

**Computer Communication & Networks  
BS-SE**

***Instructions:***

***This is an open-book take-home mid-term assignment, to be submitted by 12:00 noon, Friday, April 27<sup>th</sup>, 2020. You may consult the textbook, your notes, and any material posted on sic. No other sources of information are allowed, including friends, classmates, materials from other classes, tutors, etc. Please write your solutions as clearly and neatly as possible. Also, show all your work, preferably with explanations for each step. If you are asked to do a problem a specific way (for example, “use the standard representation. . .”), then you will receive no credit for doing it any other way. You will also receive no credit for answers without sufficient work to produce them. Attempt all questions. Answers copied will both be marked zero. Late submission will not be accepted and marked zero.***

**How to Submit?**

- 1. Write your names and IDs at the top of answer sheet.***
- 2. Scan / Take Photo of each paper and save each photo with a number. E.g. photo of paper 1 of answer sheet be saved with name 1.jpg, then 2.jpg and so on.***
- 3. Put all answer photos in a folder, name the folder with subject name, Section, your name and id e.g. CCN\_SecA\_Ali\_12345.***
- 4. Zip the folder and upload on Sic (you will be provided upload link on sic to submit your answers go to Lectures section and click on Upload Assignment and upload your answers in the subject).***

Q.No.1 (a) The Open System Interconnect (OSI) model is a conceptual framework that organizes the functionalities of any type of communication in a layered structure. The Data Link Layer transforms bit streams into data streams, and handles the sequential transmission of these frames by regulating flows and handling errors. Or if the Higher layers use services provided by lower layers, and interface with them via Protocol Data Units (PDUs). What if the Foregoing several of the intermediate layers, we encounter in order from top to bottom the Presentation Layer, Transport Layer, Data Link Layer, and Physical Layer. If none of the above then there is a case that OSI model was

introduced by the International Standards Organization (ISO). Argue the above case study and give your reasoning.

- Q.No.1 (b) Argue the advantages and disadvantages of combining the session, presentation, and application layer in the OSI model into one single application layer in the Internet model.
- Q.No.2 (a) There are several network layer models proposed in the OSI model. Find all of them. Explain the differences between them.
- Q.No.2 (b) If a signal does not change at all, its frequency is zero. If a signal changes instantaneously, its frequency is infinite. Three components of a sine wave are amplitude, frequency and phase of a signal. The change in a signal shows the relation between signal's amplitude w.r.t to time whereas the phase is not shown. Explain your answer why we cannot explicitly show phase in a time-phase plot?
- Q.No.3 (a) Four connections (10 Kbps, 100 Kbps, 1 Mbps and 10 Mbps) are multiplexed together. A unit is 1 byte or 8 bits. Find (a) the duration of 1 bit before multiplexing (b) the transmission rate of the link (c) the duration of a time slot and (d) the duration of a frame.
- Q.No.3 (b) We need a three-stage space-division switch with total inputs of 10,000. We use 1000 crossbars at the first and third stages and 16 crossbars at the middle stage.
- Draw the configuration diagram.
  - Calculate the total number of cross-points.
  - Find the possible number of simultaneous connections.
  - Find the possible number of simultaneous connections if we use one single crossbar (1000 x 1000).
  - Find the blocking factor and the ratio of the number of connections in c and in d.