**Qualifying Exam: Network Architecture**

**July. 2015**

Instruction:

* Put your name and student number on all your answer sheets.
* You have 60 minutes to complete the exam.
* **Show all your work. Partial credit will be considered, if you show intermediate steps in obtaining the answer.**

Question #1 (20pt):

1. What do you think is the major reason why various requirements from the applications such as QoS, multicast, mobility etc., can’t easily be implemented and deployed over current IP protocol?
2. The most important goal of the design of the Internet is survivability. In some network architecture the state to ensure reliable network services is stored in the intermediate switch nodes. And it should be replicated. However, in the Internet, end node takes the state information. This approach is called “fate sharing” which accept to lose the state information associated with an entity if, at the same time, the entity itself is lost. What are the most important advantages of “fate sharing”?

Question #2 (20pt): Explain how the “Count to infinity problem” occurs, when you use “distance vector algorithm” to find shortest path to destinations. What could be the solution for this problem?

Question #3 (20pt):

1. How can you solve “Hidden terminal problem” of wireless networks?
2. Why is “longest prefix matching” required to forward the packets? And also explain why it is harder than exact matching?

Question #4 (20pt):

1. Show how TCP estimates RTT.
2. Suppose that you use “Additive Increase, Additive decrease (AIAD)” as a TCP congestion control. Is that good for TCP fairness? Justify your answer.

Question #5 (20pt): In SDN, control plane is separated from data plane unlike legacy Internet. Show an example that this feature is useful for certain application such as traffic engineering, NFV, multicast, flow redirection etc.,.