Q1:

a) The IP address of the host and the port number of the socket.

b) Although centralized DNS is simple to design, it's hard to scale. There will be a huge number of hosts in the network and the whole network will break down even if there is only one single host breaks down in the internet. All the DNS queries should be handled through one DNS server and it will make it really difficult and slow for the queries from the other side of the world to be answered. The DNS server also need to update continually to account for every new host.

c) Persistent HTTP. For long distance network paths, round-trip time (RTT) will be very long. Since non-persistent HTTP will run much more times of RTT than persistent HTTP, it will be a much longer delay in time by using non-persistent HTTP when it's a long distance network path.

d) Because UDP doesn't need to check the connection or whether the file is transferred integrally. So it can fit much better when it's real time transmission such as streaming media.

e) IMAP provides means for a user to create remote folders and assign messages to folders. IMAP also allows users to obtain components of messages.

f) First, HTTP is a pull protocol while SMTP is a push protocol. Second, SMTP requires each message including the body of each message to be in 7-bit ASCII format while HTTP doesn't have the restriction. Third, HTTP encapsulates each object in its own HTTP response message, SMTP places all of the message's objects into one message.

Q2:

a) $t = (M + 1) * [2RTT + O / R] = (M + 1) * [2T + L / R]$

b) $t = (2 + M) * RTT + (M + 1) * O / R = (2 + M) * T + (M + 1) * L / R$

c) $t = 3RTT + (M + 1) * O / R = 3T + (M + 1) * L / R$

d) $t = (4RTT + (M / 2 + 1) * O / R) * 2 = 8T + (M + 2) * L / R = 8T + 12L / R$

Q3:

No. The sockets are the same. They are distinguished through IP address that is provided to the process by OS.

Q4:

Yes, they will use different socket of the web server. They are distinguished through different sockets, but the destination port for both the requests is the same, both of them are port 80.

Q5:

REQUEST:

a) index.html

b) www.cs.umass.edu

c) It is not provided.

d) It is using persistent connection

e) The version of the HTTP being used is HTTP/1.1. There are four versions of HTTP which are HTTP/0.9, HTTP/1.0, HTTP/1.1, HTTP/2.0

f) The name of the browser is Firefox. The version is 3.6.10. It is necessary to specify the browser's details in the HTTP request so that the server can actually send different versions of the same object to different types of user agents.

RESPONSE:

a) Yes, the document reply was provided at 20:09:20 on Sunday, 26 Sep GMT.

b) The document was last modified at 17:00:02 on Tuesday, 30 Oct GMT

c) There are 2652 bytes in the document being returned.

d) Yes. The connection state is Keep-Alive.

Q6:

NAME	TTL	TYPE	DATA
test.com	1000	NS	dns1.test.com
dns1.test.com	1000	A	192.168.1.1
test.com	1000	CNAME	a.test.com
test.com	1000	MX	mail.test.com
192.168.1.1	1000	NS	dns1.test.com

Q7:

C

In an ideal P2P system, there are three facts that determines the total time of the transmit. First, the file should be uploaded by server, it takes S/C time. Second, the file should be downloaded by all of the clients, which takes S/Dmin which equals to S/D in this Question. Third, all of the clients finish their upload. If it takes the clients more than S/C to finish upload, the sever will upload more than S, which means it will take KS / (C + UK) = S / (C / K + U). Once all of these three parts finish transmit, the whole transmit finishes. Since these three parts works at the same time, the total time will be the maximum of these three time which is max (S / C, S / D, S / (C / K + U)). So the answer is C.