**COMPUTER NETWORKS**

**ASSIGNMENT 1**

Total Marks 150

Guidelines:

1. No plagiarism

2. If plagiarism is caught either from a fellow student or from chatGPT they will be penalized.

3. The assignment should be on A4 pages.

4. Late submission = direct zero.

5. Submit your assignment in hard copy as well as in soft copy in Google Classroom. 6. Submission Date: 15-January-2024, 04:45 pm

1. Define the Internet and explain its significance in today's interconnected world.

2. Discuss the components of the network edge, including end systems, access networks, and links.

3. Describe the network core and compare packet switching and circuit switching as network technologies.

4. Explain the concepts of delay, loss, and throughput in computer networks, highlighting their importance in network performance.

5. Provide an overview of protocol layers and service models in computer networks. Explain how these layers work together to facilitate communication.

6. Discuss the various security threats faced by networks and the internet. Explore different types of attacks and the measures taken to ensure network security.

7. Trace the history and evolution of computer networks and the internet, highlighting key milestones and advancements.

8. Explore the role of Internet Service Providers (ISPs) in providing access to the internet. Discuss their functions, types, and their influence on network connectivity.

9. Investigate emerging trends and technologies in computer networks and the internet, such as virtual private networks (VPNs), Internet of Things (IoT), and cloud computing. Discuss their potential benefits and challenges.

10. Consider a network link with a bandwidth of 10 Mbps and a propagation delay of 2 milliseconds. Calculate the total end-to-end delay for transferring a file of 5 MB from a client to a server located 1000 km away. Assume there are no other sources of delay in the network.

11. Suppose Host A wants to send a large file to Host B. The path from Host A to Host B has three links, of rates R1 = 500 kbps, R2 = 2 Mbps, and R3 = 1 Mbps. a. Assuming no other traffic in the network, what is the throughput for the file transfer?

b. Suppose the file is 4 million bytes. Dividing the file size by the throughput, roughly how long will it take to transfer the file to Host B?

c. Repeat (a) and (b), but now with R2 reduced to 100 kbps.

12. Solve the following

A. Calculate the bandwidth-delay product for a network link with a bandwidth of 3 Gbps and a one-way propagation delay of 50 milliseconds.

B. Calculate the total end-to-end delay for a packet in a network with a packet transmission time of 0.003 seconds and a packet propagation time of 0.001 seconds.

C. If a network has a packet transmission time of 0.01 seconds and a packet propagation time of 0.005 seconds, calculate the total end-to-end delay for a packet.

D. A file is 10,000,000 bits in size, and a link has a bandwidth of 10 Mbps. Calculate the time it takes to transmit the entire file over the link while considering the link's efficiency.

E. A file is 4,000,000 bits in size, and a link has a bandwidth of 2 Mbps. Calculate the time it takes to transmit the entire file over the link.

13. What are the different types of threat actors in network security, and how do they differ in terms of their motivations and capabilities?

14. What are the ethical and legal implications of hacking activities conducted by threat actors, and what measures can law enforcement agencies take to combat cybercrime effectively?

15. Explain Service Layering and Encapsulation