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Sessional Test-2 Model Solution

Course:	MCA	Semester:	V
Session:	2017-18	Section:	MCA-1 & 2
Subject:	Computer Network	Sub Code:	NMCA-E25

Note: Answer **all** the sections.

Section-A

1. What is static channel allocation?

Solution: When multiple stations are contending to get a shared channel, a pattern can be fixed in advance to allocate the channel. For example, time slots can be assigned to each station. This is known as static channel allocation. Assigning slots is called Time division multiplexing.

2. What is efficiency of Bit-map at high load?

Solution:- In Bit-map, one contention slot is assigned to each station for announcing its will to transmit a frame. At high load this one bit will be overhead for d-bit data frame, so efficiency e will be, $\boxed{e = \frac{d}{d+1}}$.

3. How does slotted time increase the efficiency of ALOHA?

Solution:- In ALOHA, any station ready for transmission may transmit the data frame at any instant of time resulting in vulnerable period of Two frame-time. The slotted time change this vulnerable time to one frame time by allowing the stations to transmit frame only at the start of the slot. This doubles the efficiency of ALOHA from 18.4% to 36.8%.

4. Which class address 169.201.34.233 belongs to?

Solution:- The address 169.201.34.233 belongs to class B as it falls in the range

128.0.0.0 to 191.255.255.255.

The first two bits of its binary representation is 10.

5. What is external fragmentation?

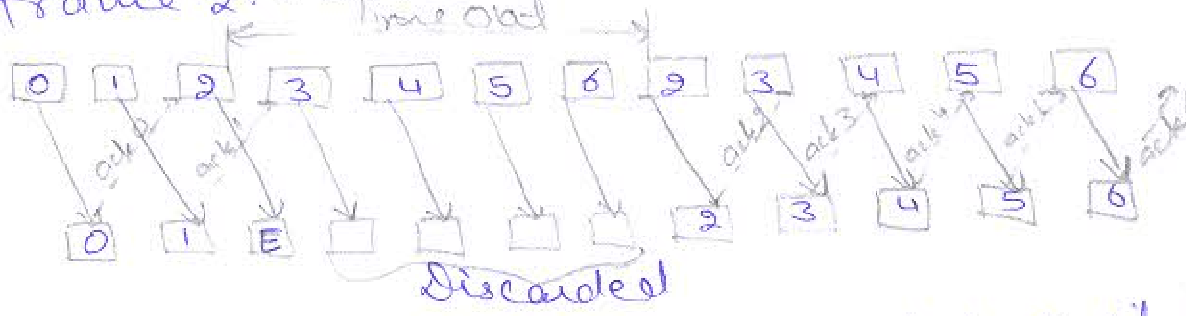
Solution:- When a large packet has to travel through a network whose maximum packet size is too small, gateways break up packets into fragments, this is called fragmentation. These fragments can be reassembled at exit gateway or at the destination.

Section-B

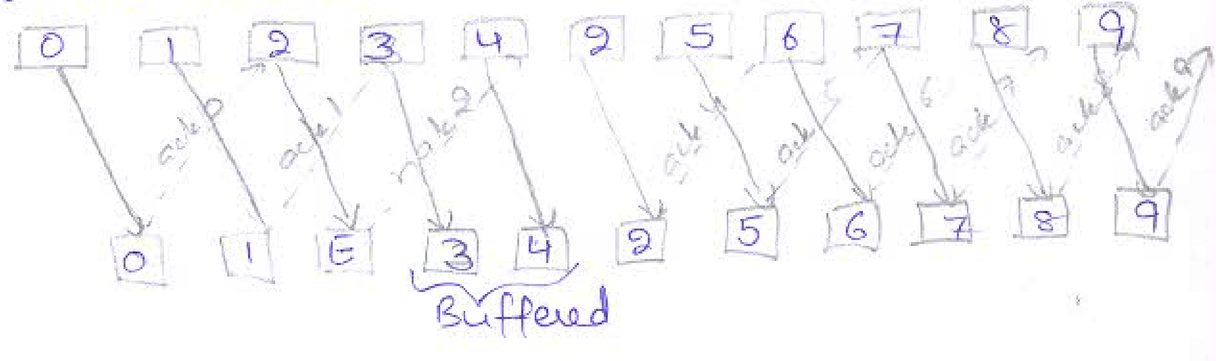
6. Differentiate between Go Back N and Selective Repeat with an example.

Solution:- GO BACK N and Selective Repeat are two protocols that deals with errors in pipelining which allows the sender to transmit upto w frames before blocking the sender. Let 0, 1, 2, 3 --- are the allowed frames and sending sequence.

