**Computer Networks**

**Spring 2023**

Assignment 4 BSE-6A,6B

**Due Date: Thursday 6th April 2023**

**Submission Mode & Time:** Handwritten solutions to be submitted during the lecture.

**Please note the following:**

1. No exceptions to the above date and time will be allowed. Inability to submit the assignment by the required time will result in zero marks.
2. To ensure self-completion of assignments and discourage plagiarism, the instructor or the relevant TA may randomly contact you and ask for an explanation of your answers. Where plagiarism and/or cheating is evident, you will be referred to the departmental disciplinary committee. In extreme cases of plagiarism an F may be awarded immediately with further referral to the university disciplinary committee.
3. All solutions must be **handwritten.**
4. **Assignment Solution Submission**: In case of **in person / physical lectures at the campus**, hard copy of the hand-written assignment’s solutions will be submitted by **hand** by each student to the Instructor / TA directly during the lecture on the due date.

**Assignment Instructions:**

1. Show Complete Working.
2. Handwritten Assignment
3. Judge Whether FLSM or VLSM required. Show Complete Working.
4. CIDR notation Should be Followed.

**(Q1)** An organization is granted a block with one of the IP addresses as 200.0.80.0/20. The  
administrator wants to create 64 subnets of fixed length. You are required to find (i) the subnet mask to be  
configured in each subnet, (ii) 1st and last IP address in subnet 1, (iii) 20th and 50th IP address in subnet  
50, (iv) number of addresses in each subnet, and (v) broadcast address in the last subnet.

**(Q2)** An ISP is granted a block of addresses starting with 150.0.0.0/16 (65,536 addresses). The ISP needs  
to distribute these addresses to four groups of customers as follows:   
I. The group has 16 customers; each customer needs 1024 addresses.  
II. The group has 32 customers; each customer needs 512 addresses.  
III. The group has 64 customers; each customer needs 256 addresses.  
IV. The group has 128 customers; each customer needs 128 addresses.  
You are required to provide network address and broadcast address for a few customers of each group as  
follows:  
▪ First Customer i.e., customer 1 in each group  
▪ Customer 3 in each group.   
▪ Customer 6 in each group.  
▪ Last Customer in each group  
Moreover, find out how many addresses are still available after these allocations?

**Q3)** You are working in a data centre environment and are assigned the address range 10.188.31.0/23. You are asked to develop an IP addressing plan to allow the maximum number of subnets with as many as 30 hosts each. Which IP address range meets these requirements?

**Q4)** Suppose you are using an Internet service and that service is being provided by FAST university, Lahore. Now the network that gives Internet service to FAST is such that the first hop in the network is a grocery store called Bismillah Store. Bismillah Store’s next hop is the main ISP called Rahat Bakery that in actual provides service to FAST. The MTU’s of all links are as follows,

**FAST to Bismillah Store: 2100 bytes (1980 bytes of data + 20 bytes of header)**

**Bismillah store to Rahat Bakery: 5640 bytes (5620 bytes of data + 20 bytes of header)**

Assume that you are using the internet directly in premises of FAST, that means FAST will be the host Node. Now, you want to see trailer of a newly released Episode of a Turkish Serial and that trailer is of 10,468 bytes (10,448 bytes of data + 20 bytes of header). You requested the video from ISP’s (Rahat Bakery) server, and it then sent you the video in response, now answer the following questions,

**(a). How many fragments will there be on the link from Rahat Bakery to Bismillah store? Also mention the size of each fragmented packet and its offset.**

**(b). How many fragments will there be on the link from Bismillah store to FAST university? Also mention the size of each fragmented packet and its offset.**

**(c). Who will you consider responsible for so much fragmentation of data?**