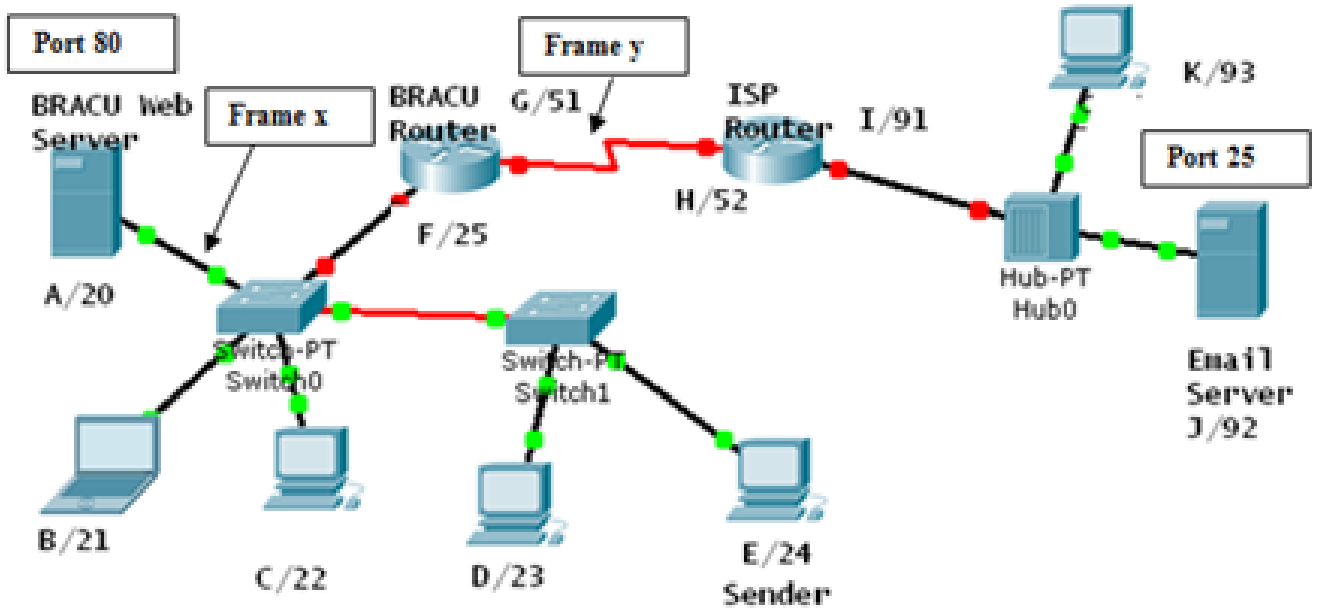
Ans:

Reliability: Frequency of failure, time to recover failure, robustness in a catastrophe

Security: Protection of data from unauthorized access, protection of damage and development, implementing policies and recoveries from breaches and data loses.

Communication can be secured but less reliable. A secured network can have encrypted data, strong authentication, firewalls etc, even though it can have network failure, packet drops and long time recovery.

Q4.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)



Ans:

