COMPUTER NETWORKS

Unit - I
1. a) What do you mean by Protocol? What does "negotiation" mean when discussing network protocols? Give an example. 7M
   b) Ten signals, each requiring 4000 Hz, are multiplexed on to a single channel using FDM. How much minimum bandwidth is required for the multiplexed channel? Assume that the guard bands are 400 Hz wide. 8M
2. a) A system has an n-layer protocol hierarchy. Applications generate messages of length $M$ bytes. At each of the layers, an $h$-byte header is added. What fraction of the network bandwidth is filled with headers? 8M
   b) What is the essential difference between message switching and packet switching? 7M

Unit - II
3. a) What is framing? Explain the different framing techniques with example. 10M
   b) Explain the working of selective repeat sliding window protocol to handle errors in noisy channel. 5M
4. a) Derive the expression connecting the throughput $S$ and the total arrival rate $G$ in a slotted ALOHA system and hence derive the maximum value of the throughput. 10M
   b) What is binary exponential backoff algorithm? Explain. 5M

Unit - III
5. a) With an example explain link state routing algorithm. 10M
   b) How the routing takes place for mobile hosts? Explain. 5M
6. a) Explain how RED (Random Early Detection) is used to control congestion. 5M
   b) Discuss in detail different types of differentiated services. 10M

Unit - IV
7. a) Give the state diagram for a simple connection management scheme, which make use of the transport service primitives. 6M
   b) Explain TCP protocol in detail. Give the TCP header format and give the description of all the fields of the header. 9M
8. a) Explain TCP transmission policy along with the window management. 9M
   b) With an example explain silly window syndrome. 6M

Unit - V
9. a) What is DNS namespace? Explain in detail DNS resource records with an example. 10M
   b) What are name servers? Discuss the advantages of using names servers. 5M
10. a) Discuss with necessary diagrams, the message transfer using SMTP. 5M
    b) Discuss why MIME was introduced? Give the composition of MIME. 10M

REGULAR
1. a) Two networks each provide reliable connection-oriented service. One of them offers a reliable byte stream and the other offers a reliable message stream. Are these identical? If so, why is the distinction made? If not, give an example of how they differ. 8M
   b) A cable TV system has 100 commercial channels, all of them alternating programs with advertising. Is this more like TDM or like FDM? 7M
2. a) Television channels are 6 MHz wide. How many bits/sec can be sent if four-level digital signals are used? Assume a noiseless channel. 7M
   b) If the unit exchanged at the data link level is called a frame and the unit exchanged at the network level is called a packet, do frames encapsulate packets or do packets encapsulate frames? Explain your answer. 8M
Unit - II
3. a) PPP is based closely on HDLC, which uses bit stuffing to prevent accidental flag bytes within the payload from causing confusion. Give at least one reason why PPP uses byte stuffing instead. 8M
b) An IP packet to be transmitted by Ethernet is 60 bytes long, including all its headers. If LLC is not in use, is padding needed in the Ethernet frame, and if so, how many bytes? 7M
4. a) When bit stuffing is used, is it possible for the loss, insertion, or modification of a single bit to cause an error not detected by the checksum? If not, why not? If so, how? Does the checksum length play a role here? 7M
b) Give two reasons why networks might use an error-correcting code instead of error detection and retransmission. 8M

Unit - III
5. a) What is the problem with Bellman-Ford routing algorithm? Discuss the ways to overcome from this problem. 5M
b) Describe the AoDV algorithm used for routing packets in ad hoc networks. 10M
6. a) Discuss the different techniques adapted for achieving good quality of service, also explain token bucket algorithm. In what way token bucket algorithm is efficient than leaky bucket algorithm? 10M
b) Explain how RSVP protocol used to achieve quality of service in unicast and multicast application. 5M

