IT694 Computer Networks
Final Examination, Winter Semester, 2021-22
Duration – 2 Hours. Maximum Marks – 40%. Closed Book.
All questions carry five marks each.

1. Briefly describe the ARP protocol. Why is an ARP query sent within a broadcast frame? Why is an ARP response sent within a frame with a specific destination MAC address?

2. We discussed an outline of the derivation of the efficiency of slotted ALOHA. For N active nodes, and probability of transmission p, derive the expression for efficiency. Find the value of p that maximizes this expression. What is this expression as N approaches infinity?

3. Briefly describe the routing protocols based on (a) DV - distance vector and (b) LSP - link state packets. Give a reason why LSP based protocol is preferred over DV in the Internet.

4. Router uses a switching element to forward packets. Describe switching via (a) memory, (b) bus, and (c) interconnection network. How do these architectures compare to each other – give reasons.

5. Many organizations use NAT protocol to provide outward Internet connectivity to a large number of internal nodes even though they may have only a few global IP addresses. Using a clear example, explain the working of NAT.

6. Show the main fields in the TCP header and very briefly describe these. How does TCP manage connection between two nodes? Use diagrams to show the establishments and termination of connections.

7. How do you define network congestion? Explain the functioning of the *slow start algorithm* used for congestion control in TCP.

8. Does TCP use sliding window protocol for reliability? If yes, which specific sliding window mechanism it uses? Give clear justification for your answer.