University of Colombo, Sri Lanka

University of Colombo School of Computing

Bachelor of Science in Information Systems

Second Year Examination — Semester II - 2020/2021

IS2111 — Computer Networks

(2 Hours)

Answer All Questions

Number of Pages = 12 Number of Questions = 4

To be completed by the candidate								
Index Number								

Important Instructions

- The duration of the paper is **2** Hours.
- The medium of instructions and questions is English. Answer questions in English.
- This paper has **4** questions on **12** pages.
- Answer **all** questions.
- **Write your answers on and only on the space provided** on this question paper.
- Do not tear off any part of this answer book. Under no circumstances may this book (or any part of this book), used or unused, be removed from the Examination Hall by a candidate.
- Questions appear on both sides of the paper. If a page is not printed, please inform the supervisor immediately.
- Any electronic device capable of storing and retrieving text, including electronic dictionaries and mobile phones, are **not allowed**.
- Non-programmable Calculators may be used.

To be completed by the examiners

1	
2	
3	
4	
Total	

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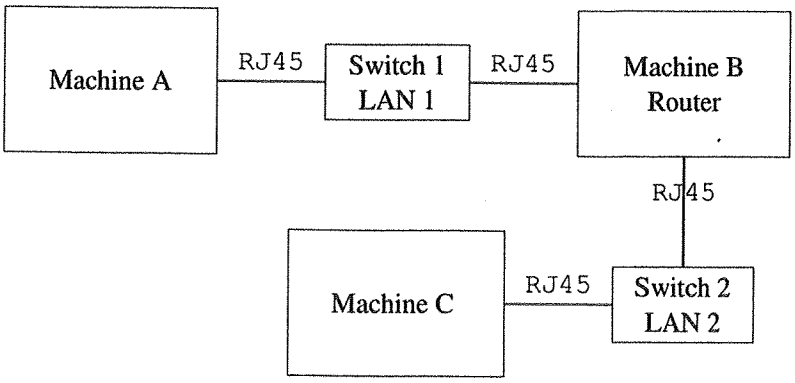
1. (a). A network is depicted in the following diagram. Use this diagram to answer the questions from 1(a)i to 1(a)vii.



The configurations of the machines are given bellow. All IP addresses and subnet masks are given in the dotted decimal notation.

Machine	Interface	MAC address	IP address	Subnet Mask
A	eth0	MA0	S.T.U.1	X.X.X.Y
B	eth0	MB0	S.T.5.10	X.X.X.Y
B	eth1	MB1	192.168.10.254	X.X.X.Z
C	eth0	MC0	192.168.10.1	X.X.X.Z

The broadcast address of LAN 1 is 192.168.5.63.

The machine C received an IP datagram, D, from the machine A.

i. What is the decimal number represented by the symbol Y?

[5 marks]

192

ii. What is the decimal number represented by the symbol Z?

[3 marks]

0

iii. What is the decimal number represented by the symbol X?

[2 marks]

255

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iv. Write down the IP address of the interface `eth0` of the machine A without using the symbols S,T and U.

[3 marks]

192.168.5.1

v. What is the network address of the LAN 2?

[3 marks]

192.168.10.0 or 10.254 not sure

vi. What is the source MAC address in the data link layer frame, containing D, received at C?

[3 marks]

MB1

vii. What is the destination MAC address in the data link layer frame, containing D, received at B?

[3 marks]

MB0

(b). What is the purpose of the Address Resolution Protocol (ARP) in a Local Area Network (LAN)?

[3 marks]

find the mac address of the relavent destination in ip address in the pdu

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2. (a). A machine, C, in a home network is configured with the IP address 192.168.2.5. This network is connected to the ISP using an ADSL connection. A machine, S, on the Internet has the IP address 8.8.8.8. M sends an IP datagram, P, that belongs to a TCP connection to S. The source IP address on P when it is received at S is 192.248.16.89.

i. What is the reason for not having 192.168.2.5 as the source IP address in P when it is received by S?

