SPRING END SEMESTER EXAMINATION-2019
6th Semester B.Tech & B.Tech Dual Degree
COMPUTER NETWORKS
IT3001 / IT-603
(For 2017(L.E), 2016 & Previous Admitted Batches)

Time: 3 Hours Full Marks: 60

Answer any SIX questions.
Question paper consists of four sections-A, B, C, D.
Section A is compulsory.
Attempt minimum one question each from Sections B, C, D.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable and
all parts of a question should be answered at one place only.

SECTION-A

1. Answer the following questions: [2 × 10]

    (a) Why there is a need to establish the connection before the transmission of message? Briefly write the advantages and limitations of connection-orientedprotocol.

    (b) Distinguish between CSMA/CD and CSMA/CA.

    (c) What is the need of UDP? Would it not have been enough to just let user processes send raw IP packets? Explain in few sentences.

    (d) Explain a way to do reassembly of IP fragments at the destination.

    (e) With non-persistent connection between browser and origin server, is it possible for a single TCP segment to carry two distinct HTTP request message? Explain your answer.

(f) What is the use of subnet mask in IP addressing?

(g) Let the size of congestion window of a TCP connection be 32 KB when a timeout occurs. The round-trip time of the connection is 100 msec and the maximum segment size used is 2 KB. Find the time taken (in msec) by the TCP connection to get back to 32 KB congestion window.

(h) Difference between Stop and Wait, Go-Back-N and Selective Repeat.

(i) Explain through an example the use of NAT (Network Address Translation) in a network.

(j) What would be the type for the Resource Record (RR) that contains the canonical host-name for a host?

SECTION-B

2. (a) How does TCP determine the time-out for implicit detection of packet loss? Be brief. [4]

(b) Sketch the flow of a typical email from Alice to Bob. Assume that Alice and Bob are on different "networks" (say, they are in different parts of the world). Identify the key components (both hardware and software) and protocols in the flow. [4]

3. (a) A router has the following (CIDR) entries in its routing table: [4]

Address/mask	Next hop
135.46.56.0/22	Interface 0
135.46.60.0/22	Interface 1
192.53.40.0/23	Router 1
default	Router 2

For each of the following IP addresses, what does the router do if a packet with that address arrives?

(a) 135.46.63.10

(b) 135.46.57.14

(c) 135.46.52.2

(d) 192.53.40.7

(e) 192.53.56.7

(b) Consider sending a packet from a source host to a destination host over a fixed route. List and explain the delay components in the end-to-end delay. Which of these delays are constant and which are variable? [4]
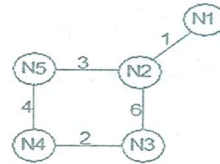
SECTION-C

4. (a) Explain why the size of the sender window must be less than 2^m for Go-Back-N ARQ. [4]

   (b) What is the difference between centralized P2P network and decentralized P2P network? [4]

5. (a) What is DNS and what is it used for? If all DNS servers could be "crashed" (taken offline), what would happen to the Internet (be precise). [4]

   (b) What do you mean by congestion control and congestion avoidance? Briefly explain the different congestion control mechanisms used in the network. [4]

6. (a) How long does it take a packet of length 1000 bytes to propagate over a link of distance 2,500 km, propagation speed 2.5×10^8 m/s, and transmission rate 2 Mbps? More generally, how long does it take a packet of length L to propagate over a link of distance d, propagation speed s, and transmission rate R bps? Does this delay depend on packet length? Does this delay depend on transmission rate? [4]

   (b) Suppose Alice, with a web-based e-mail account send a message to Bob, who accesses his mail from his mail server using POP3. Discuss how the message gets from Alice's host to Bob's host. [4]

7. (a) One class B network on the Internet has a subnet mask of 255.255.240.0. What is the maximum number of hosts per subnet? [4]

(b) Consider a network with five nodes, N1 to N5, as shown below. [4]

The network uses a Distance Vector Routing. Once the routes have stabilized, the distance vectors at different nodes are as following.

N1:(0, 1, 7, 8, 4)
N2:(1, 0, 6, 7, 3)
N3:(7, 6, 0, 2, 6)
N4:(8, 7, 2, 0, 4)
N5:(4, 3, 6, 4, 0)

Each distance vector is the distance of the best known path at that instance to nodes, N1 to N5, where the distance to itself is 0. Also, all links are symmetric, and the cost is identical in both directions. In each round, all nodes exchange their distance vectors with their respective neighbors. Then all nodes update their distance vectors. In between two rounds, any change in cost of a link will cause the two incident nodes to change only that entry in their distance vectors.

The cost of link N2-N3 reduces to 2 (in both directions). After the next round of update what will be the new distance vector at node, N3?

8. (a) What is the formula to calculate the number of redundancy bits required to correct a bit error in a given number of data bits? Explain an error correction technique on the following data: Data send 1001101 and data received 1000101. [4]

(b) Why is it that voice and video traffic is often sent over TCP rather than UDP in today's internet? [4]

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