CS 258-01 Data Communication System

END-TERM RESEAECH PLAN **Points: 5** **Instructor: Prof. Navrati Saxena**

Group Information:

#	Student's Name
1	Omkar Yadav
2	Alisha Rath

1. **Topic:** Domain Name System (DNS) Exploration and Basic Implementation

2. **Sub-topic:** Implementation of DNS
    a. For this we will be focusing on learning the DNS protocol through a hands-on approach that includes building various components of a DNS server. This involves developing a stub resolver, a proxy server, and a recursive resolver to understand the intricacies of DNS operations from ground up.

3. **Problem statement:** The challenge lies in gaining a deep and practical understanding of DNS mechanisms, specifically how DNS queries are processed and resolved, and the technical complexities involved in implementing a functional DNS.

4. **Motivation:**
    a. We are interested in this topic because DNS is a cornerstone of modern internet architecture, yet its operations remain opaque to many who use the internet daily. By dissecting and reconstructing DNS functionalities, we aim to demystify how domain names are resolved into IP addresses, making the internet accessible.
    b. DNS is crucial for the functioning of the internet, impacting virtually everyone who accesses web resources. Understanding and improving DNS technology can lead to more robust, efficient, and secure internet usage. For society, this means not only enhanced user experience but also stronger defenses against cyber threats like DNS attacks, which can disrupt essential services and compromise sensitive data.

5. **Objective:**
    a. Study the DNS RFCs to thoroughly understand message formats and operational procedures.
    b. Develop a basic DNS stub resolver that can form and send queries and interpret responses.
    c. Understand key components of a DNS server, including a stub resolver, a proxy server, and a recursive resolver.
    d. Use networking tools such as *nc* and *dig* to experiment with DNS packet transmissions, capturing and analyzing the data to understand real-world DNS traffic.

6. Timeline:

	April 14	April 17	April 20	April 23	April 26	April 29
Understanding key DNS components and history [1] [2]						
Reading of RFC 1035 [3]						
Implementing key concepts						
Integration and testing						
Finalizing presentation and talk						

7. References:

[1] B. Petrova, “DNS history. When and why was DNS created?,” ClouDNS Blog, Dec. 27, 2018. https://www.cloudns.net/blog/dns-history-creation-first/

[2] DNSimple, “How DNS works,” howdns.works. https://howdns.works/

[3] P. V. Mockapetris, “Domain names - implementation and specification,” Nov. 1987, doi: https://doi.org/10.17487/rfc1035.