Unit - IV
7. a) Imagine that a two-way handshake rather than a three-way handshake were used to set up connections. In other words, the third message was not required. Are deadlocks now possible? Give an example or show that none exist. 7M
b) Give a potential disadvantage when Nagle’s algorithm is used on a badly-congested network. 8M
8. a) Why does UDP exist? Would it not have been enough to just let user processes send raw IP packets? 7M
b) Consider a simple application-level protocol built on top of UDP that allows a client to retrieve a file from a remote server residing at a well-known address. The client first sends a request with file name, and the server responds with a sequence of data packets containing different parts of the requested file. To ensure reliability and sequenced delivery, client and server use a stop-and-wait protocol. Ignoring the obvious performance issue, do you see a problem with this protocol? Think carefully about the possibility of processes crashing. 8M

Unit - V
9. a) Does voice over IP have the same problems with firewalls that streaming audio does? Discuss your answer. 7M
b) Does Webmail use POP3, IMAP, or neither? If one of these, why was that one chosen? If neither, which one is it closer to in spirit? 8M
10. a) DNS uses UDP instead of TCP. If a DNS packet is lost, there is no automatic recovery. Does this cause a problem, and if so, how is it solved? 8M
b) POP3 allows users to fetch and download e-mail from a remote mailbox. Does this mean that the internal format of mailboxes has to be standardized so any POP3 program on the client side can read the mailbox on any mail server? Discuss your answer.
DEC 2013 CSE

Unit - 1
1. a) What is OSI Model? Explain all the layers of OSI model in detail. 9M
b) Suppose two hosts, A and B, are separated by 10000 kilometers and are connected by a direct link of $R = 1$ Gbps. Suppose the propagation speed over the link is $2.5 \cdot 10^8$ meters/sec. Calculate the bandwidth-delay product, $R \cdot t_{prop}$. Consider sending a file of 400,000 bits from Host A to Host B. Suppose the file is sent continuously as one big message. What is the maximum number of bits that will be in the link at any given time? 6M

2. a) What advantages does a circuit-switched network have over a packet-switched network? What advantages does TDM have over FDM in a circuit-switched network? Explain in detail. 6M
b) What are the five layers in the Internet Protocol Stack? What are the principal responsibilities of each of these layers? 9M

Unit – 2
3. a) Explain the Ethernet Frame Structure in detail. 10M
b) What do you mean by Connectionless and Connection Oriented Service? Explain in detail with example. 5M
4. a) Explain slotted ALOHA protocol in detail. 10M
b) What’s the difference between error detection and error correction techniques? Explain in detail. 5M

Unit - 3
5. a) Explain IPv6 datagram format with diagram in detail. 12M
b) Describe how packet loss can occur at input ports. Describe how packet loss at input ports can be eliminated (without using infinite buffers). 3M
6. a) What do you mean by congestion control? Explain the various approached of congestion control? 10M
b) Describe how packet loss can occur at output ports. 5M

Unit - 4
7. a) Explain UDP segment format with a neat diagram. 8M
b) Compare UDP and TCP. Also mention at least two applications which use TCP and UDP. 7M
8. a) Explain how connection establishment and termination happen in TCP. 10M
b) Explain multiplexing and demultiplexing with respect to UDP. 5M

Unit - 5
9. a) With an example explain how the name resolution takes place in DNS. 10M
b) With a neat diagram explain DNS hierarchy. 5M
10. Describe with an example how does a HTTP request retrieves the document usr/users/doc/doc1. Use at least two general headers, two request headers and one entity header. Show the response if the document has moved to usr/reads/doc/doc1 and if there is a syntax error in the request.
JUNE 2014

Unit - I
1. a) Explain guided and unguided media in detail? 7M
b) Compare OSI reference model with TCP/IP reference model. 8M
2. a) What do you mean by circuit switching? Explain in detail? 7M
b) With a neat diagram, explain the different layers of the OSI reference model. 8M

Unit - II
3. a) Generate CRC code for the data word 10101010 using the divisor $x^4 - x^2 - 1$ 7M
b) With a neat diagram, explain the different types of high level data link control Frames. 8M
4. a) Discuss hidden and exposed station problem and how it is overcome. 8M
b) Explain CSMA/CA protocol with a neat diagram? 7M

Unit - III
5. a) Explain IPv6 datagram format with diagram in detail? 7M
b) What do you mean by congestion control? Explain the various approaches of congestion control? 8M
6. a) Explain link state routing algorithm and trace the algorithm for a network? 7M
b) Classify the congestion control algorithms and briefly explain any one of them. 8M