In Go Back N, as shown in figure below, if frame 2 is erroneous, then the receiver discards the subsequent frames and after time out, sender restarts from frame 2. The reciever window size is 1.



In Selective repeat, as shown below, if frame 2 reaches erroneous, Then receiver buffers the subsequent frames and sends back negative acknowledgement of 2. After receiving this, sender resends only frame 2. The receiver window size is >1.



7. What is the remainder obtained by dividing x^7+x^5+1 by the generator polynomial x^3+1?

Solution:- Message polynomial $= x^7+x^5+1$.

Binary representation

$= 10100001$

Generator polynomial $= x^3+1$

in Binary 1001

Message after appending 3 bits

$= 10100001000$

Dividing

```
1001 ) 10100001000 ( 10110111
       1001
       ----
        0110
        0000
        ----
         1100
         1001
         ----
          1010
          1001
          ----
           0111
           0000
           ----
            1110
            1001
            ----
             1110
             1001
             ----
              1110
              1001
              ----
               111
```

Remainder = 111

Remainder polynomial $= x^2+x+1$.

8. Compare virtual circuit and datagram subnet.

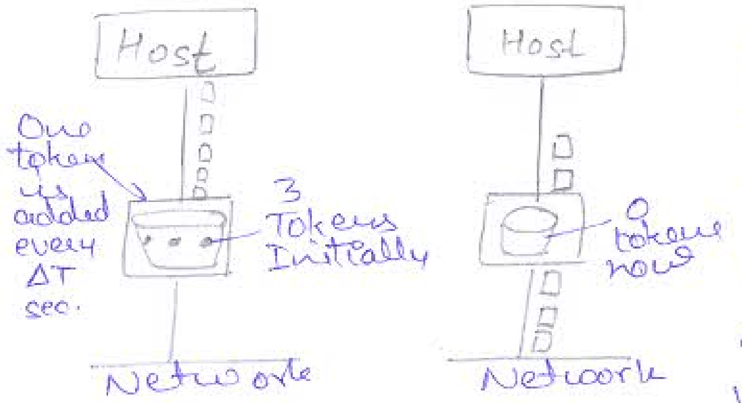
Solution:-

Issue	Virtual circuit	Datagram Subnet
1. Connection	Connection is setup.	It is connection less subnet
2. Address	Each packet contains a virtual circuit number.	Each packet contains full source and destination address.
3. State Information at Routers	Each VC requires router table space per connection.	Routers do not maintain any information about connections.

Issue	Virtual Circuit	Datagram subnet
3. Routing	At VC setup time route is chosen. All packets take that route.	Each packet move indepen dently
4. Failure	All VCs via failed router get termi- nated.	packet present at failed router lost.
5. QoS	Easy by allocating enough resources in advance for each VC.	Difficult to provide.
6. Conges- tion Control	Easy by alloca- ting resources.	tough to handle.

9. Explain Token bucket algorithm.

Solution:- Token bucket algorithm.
It is a traffic shaping method for congestion control. Here, a token bucket is implemented between Host comp- uter and the network. The number of packets transmitted to the network will depend upon tokens present in token bucket, generated by a clock at the rate of one token every Δt seconds. As shown in figure, let five packets are generated at the host, but only three tokens are present in buket, So,



Only three packets will be passed to the networks, remaining two will wait for next token generation. So in this way, whatever irregulated flow comes from host, the data flow to the network is regulated. Token bucket allows burst traffic to flow to network according to available tokens. There is no packet loss.

10. Sixteen-bit messages are transmitted using a Hamming code. Show the bit pattern transmitted for the message 1111000010100101. Assume that odd parity is used in the Hamming code.

Solution:- Message 1111000010100101.

Codeword:

C_1	C_2	1	C_3	1	1	1	C_4	0	0	0
1	2	3	4	5	6	7	8	9	10	11

0	1	0	1	C_5	0	0	1	0	1
12	13	14	15	16	17	18	19	20	21

Expanding message location:-

3 = 1 + 2
5 = 1 + 4
6 = 2 + 4
7 = 1 + 2 + 4
9 = 1 + 8
10 = 2 + 8
11 = 1 + 2 + 8
12 = 4 + 8
13 = 1 + 4 + 8
14 = 2 + 4 + 8
15 = 1 + 2 + 4 + 8
17 = 1 + 16
18 = 2 + 16
19 = 1 + 2 + 16
20 = 4 + 16
21 = 1 + 4 + 16