Frame X

D. Mac	S. MAC	D. IP	S. IP	D. Port	S. Port
A	E	20	24	80	52167

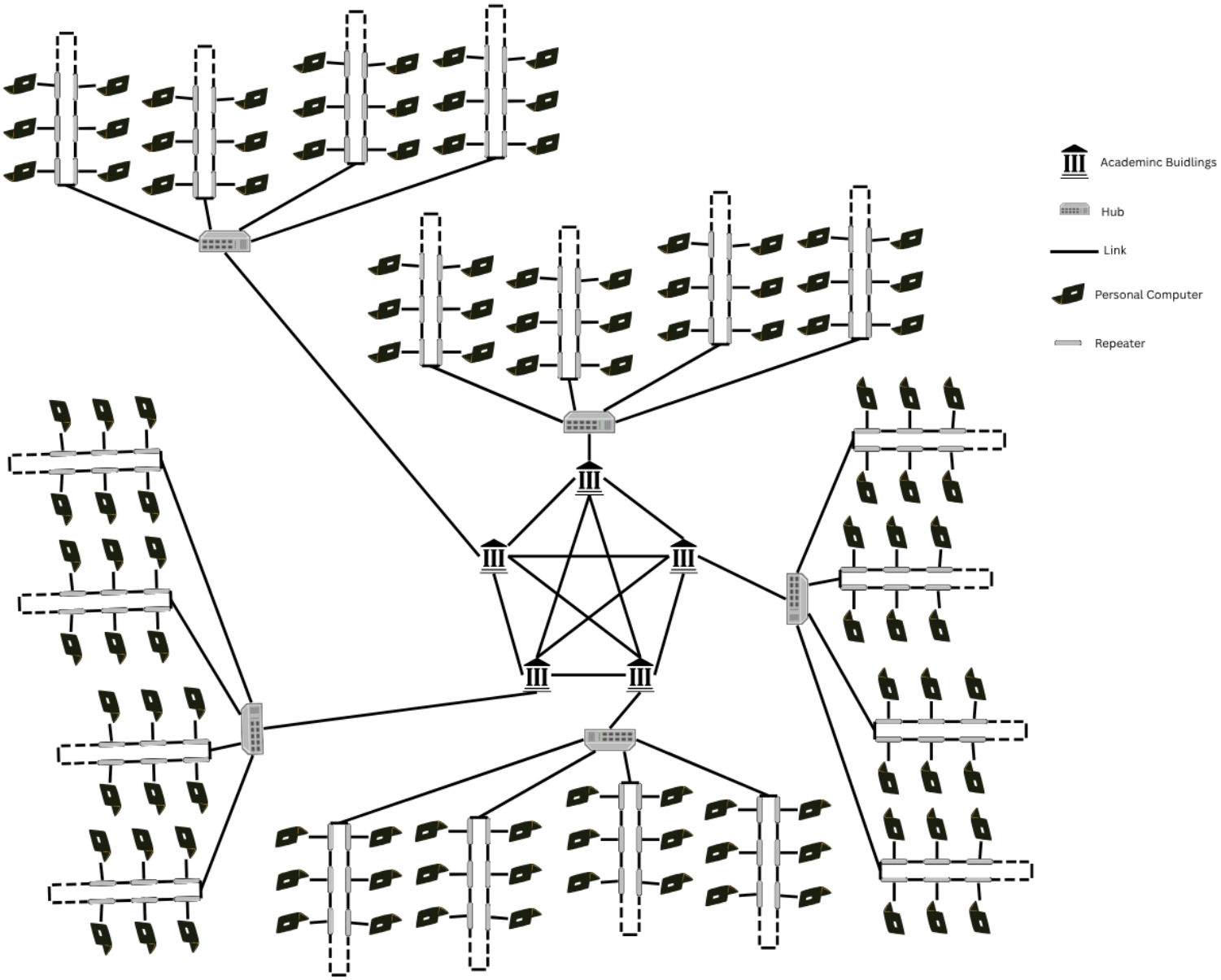
Frame Y

D. Mac	S. MAC	D. IP	S. IP	D. Port	S. Port
G	H	24	92	49254	25

Q5. Suppose we want to design a network system for BRACU. There are 5 main academic buildings which need to be connected in such a way that the network is never down. 4 labs are connected with each academic building using hubs. There are 30 computers in each lab. The computers in a lab are connected in such a way that the cabling-cost is minimized but no single point of failure. Now design a hybrid topology that fulfills all the requirements. Calculate the total links required for the network systems. Calculate total cost using the table below:

Topology	Cost Per Link (tk)
Mesh	25
Star	100
Bus	70
Ring	60

Ans:



Costing

For building's Mesh topology → 5 devices = 10 links = 10*25 = 250 Tk

For Lab's Star Topology → 4*5 = 20 labs = 20*100 = 2000 Tk

For PC's Ring Topology → 20*30 = 600 labs = 600 * 60 = 36000 Tk

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Total Costings= 38250 Tk