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**ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)**  
**ORGANISATION OF ISLAMIC COOPERATION (OIC)**  
**Department of Computer Science and Engineering (CSE)**

**MID SEMESTER EXAMINATION**  
**DURATION: 1 HOUR 30 MINUTES**

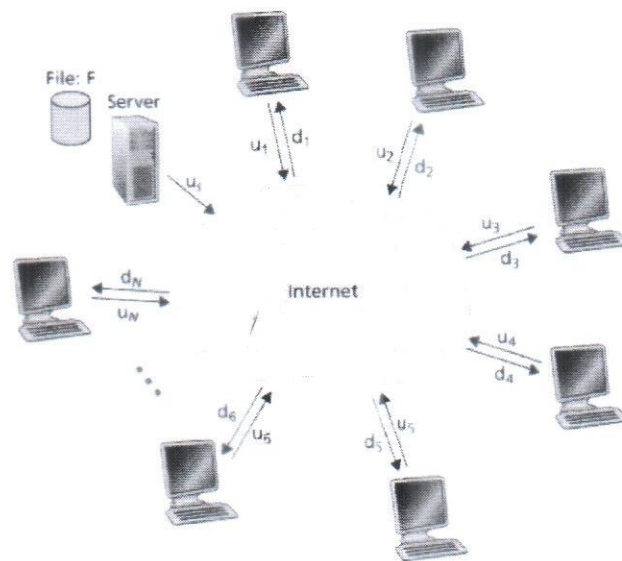
**SUMMER SEMESTER, 2021-2022**  
**FULL MARKS: 75**

**CSE 4411: Data Communication and Networking**

**Programmable calculators are not allowed. Do not write anything on the question paper.**

Answer **all 3 (three)** questions. Figures in the right margin indicate full marks of questions whereas corresponding CO and PO are written within parentheses.

1. a) Briefly explain the service model of each layer of the Internet Protocol stack. 10  
(CO1)  
(PO1)
- b) What is the *Denial of Service* (DoS) attack? Explain the process of different categories of DoS attacks. Is *Distributed Denial of service* (DDoS) attack different from a DoS attack? 10  
(CO1)  
(PO1)
- c) Consider sending a packet from a source host to a destination host over a fixed route. List the delay components in the end-to-end delay. Which of these delays are constant and which are variable? 5  
(CO1)  
(PO1)
2. a) Describe the transfer process of electronic mail on the internet with suitable diagram(s). Your answer should contain the role of user agents, mail servers, and Simple Mail Transfer Protocol (SMTP). 10  
(CO1)  
(PO1)



**Figure 1:** A diagram representing file distribution for Question 2. b)

- b) Figure 1 shows the distribution of a single file F on the Internet to N number of end devices. Deduce a quantitative model to show the performance in distribution time of *Peer-to-Peer* architecture and *Server-Client* architecture. Which architecture will provide more scalability? Justify your answer with the quantitative model. 10  
(CO2)  
(PO2)
- c) What are the two most essential transport layer services utilized by various applications? What are the application properties to consider before selecting one of these transport layer services? 5  
(CO1)  
(PO1)

3. a) DNS uses a large number of servers, organized in a hierarchical fashion and distributed around the world. With suitable labeled diagram(s), explain in brief the interaction among the different types of DNS servers (such as Local, Root, TLD, and Authoritative DNS Servers) when a host requests a DNS entry. Your answer should contain a labeled diagram to illustrate the interaction. 10  
(CO1)  
(PO1)
- b) Cookies are used to save the user's current status. Using a timing diagram, demonstrate a user-server interaction that makes use of the user's state via a cookie. 10  
(CO1)  
(PO1)
- c) Explain how the "man-in-the-middle" attack occurs. 5  
(CO1)  
(PO1)