C_1 will be calculated from 3, 5, 7, 9, 11, 13, 15, 17, 19, 21

C_2: 3, 6, 7, 10, 11, 14, 15, 18, 19

C_3: 5, 6, 7, 12, 13, 14, 15, 20, 21

C_4: 9, 10, 11, 12, 13, 14, 15

C_5: 17, 18, 19, 20, 21

For our problem (Using odd parity)

C_1: 1, 1, 1, 0, 0, 1, 1, 0, 1, 1 $\qquad C_1 = 0$

C_2: 1, 1, 1, 0, 0, 0, 1, 0, 1 $\qquad C_2 = 0$

C_3: 1, 1, 1, 0, 1, 01, 0, 1 $\qquad C_3 = 1$

$\qquad C_4 = 1$

C_4: 0, 0, 0, 0, 1, 0, 1 $\qquad C_5 = 1$

C_5: 0, 0, 1, 0, 1

Transmitted Message =

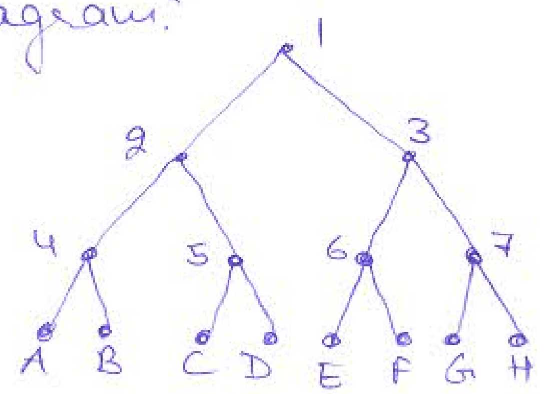
0011111100000101100101

Section-C

11. Explain Adaptive tree walk limited contention protocol with an example.

Solution! - Adaptive tree walk! ~~to~~

Adaptive tree walk is a limited contention protocol which combines the best properties of the contention and collision free protocols. It uses contention protocol at low load and collision free protocol at high load. In adaptive tree walk, In first contention slot, all the stations are permitted to make transmission. If successful transmission occurs, then ok. Otherwise, slot 1 is given to the stations in group 1 and if again collision occurs the group 1 is divided into two groups and next slot is given to the stations of one of those groups. It can be implemented with help of a binary tree, having stations as its leaves as shown in following diagram:



Here, slot 1 will be given to all the stations A-H. Slot 2 can be used by A-D. Slot 4 can be used by A and B only. Let B and D are ready stations, for example. In slot 1, both will make transmission and so frames will ~~be~~ collided. Now stations under node 2 will use slot 2 for transmission. So, again B and D will transmit and collision occur. Now, stations under node 4 will be allowed to make transmission in slot 3. Process is summarized below:

slot 1 : B, D
Slot 2 : B, D
slot 3 : B
Slot 4 : D
Slot 5 : —

optimal level to begin searching the tree, $i = \log_2 q$, where q is the number of ready stations.

12. Discuss distance vector routing. What is count to infinity problem?

Solution:- Distance Vector routing:- Distance vector routing operate by having each router maintain a table giving the best known distance to each destination and which line to use to get there. So, each router maintains a routing table, indexed by, and containing one entry for each router in the subnet. The routers know distance to each of its neighbors. Once every T msec each router sends to each neighbor a list of its estimated delays to each destination. It receives similar list from each of its neighbors. Let one of these tables has just come in from neighbor X, and X_i is the estimated cost of X from X to i. The router can calculate its distance to i by just adding its distance m to X to X_i i.e. $\boxed{X_i + m}$. By performing, this calculation for each neighbor, it can find best cost to i.

<u>Count-to-infinity Problem</u>:- Distance vector routing suffers with count to infinity problem. Let us assume the below shown topology of 5 routers.

A	B	C	D	E
	1	2	3	4
	3	2	3	4
	3	4	3	4
	5	4	5	4
	5	6	5	6
	7	6	7	6
	⋮	⋮	⋮	⋮
	∞	∞	∞	∞

Let, initially, all the lines are up. Routers B, C, D, E know distance to A i.e 1, 2, 3 and 4 respectively.

Suddenly A goes down, resulting in failure of AB line. Now, B will update its table with help of C's routing table. next time C will update its table from B's table and so on all the routers will go on updating the routing tables with incrementing their neighbour's estimated cost. This will lead to counting to infinity. Means, in infinite time routers will come to know that A is at infinite distance from them.