Indicate which is the right statement (correct answer will give 1 point, incorrect will not count). The objective of this section is to ensure that some of the basic concepts of transport, link layer and application protocols are understood.

1- Transmission Delay
a) is the time to propagate the bits from the begining to the end of the link
b) depends on the distance between begining and end of the link
c) is the time required to push all the bits into the link
d) is the time the packet has to wait in the router before being sent to the link

2- HTTP 1.0 uses
a) UDP as transport protocol
b) 90 as the default port in the server for incoming connections
c) both persistent and non persistent connections
d) non persistent connections only

3- HTTP client uses
a) "WWW-Authenticate" header to send user authentication info to the server
b) "Authorization" header to send user authentication info to the server
c) "User-Agent" header to send user authentication info to the server
d) "Content-Disposition" header to send user authentication info to the server

4- The DNS authoritative server
a) knows the IP addresses of all other authoritative servers for a given hostname
b) knows the CNAME and MX information for all the hosts
c) for a given host only store the CNAME for the given hostname
d) for a given host is the one that always has a record that translates that host's hostname

5- UDP provides the following services to upper layers
a) reliable transfer based on ACK messages and retransmission
b) multiplexing and demultiplexing based on port numbers
c) congestion control based on RTT calculations
d) multiplexing and demultiplexing based on source and destination IP addresses

6- TCP provides the following services to upper layers
a) only point-to-point communications
b) non reliable transfer
c) support for multicast communications
d) connection-less communications

7- The MSS in TCP indicates
a) the maximum size of the data that guarantees no fragmentation at IP layer
b) the maximum size of application data that can be placed in a TCP segment
c) size of TCP segment including application data and TCP headers
d) the maximum size of the TCP buffers for the congestion window

8- The TCP sequence number is
a) a random number selected for every TCP segment
b) the byte number of the first byte in the TCP segment
c) used for implementing multiplexing and demultiplexing
d) the number selected in the receiver to indicate the bytes that it can receive

9- The TCP SYN flag is set to 1 when
a) client initiates the connection with the server
b) when server sends connection-granted to the client
c) when client initiates the connection with the server and server sends connection-granted
d) when client initiates the connection with the server and server initiates the closing of the connection

10- The CI and NI bits are set
a) in the TCP message to indicate congestion
b) in the Frame Relay message to indicate congestion
c) in the Ethernet message to indicate congestion
d) in the ATM RM cells to indicate congestion

11- The data field in Ethernet frame
a) should be higher than 1500bytes
b) is between 40 and 1500 bytes
c) will be stuffed if data is less than 46 bytes
d) is between 50 and 1500 bytes

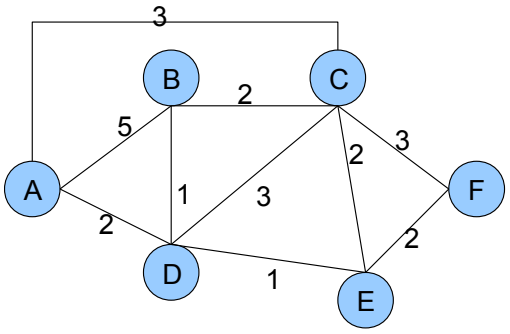
12- The ATM cells have
a) fixed size of 55 bytes
b) only 3 bytes of header
c) dynamic size for congestion control
d) 5 bytes of header and 48bytes of data

Give the answer to the following questions (correct answer will give 2 points, incorrect will not count):
The student should have deep understanding of basic IP message structure, routing algorithm and application protocol

13 - Fill in the fields and their size in bytes of the following IPv6 message structure

Version(4-bit)	Traffic class (8-bit)	Flow label (20-bit)
Payload Length (16-bit)	Next Header (8-bit)	Hop Limit (8-bit)
Source address (128-bit)		
Destination address (128-bit)		
Data		

14- Fill in the routing table according to Dijskstra's algorithm



Step	N	D(B) p(B)	D(C) p(C)	D(D) p(D)	D(E) p(E)	D(F) p(F)
0	A	5,A	3,A	2,A	∞	∞
1	A,D	3,D	3,A	2,A	3,D	∞
2	A,D,B	3,D	3,A	2,A	3,D	∞
3	A,D,B, E	3,D	3,A	2,A	3,D	5,E
4	A,D,B, E,F	3,D	3,A	2,A	3,D	5,E
5	A,D,B, E,F,C	3,D	3,A	2,A	3,D	5,E

D(v)= cost of the path from the source to destination *v* that has currently as of this iteration of the algorithm, the least cost
p(v) =previous node, neighbor of v along the current least-cost path from the source to *v*
N= the set of nodes whose least-cost path from the source is definitely known

15- Fill in the ESP fields in the IP datagram and indicate which of them are encrypted.

IP header	ESP header	TCP/UDP segment	ESP trailer	ESP auth

16- Fill in the missing headers in the following SIP message to ensure it is well-formed

INVITE sip: bob@tkk.fi SIP/2.0
From: sip: student@tkk.fi
Via: SIP/2.0/UDP 123.123.11.11
Content-Type: application/sdp
To: sip: bob@tkk.fi
Call-ID: 34ER@netlab.tkk.fi
Content-length= NN

c=IN IP4 123.123.11.11
m=audio 3780 RTP/AVP 0