[4 marks]

a proxy server might be used

ii. S sends a reply to C on the same TCP connection. What is the destination IP address of the IP datagrams in the reply?

[3 marks]

192.168.2.5

iii. The machine Q is on a different home network connected to the same ISP. The IP address of Q is same as the IP address of M. Q also sends an IP datagram to S. Can this creates a conflict? Explain your answer.

[4 marks]

no because Q uses a private Ip address so it want collide

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(b). Explain the role of the port numbers in the Transport Protocols.

[3 marks]

to identify the process of a given host

(c). Ajantha and Jeevani use a public key system for communication. The function $E(m, k)$, where m is a message and k is a key, is the encryption function. The function $D(c, k)$, where c is an encrypted message and k is a key, is the decryption function.

Ajantha sends c, where $c = E(E(m, J), Y)$ to Jeevani. m is the plain text message. Jeevani gets m by applying $D(D(c, A), X)$. Prasad can eavesdrop on the network, but he cannot get the plain text m.

i. What is the private key of Ajantha?

[3 marks]

Y

ii. What is the private key of Jeevani?

[3 marks]

A

(d). A 10000 bytes message is sent over a TCP connection. The receiver has received all the bytes from the first byte to the 5000^{th} byte of the message. Does the TCP protocol guarantee that the receiver would receive the 5001^{th} byte of the message? Justify your answer.

[5 marks]

yes because tcp is a connection oriented protocol where and acknowledgement is send to the sender after the retrieval of a date packet

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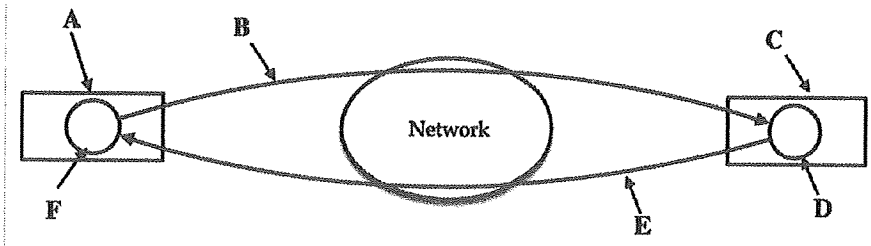
3. (a). The following diagram shows the client-server model. Identify and write down the components of the diagram named from A to F.



[3 marks]

A - client
B - request
C - Server
D - Server Process
E - Response
F - Client process

(b). Discuss the difference between persistent and non-persistent HTTP connections.

[4 marks]

presistent established tcp connection for every request that the client makes.

non persistent makes a tcp connection for a every multiple connetions that the client make

