RIPHAH
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Subject:	Computer Networks
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Assignment#1

<u>Question 1:</u> Describe Your Home Network Performance and Characteristics

Answer:

1. **Network Speed Check:** Use a tool like Ookla's Speedtest, Fast.com, or any similar app to measure your network's upload, download speeds, and latency. Take a screenshot of the results.

2. **Network Performance and Characteristics:**
   i) **Performance:** Discuss parameters like latency (delay in data transfer), jitter (variation in packet arrival time), packet loss, and bandwidth.
   ii) **Characteristics:** Describe aspects like IP addresses, MAC addresses, type of connection (wired or wireless), and network hardware used (router, modem).

3. **Calculate Network Availability and Throughput:**
   i) Availability formula (for one day):

Availability = (Uptime\Uptime + Downtime) * times 100

where uptime is the time network was available in a day.

   ii) **Throughput:** Reflects data transferred in a given time, often estimated from the average download speed.

Question 2: Compare Network Topologies

Create a table comparing at least three network topologies (e.g., Star, Bus, and Ring) based on the following metrics:

(i) Speed: How fast data transfer is within each topology.
(ii) Connection Formula: For example, Star topology has ***n*** links for ***n*** devices.
(iii) Cable: Types of cables used, such as coaxial, fiber-optic, or twisted pair.
(iv) Physical Structure: Layout and physical arrangement.
(v) Type of Connection: Point-to-point or shared among devices.
(vi) Other features could include reliability, cost, and ease of troubleshooting.

<u>Question 3:</u> Internet, Intranet, and Extranet

Define Each Using a Mathematical Approach:

Internet: The global network connecting multiple intranets; expressed as ***Internet*** = **U** (Intranets).

Intranet: A private network within an organization; often defined as ***Intranet*** = Internal Network Resources.

Extranet: An intranet extended to authorized external users; Extranet = Intranet **U** Authorized External Access.

2. Examples:

- Internet: Public websites accessible worldwide.
- Intranet: A company's internal network for employees.
- Extranet: Supplier portal with restricted access for partners.

3. Design Topologies: Draw a basic topology for each, highlighting access points for internal or external users as needed.

<u>Question 4:</u> Ensuring System Authorization, Availability, and Monitoring

For a new department setup for Riphah alumni:

1. System Authorization:

- Use authentication mechanisms like usernames and passwords, possibly with two-factor authentication.

- Role-based access control (RBAC) to assign permissions based on user roles.

2. Availability:

- Implement failover servers or backup systems.

- Regular maintenance and network redundancy to prevent downtime.

3. Monitoring:

- Use network monitoring tools to track access logs, monitor performance, and identify unusual activity.

- Set up alerts for unauthorized access attempts or other security breaches.

<u>Question 5:</u> OSI and DoD Models

1. OSI Model: Explain its 7 layers (Physical, Data Link, Network, Transport, Session, Presentation, and Application) with a real-world example, like sending an email.

2. DoD Model (TCP/IP Model): Explain its 4 layers (Network Access, Internet, Transport, and Application) with an example, such as accessing a webpage.

3. Process Diagram: Draw diagrams that show each layer's function in transferring data between devices for both OSI and DoD models.