Unit - IV
7. a) Explain TCP connection establishment using three way handshaking? 8M
b) Explain the salient features of UDP? 7M
8. a) What is the difference between routing & forwarding? Explain in detail? 5M
b) Compare UDP and TCP. Also mention at least two applications which use TCP and UDP. 10M

Unit - V
9. a) Explain in brief that how DNS works? 8M
b) Explain how Uniform Resource Locators (URLs) works? 7M
10. a) Explain the short notes on following:
    i. SNMP Protocol
    ii. MIME Header
    10M
b) Write short notes on SMTP. 5M

December 2014

Unit - I
1. a) Discuss the principle of working of any two types of connection-oriented networks. 7M
b) With suitable timing event diagrams explain the working of various types of switching mechanism. 8M
2. a) Write OSI reference model, mention significance of each layer. 8M
b) With a neat diagram explain the use of electromagnetic spectrum for wireless communications. 7M

Unit - II
3. a) When bit stuffing is used, is it possible for the loss, insertion, or modification of a single bit to cause an error not detected by the checksum? If not, why not? If so, how? Does the checksum length play a role here? 8M
b) Imagine that you are writing the data link layer software for a line used to send data to
you, but not from you. The other end uses HDLC, with a 3-bit sequence number and a window size of seven frames. You would like to buffer as many out-of-sequence frames as possible to enhance efficiency, but you are not allowed to modify the software on the sending side. Is it possible to have a receiver window greater than 1, and still guarantee that the protocol will never fail? If so, what is the largest window that can be safely used? 7M

4. a) Discuss the working of HDLC protocol, with required frame formats. 9M
   b) A group of N stations share a 56-kbps pure ALOHA channel. Each station outputs a 1000-bit frame on an average of once every 100 sec, even if the previous one has not yet been sent (e.g., the stations can buffer outgoing frames). What is the maximum value of N? 6M

Unit – III

5. a) Compute a multicast spanning tree for router C in the following subnet for a group with members at routers A, B, C, D, E, F, I, and K. 6M
   b) Suppose that host A is connected to a router R1, R1 is connected to another router R2 and R2 is connected to host B. Suppose that a TCP message that contains 900 bytes of data and 20 bytes of TCP header is passed to the IP code at host A for delivery to B. Show the Total length, Identification, DF, MF, and Fragment offset fields of the IP header in each packet transmitted over the three links. Assume that link A-R1 can support a maximum frame size of 1024 bytes including a 14-byte frame header, link R1-R2 can support a maximum frame size of 512 bytes, including an 8-byte frame header, and link R2-B can support a maximum frame size of 512 bytes including a 12-byte frame header. 9M

6. a) An IP datagram using the Strict source routing option has to be fragmented. Do you think the option is copied into each fragment, or is it sufficient to just put it in the first fragment? Explain your answer. 6M
   b) A large number of consecutive IP address are available starting at 198.16.0.0. Suppose that four organizations, A, B, C, and D, request 4000, 2000, 4000, and 8000 addresses, respectively, and in that order. For each of these, give the first IP address assigned, the last IP address assigned, and the mask in the w.x.y.z/s notation. 9M

Unit – IV

7. a) Discuss with neat time sequence diagrams four protocol scenarios during connection release using a three way handshake. 8M
   b) With a neat diagram of TCP header, explain the purpose of every field. 7M

8. a) Explain the mechanism used in TCP congestion control. 10M
   b) If the TCP round-trip time RTT is currently 30msec and the following acknowledgements come in after 26, 32, and 24msec respectively, what is the new RTT estimate using the Jacobson algorithm? Use $\alpha = 0.9$. 5M

Unit – V

9. a) Discuss how a resolver looks up a remote name using eight steps procedure. 8M
   b) Explain the working of simple network management protocol, with basic operations and MIB. 7M

10. a) Discuss the working of SMTP with details on various protocols used for mail exchange. 9M
    b) Explain the need of dynamic web documents as against to static web pages. 6M