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Paper Code: TCS/TIT-403

End Semester Examination 2017  
Course – B.Tech (CS/IT) IV<sup>th</sup> Semester  
Paper Name: Computer Network-1

Time: Three Hours

Note:

MM: 100

- I. This question paper contains five questions.
- II. All questions are compulsory.
- III. Every question has three parts a, b and c. You have to attend any two parts from each question.
- IV. Total marks assigned to each question are twenty.

- Q 1. a. i) What are the different transmission rates of Ethernet LANs? Describe different physical media that Ethernet can run over? (2+3)
- ii) Consider an application that transmits data at a steady rate (for example, the sender generates an N-bit unit of data every k time units, where k is small and fixed). Also, when such an application starts, it will continue running for a relatively long period of time. Answer the following questions, briefly justifying your answer: (2+3)
- i. Would a packet-switched network or a circuit-switched network be more appropriate for this application? Why?
  - ii. Suppose that a packet-switched network is used and the only traffic in this network comes from such applications as described above. Furthermore, assume that the sum of the application data rates is less than the capacities of each and every link. Is some form of congestion control needed? Why?
- b. Explain the hierarchy of DNS servers. What is the difference between iterative and recursive DNS queries? Which command will you use on your host to send DNS queries to a DNS server i.e. google.com? Write query for Type A, NS, and MX records and their outputs. (3+3+1+3)
- c. i) Suppose end system A wants to send a large file to end system B. At a very high level, describe how end system A creates packets from the file. When one of these packets arrives to a packet switch, what information in the packet does the switch use to determine the link onto which the packet is forwarded? Why is packet switching in the Internet analogous to driving from one city to another and asking directions along the way? (2+1+2)
- ii) How long does it take a packet of length 1000 bytes to propagate over a link of distance 2,500 km, propagation speed  $2.5 \times 10^8$  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? (2+1+1+1)
- Q 2. a. i) Describe the HTTP request-response. What are the various http status codes and phrase in the response messages a client may receive from the server. (2+3)
- ii) Suppose Alice, with a Web-based e-mail account (such as Yahoo mail or Gmail), sends 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 by listing the series of application-layer protocols that are used to move the message between the two hosts. (5)

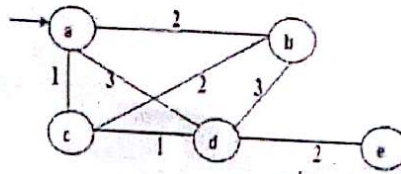


- b. For a P2P file-sharing application, do you agree with the statement, "There is no notion of client and server sides of a communication session"? Why or why not? What information is used by a process running on one host to identify a process running on another host? Suppose you wanted to do a transaction from a remote client to a server as fast as possible. Would you use UDP or TCP? Why? (1+3+2+1+3)
- c. i) Describe how Web caching can reduce the delay in receiving a requested object. Will Web caching reduce the delay for all objects requested by a user or for only some of the objects? Why? (2+1+2)
- ii) Match the following to one or more layers of the OSI model: (5)
- Reliable process-to-process message delivery
  - Error correction and retransmission
  - Defines frames
  - Provides user services such as e-mail and file transfer
  - Transmission of bit stream across physical medium.

- Q 3. a. Consider Go Back N protocol with window size 3, if every 5<sup>th</sup> packet is being transmitted is lost and if we have to send 10 packets, then how many transitions will be required? How many transitions will be required if we use selective repeat protocol instead of GO Back N in above scenario with same window size. (5+5)
- b. i) Calculate the sequence number of first, second last, last segment, of TCP if you have 50000 bytes of data stream to send with maximum segment size of 1000 bytes, Assume that sequence numbers are starting from zero. (5)
- ii) Draw and explain Finite State Machine for reliable data transfer over a channel with Bit Errors. (5)
- c. What is the purpose of checksum field in UDP header? Suppose that we have following 16 bit words (A, B, C) to send from a sender S to receiver R. A=0110011001100000, B=0101010101010101, C=1011101110110101, Compute the checksum that has to be sent in UDP segment. Find out is there any error in data at receiver end. (2+5+3)

- Q 4. a. i) What are the flags used in connection establishment and terminating process? Suppose TCP opens a connection using an initial sequence number (ISN) of 14,534. The other party opens the connection with an ISN of 21,732, show the three TCP segments during the connection establishment on the basis of given ISN. (2+3)
- ii) Differentiate between the IPv4 and the IPv6 header fields. Explain their fields in common. (3+2)
- b. Consider transferring an enormous file of L bytes from Host A to Host B. Assume a MSS of 536 bytes.
- (i) What is the maximum value of L such that TCP sequence numbers are not exhausted? Recall that the TCP sequence number field has 4 bytes. (5)
- ii) For the L you obtain in (i), find how long it takes to transmit the file. Assume that a total of 66 bytes of transport, network, and data-link header are added to each segment before the resulting packet is sent out over a 155 Mbps link. Ignore flow control and congestion control so A can pump out the segments back to back and continuously. (5)
- c. Do port addresses need to be unique? Why or why not? Why are port addresses shorter than IP addresses? List the fields in the TCP header that are missing from UDP header. Give the reason for their absence. (1+2+2+3+2)

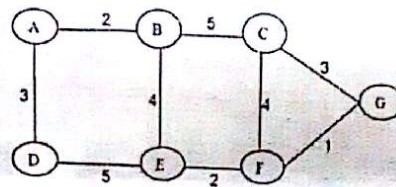
- Q 5. a. Describe Link State Routing Algorithm, Consider the following network with the indicated link costs, use Dijkstra's shortest path algorithm to compute shortest path from 'a' to all network nodes. (5+5)



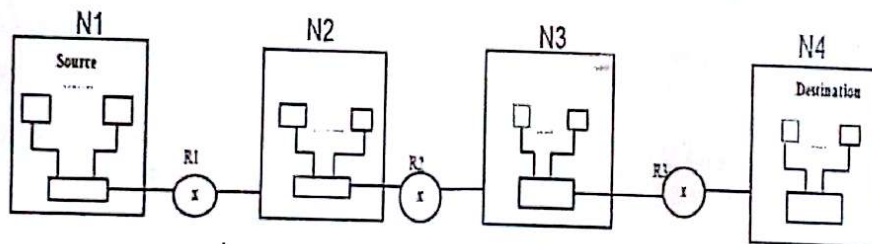
- b. Fill the following table for class full addressing, for all the classes A to E. (2+2+2+2+2)

Class Name	Leading bits in prefix	Number of Network id bits	Number of Host id bits	First byte range in Class	A valid Example of IP address	Subnet mask value	Total number of Networks	Total number of Hosts
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- c. i) Consider the following network, and find out distance vector for all the nodes, show updated vector of node B after receiving the vector of node A using distance vector routing. (5)



- ii) Consider the following Autonomous systems N1 to N4, show total number of hop count for each router and create the forwarding table of Routing Information Protocol (RIP). (5)



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