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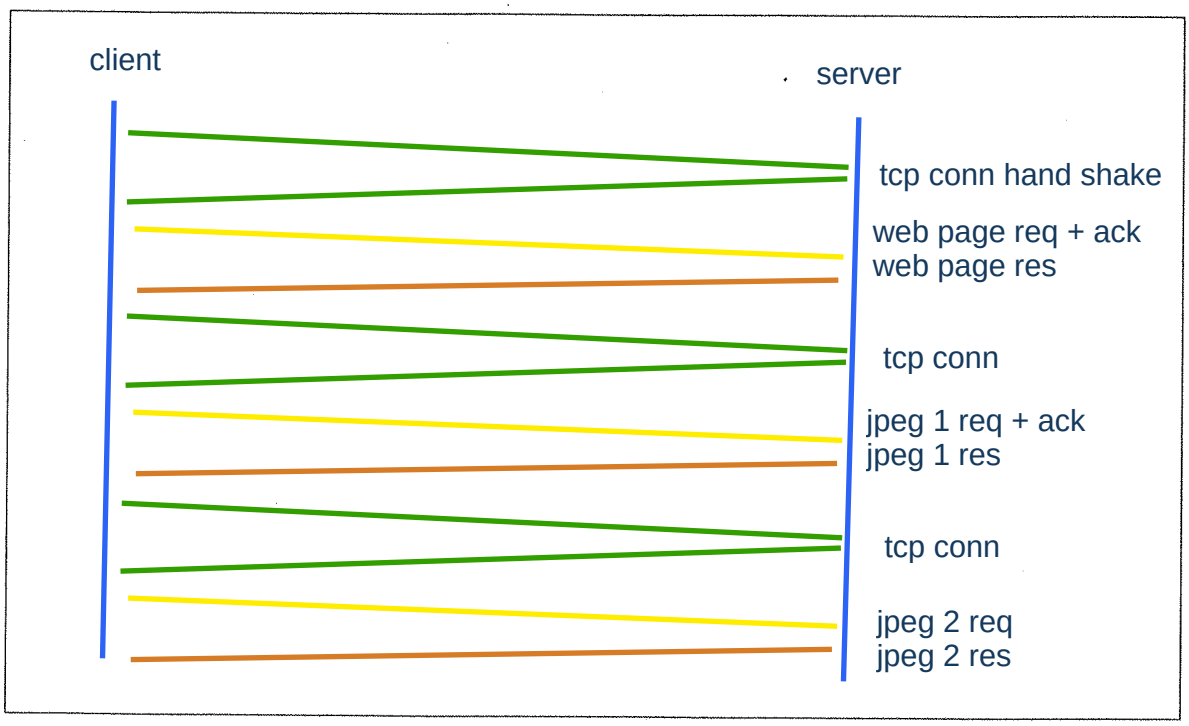
(c). Assume that there is a web page with two (2) JPEG images. Write down the steps of transferring the web page from the server to the client using non-persistent connections.

[4 marks]



(d). *Entity-body* is one of the component of the HTTP request message. Write down the other four (4) components of the HTTP request message.

[4 marks]

content type
header length
redirection link
status code

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(e). Mention the meaning of the HTTP status codes, 200, 401, 404, and 500.

[4 marks]

200 - ok
401 - unauthorized
404- not found
500 - internal server error

(f). List down the three (3) forms of web servers.

[3 marks]

general purpose s/w
embedded web sever
web server appliance

(g). There are different web server architectures which provide the services to the requests in different ways. Write down three (3) web server architectures.

[3 marks]

single thread
multi thread
mutiplexing io

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4. (a). Assume that the IP address of google.com is 142.250.192.78 and the IP address of your computer is 192.168.10.23. Write the Wireshark filters for the following scenarios.

i. Filter the packets which are originated from your computer.

[2 marks]

ip.src == 142.250.192.23

ii. Filter the packets which are sent to the google.com from your computer.

[4 marks]

ip.src == 142.250.192.23 && ip.dst == 192.168.10.78

iii. Filter the packets which have used UDP protocol.

[1 marks]

_ws.col.protocol == 'udp'

iv. Filter the packet which requests a file called "networkpaper.pdf" from a server.

[3 marks]

_ws.col.info == 'GET /networkpaper.pdf HTTP/1.0'

(b). What are the two (2) types of fiber cables?

[2 marks]

single mode
multi mode

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(c). Which type of fiber cable is more suitable for long distance communication?

[2 marks]

single mode

(d). Write down two (2) disadvantages of WiFi networks compared to wired networks.

[2 marks]

less secure
interferences are high
less speed

(e). List down two (2) major standards of WiFi.

[2 marks]

802.11a
802.11b
802.11g

(f). What is the WiFi standard capable of using multiple antennas to increase the data rate?

[2 marks]

802.11n

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(g). A device is using the CDMA technology. It has received the following bit stream.
1101100101100110
Leftmost bit is received first. It uses the code (chip sequence) 110011001. Decode the stream and identify the data bits it has received. Include your working.

[5 marks]

1101100101100110

111111111	111111111	000000000
110011001	110011001	110011001
11-1-111-1-1 1	11-1-111-1-11	-1-111-1-111-1
1	1	0

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