

MM: 50

Computer Networks

Time: 1.5 Hours

PART - A

16 1/2

1. For each of the following four networks, discuss the consequences if a connection fails.

a) Seven devices arranged in a mesh topology

Only the communication between two devices will get affected

b) Seven devices arranged in a star topology (not counting the hub)

Only the communication between two devices will get affected.

c) Seven devices arranged in a bus topology

Communication between all the devices will be disrupted.

d) Seven devices arranged in a ring topology

Communication between few devices will get disrupted.

[4*1 Marks]

2. In an internet, assume that the LAN technology is changed to a new one. Which layers in the TCP/IP protocol suite need to be changed?

Physical Layer ~~Application~~

[1 Marks]

3. Match the following to one or more layers of the TCP/IP protocol suite:

a) route determination: ~~Data link layer~~ Network Layer.

b) connection to transmission media: Physical Layer

c) providing services for the end user: Application Layer.

[1.5 Marks]

4. How many IP addresses and how many link-layer addresses should a router have when it is connected to five links?

2 link layer address and 5 IP address.

[1 Marks]

5. In CRC, let the chosen generator be 1100101. What is the probability of detecting a burst error of length 10?

$$\frac{1}{2^{10}} \text{ Since}$$

[2 Marks]

6. In CRC, which of the following generators (divisors) guarantees the detection of an odd number of errors? Why?

a) 10111

b) 101101

c) 111

b) can be written as $1+x^2+x^3+x^5 = (1+x^2)(1+x^3) = (1+x)(1+x^2)(1+x^2-x)$
 since $x+1$ is a factor and we know that $(x+1)$ guarantees the detection of an odd no. of errors.

[4 Marks]

7. For the Stop-and-Wait protocol, state what happens in each of the following cases:

a) The receiver is in the ready state and a packet comes from the network layer.

Ack. is sent back.

b) The receiver is in the ready state and a corrupted frame arrives.

Frame is discarded and acknowledgement not sent.
Rn not increased.

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- c) The receiver is in the ready state and an acknowledgement arrives.
 S_f is incremented. Next packet is sent and then S_n incremented.
- d) The sender is at the ready state and a corrupted acknowledgement arrives.
Acknowledgement is discarded. And the whole frame is discarded afterward and sent from fresh.
- e) The sender is at the ready state and a time-out occurs.
Sender sends the previous packet again.
- f) The sender is at the blocking state and a time-out occurs.
whole frame is sent from fresh.

[6*1 Marks]

8. Answer the following questions related to Selective-repeat protocol with $m = 7$ bits.

- a) The sending machine is in the ready state with $S_f = 10$ and $S_n = 15$. What is the sequence number of next packet to send?
15
- b) The sending machine is in the ready state with $S_f = 10$ and $S_n = 15$. The timer for packet 10 times out. How many frames are to be resent? What are their sequence numbers?
only packet 10 is resent. One packet has to be resent.
- c) The sending machine is in the ready state with $S_f = 10$ and $S_n = 15$. An ACK with ackNo = 13 arrives. What are the next values of S_f and S_n ? What is the action in response to this event?
 S_n and S_f remains same.
 $S_n = 15$ $S_f = 14$

- d) The sending machine is in blocking state with $S_f = 14$ and $S_n = 21$. What is the size of the window?
Window size = $2^6 = 64$

- e) The sending machine is in blocking state with $S_f = 14$ and $S_n = 21$. An ACK with ackNo = 14 arrives. Frames 15 and 16 have already been acknowledged. What are the next values of S_f and S_n ? What is the state of the sending machine?
 $S_f = 17$ $S_n = 21$ Sending machine in ready state.

[5*1.5 Marks]

9. Match the following to the devices:

- a) A multiport device, that can be used to serve as the connection point and at the same time function as a repeater. Switch.
- b) Forwards the packet from all outgoing ports except the one from which the signal was received. Router. Hub.
- c) It can check the destination address of a frame and can decide which outgoing port the frame should be sent. Switch.
- d) Uses a table that maps addresses to ports. Router.

[1 Marks]