

Computer Networks

Paper code: IT-601
Time: 3 hours

Branch: IT
Full Marks: 70

Answer Question 1 and ANY FOUR from the rest

1. Answer the following questions.

$2 \times 15 = 30$

- i. Suppose computers A and B have IP addresses 10.105.1.113 and 10.105.1.91 respectively, and both the computers use same netmask N. If A and B are on different networks, find a probable value of N.
- ii. Let $G(x)$ be the generator polynomial used for CRC checking. What is the condition that should be satisfied by $G(x)$ to detect odd number of bits in error?
- iii. What is the maximum size of data that the application layer can pass on to the TCP? Explain.
- iv. In which ARQ, when a NAK is received, all frames are sent since the last frame is acknowledged? Explain the reason.
- v. In a token ring network, the transmission speed is 10^7 bps and the propagation speed is 200 m/ μ s. Find the physical length of a bit.
- vi. Data link layer retransmits the damaged frames in some networks. If probability of a frame's being damaged is p , then what is the mean number transmissions required to send a frame if acknowledgement is never lost?
- vii. What are the primary characteristics that distinguish a cell from a packet?
- viii. A packet switching network has the following characteristics: Propagation delay = 2 sec/hop; Data transmission rate = 1 Mbps; Packet size = 512 bits; Number of hop = 10. Find the time required to deliver a packet.
- ix. A noiseless 3 kHz channel transmits bits with binary level signals. What is maximum data rate?
- x. Consider two computers A and B are attached in an Ethernet LAN. The IP address and hardware address of computer A are 197.15.3.2 and 0A:07:4B:12:82:36 (in Hex), whereas the IP and hardware addresses of computer B are 197.15.3.3 and 0A:9C:28:71:32:8D respectively. Computer A broadcasts an ARP message to know the hardware address of computer B. Show (with the help of a suitable diagram) the ARP message sent by A.
- xi. How does Ethernet decide to forward data to IP or to ARP or to other protocol?
- xii. Does slotted ALOHA require global time synchronization? Explain.
- xiii. What is the difference between baud rate and bit rate?
- xiv. Bit stuff the data: 00011111110011111010001111111111000011111.
- xv. Show the values of the TCP flags during each handshake of three-way handshaking.

2. *a.* State the congestion control mechanism of TCP.
b. Give an example to show that two-way handshaking cannot successfully establish a connection for TCP but three-way handshaking can.

5 + 5

3. *a.* If datagram switching is replaced by virtual circuit switching, then do we need TTL (Time To Live) like field in network layer header? Explain.
b. A computer network generally uses two types of addresses (physical and logical) to deliver data to some specific host. Can you construct a computer network with a single type of address? If not, state reason. If yes, state the problems of doing so.

5+5

4. *a.* What is the characteristics of distance vector routing which leads to count-to-infinity problem? Why is such problem not found in link state routing?
b. What is split horizon solution to the count-to-infinity problem? Give an example with suitable diagram that shows its effectiveness. Give another example which shows the failure of split horizon solution.

5 + 5

5. *a.* Why are the maximum window sizes in Go-Back-N ARQ and Selective-Repeat ARG $2^m - 1$ (instead of 2^m) and 2^{m-1} (instead of $2^m - 1$) respectively, where m is the number of bits used for sequencing?
b. Discuss about transition phases of PPP (Point-to-Point Protocol) with suitable diagram.

5 + 5

6. *a.* Describe (with suitable examples) hidden station problem and exposed station problem found in wireless networking.
b. State how collision is avoided in DQDB?

5 + 5