



Continuous Assessment Test – II
Winter Semester 2019-20

Duration: 90 Minutes.

Max. Marks: 50

Course Mode: CAL

Mode: Closed Book

1. Five prisoners are locked up in adjacent cells in prison. They would like to communicate with each other, but the walls and doors are too thick. One day, one of the prisoners discovers that if he hits the water pipe in his cell with a metal spoon, the sound travels to two cells in each direction, i.e. noise from cell i can be heard in cells $i-2$, $i-1$, $i+1$, and $i+2$, assuming these cells exist. After some experiments, they discover this is true for all the cells. Over lunch, they decide to define a protocol that will allow efficient communication. One of the prisoners has taken computer networks course and argued that this is very much like an Ethernet, so they decide to use the Ethernet protocol over their Water Pipe Network. The prisoners planning the break are in five adjacent cells that are lined up in a row. Unfortunately, there are some problems. Can you help them? Explain how the following three concepts map onto specific aspects of this network.

- i) Carrier Sensing
- ii) Multiple Access
- iii) Collision Detection.

2. i. An IPv4 datagram has arrived with the following information in the header (in hexadecimal): 0x45 00 00 54 00 03 58 50 20 06 00 00 7C 4E 03 02 B4 OE OF 02

1. Is the packet corrupted?
2. Are there any options?



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3. Is the packet fragmented?
 4. What is the size of the data?
 5. How many more routers can the packet travel to?
 6. What is the identification number of the packet?
 7. What is the type of service?
- ii. In an IPv4 datagram, the *M* bit is 0, the value of HLEN is 5, the value of total length is 200, and the offset value is 200. What is the number of the first byte and number of the last byte in this datagram? Is this the last fragment, the first fragment, or a middle fragment?
3. An ISP is granted a block of addresses starting with 175.20.0.0/16 (65,536 addresses). The ISP needs to distribute these addresses to three groups of customers as follows:
- a. The first group has 64 customers; each needs 128 addresses.
 - b. The second group has 128 customers; each needs 64 addresses.
 - c. The third group has 128 customers; each needs 32 addresses.
- Design the subblocks and find out how many addresses are still available after these allocations.
4. Which sliding window flow control protocol is best suitable when out of order acceptance is allowed? Explain the same protocol by drawing the sliding windows, sequence numbers, time graphs and changing the position of all the variables both at sender and receiver, ($m=3$)
- i. Frames 0, 1 and 2 are sent; frames 0 through 2 are acknowledged.
 - ii. Frame 3 is sent; frame 3 is lost.
 - iii. Frames 4 and 5 are sent; frames 4 and 5 are acknowledged after receiving frame 3.
 - iv. Frames 6 and 7 are sent; frames 6 and 7 are acknowledged, but frame 7's acknowledgement is lost.
 - v. Frames 0 and 1 are sent; frames 0 and 1 are acknowledged.
5. i. An organization is granted the block 16.0.0.0/16. The administrator wants to create 500 subnets.
- i. Find the subnet mask.
 - ii. Find the number of addresses in each subnet.
 - iii. Find the first and last addresses in subnet 1.
 - iv. Find the first and last addresses in subnet 1024.
- ii. State and explain the various inter-connecting devices with respect to OSI layers.