



## AUTUMN END SEMESTER EXAMINATION-2015

5<sup>th</sup> Semester B.Tech & B.Tech Dual Degree

### COMPUTER NETWORKS (IT-3001)

(Regular-2013 Admitted Batch)

**Full Marks: 60**

**Time: 3 Hours**

*Answer any SIX questions including Question No.1 which is compulsory.*

*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.*

1. a) In TCP, if the value of HLEN is 0111, how many bytes of  $[2 \times 10]$  options are included in the segment?
- b) Differentiate datagram subnet and virtual circuit subnet.
- c) How does the performance get improved in CSMA/CD protocol compared to CSMA protocol?
- d) How many Class C networks are there? Explain, the reason for the same.
- e) If flow control and error control are performed at the data link layer, then why is it also necessary to perform flow and error control at the transport layer?
- f) How does an ARQ system deal with packet loss?
- g) What do you mean by count to infinity problem, explain with proper example.
- h) With a neat sketch discuss UDP header.
- i) How throughput is improved in slotted ALOHA over pure ALOHA?

j) In a TCP connection, the initial sequence number at the client site is 210. The client opens the connection, sends 1000 bytes of data successfully, and closes the connection. What is the value of the sequence number in each of the following segments sent by the client?

- The SYN segment
- The FIN segment

2. a) An administrator has an IP 192.168.1.0/24 and wants to form subnets for 4(four) departments with 100, 50, 25, and 5 hosts. Design a possible arrangement of subnets to make each department in a different subnet. For each subnet, give subnet mask and range of IP addresses. [4]

b) List out the advantages and disadvantages of star and ring topology. [4]

3. a) Suppose two hosts, A and B, are separated by 20,000 kilometers and are connected by a direct link of  $R = 2$  Mbps. Suppose the propagation speed over the link is  $2.5 \times 10^8$  meters/sec. [4]

(a) Calculate the bandwidth-delay product.

(b) Consider sending a file of 800,000 bits from Host A to Host B. Suppose the file is sent continuously as one large message. What is the maximum number of bits that will be in the link at any given time?

(c) What is the width (in meters) of a bit in the link? Is it longer than a football field?

b) Explain in detail how SMTP send your email to your friend's mailbox. [4]

4. a) The distance from earth to a distant planet is approximately  $9 \times 10^{10}$  m. What is the channel utilization if a stop-and-wait protocol is used for frame transmission on a 64 Mbps point-to-point link? Assume that the frame size is 32 KB and the speed of light is  $3 \times 10^8$  m/s. [2]
- b) What do you mean by congestion control? Explain the methods involved in TCP slow start to avoid congestion control. [6]
5. a) Explain Addressing and Channel access control mechanism for Ethernet LAN. [4]
- b) Consider sending a 2400-byte datagram into a link that has an MTU of 700 bytes. Suppose the original datagram is stamped with the identification number 422. How many fragments are sent out of the host and specify fragment size, identification number, identification flags, and fragment offset of each fragment. [5]
6. a) Explain with example, a transport layer sender and receiver with non-pipeline reliable data transfer protocol over a lossy channel. [3]
- b) Find the code word using hamming code method for the data bits 101011001110. [3]
7. a) Explain how CRC is used in detecting errors for the polynomial,  $g(x)=x^4+x+1$ . Consider the information sequence 1101011011. [4]
- (i) Find the codeword.
- (ii) If the code word has error in third bit, what does receiver obtain when it does error checking.

- b) Explain Distance vector routing algorithm along with its limitation and how it has been overcome. [4]

8. *Answer any four questions* [2 × 4]

- a) RIP vs OSPF
- b) Open loop vs Close loop congestion control
- c) Forward error vs backward error correction
- d) Hamming distance
- e) Limited vs Directed Broadcast

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