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| **Sem/Sec:** | BSCS-5 |
| **Subject:** | Computer Networks |
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**Assignment#1**

**Question 1: 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:**
   * 1. **Performance:** Discuss parameters like latency (delay in data transfer), jitter (variation in packet arrival time), packet loss, and bandwidth.
     2. **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:**
   * 1. **Availability formula (for one day):**

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

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

* + 1. **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:

Speed: How fast data transfer is within each topology.

Connection Formula: For example, Star topology has ***n*** links for ***n*** devices.

Cable: Types of cables used, such as coaxial, fiber-optic, or twisted pair.

Physical Structure: Layout and physical arrangement.

Type of Connection: Point-to-point or shared among devices.

Other features could include reliability, cost, and ease of troubleshooting.

**Question 3: 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.

**Question 4: 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.

**Question 5: 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.