

ITS 413 – QUIZ 4

First name: _____ Last name: _____

ID: _____

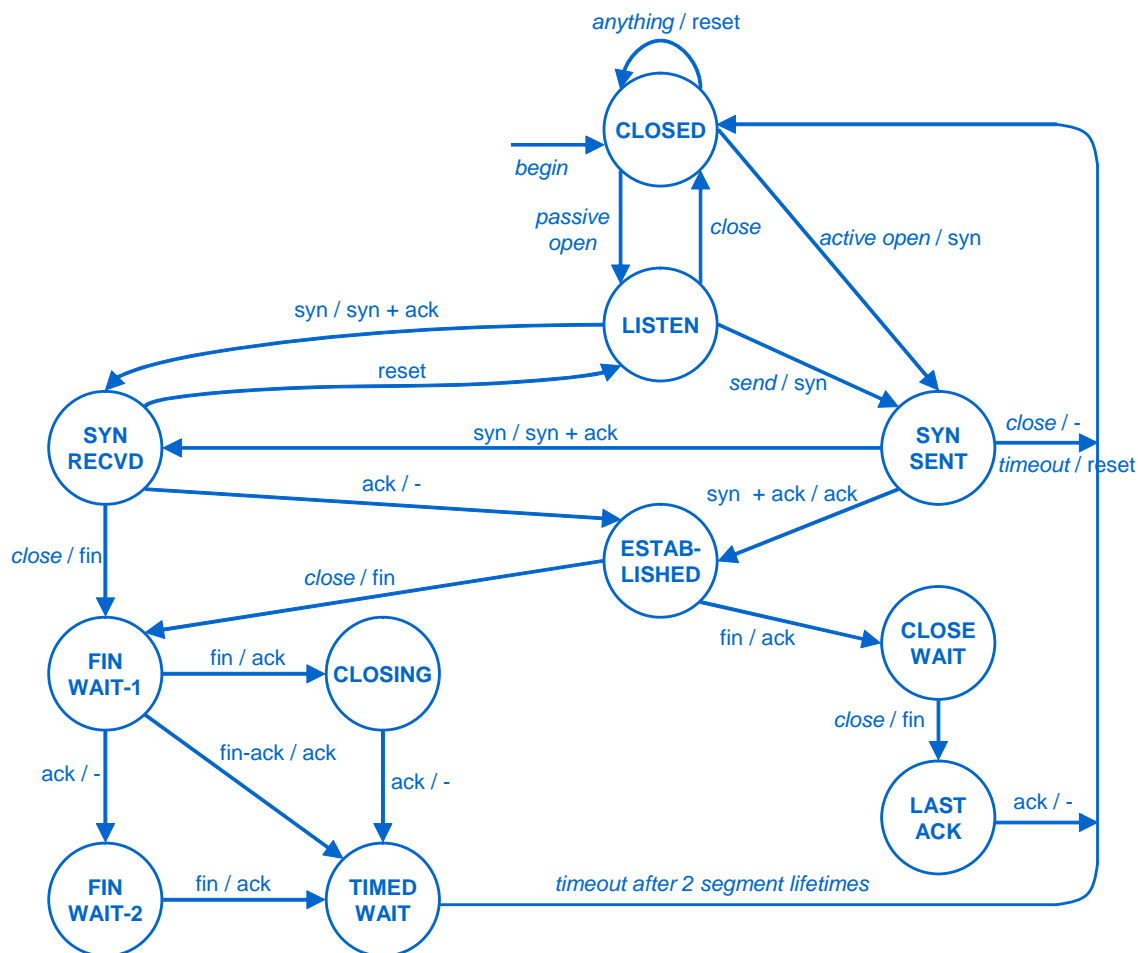
Total Marks: _____

out of 15

- Write your name and ID in the space provided at the top of the sheet.
- Answer the questions on this sheet(s) only, using the space given.
- When asked to *describe* or *explain* something, your answer must be clear, concise and unambiguous. Usually about 1 to 4 sentences.

Question 1 [6 marks]

The figure below shows the state machine for TCP connection management.



Both client and server begin in the CLOSED state. A server is started with a *passive open* while a client is started with an *active open*. Draw a time sequence diagram that illustrates:

- A *send* from the client application initiating connection setup (establishment)
- Immediately after the connection is established, the server application issues a *close*, and after a short time the client application issues *close*.

Question 2 [3 marks]

- a) What is the purpose of flow control in TCP?
- b) What is the purpose of congestion control in TCP?
- c) How does *slow start* help in congestion control in TCP?

Question 3 [6 marks]

Assume the following:

- A TCP client is sending 1000 byte segments to a TCP server. It has 7 segments (7000 bytes) to send.
 - The Round Trip Time between a TCP client and TCP server is 100msec.
 - There are no processing (or other) delays at the client or server
 - The TCP server responds with an ACK immediately when a segment is received from the client.
 - The first byte sent by the client has sequence number 1
 - The TCP client sends 1 segment every 40 msec. The first segment is sent at time 0msec. And the 7th segment is sent at time 240msec.
 - The initial window size allows the TCP segment to send 7000 bytes (i.e. 7 segments)
 - The retransmission timeout is set to 380msec (and does not change)
 - Ignore any changes in the window size (which may be due to flow or congestion control)
- a) What is the ACK value for the third Ack segment received by the TCP client?
 - b) When is the third Ack segment received?
 - c) If the fourth segment was lost and the original TCP (with no Fast Retransmit) is used, at what time is the final Ack segment received, acknowledging all 7000 bytes.
 - d) If in part (c) TCP Tahoe is used (i.e. Fast Retransmit, which supports duplicate ACKs), at what time is the final Ack segment received?

