00450

The Open University of Sri Lanka
Faculty of Natural Sciences
B.Sc/ B. Ed Degree Programme

Department	**: Computer Science**
Level	**: 4 / 5**
Name of the Examination	: Final Examination
Course Title and - Code	**: CSU4303/CSU5316 - Computer Networks**
Academic Year	**: 2020 / 21**
Date	**: 28-03-2022**
Time	**: 1.30 p.m. – 3.30 p.m.**
Duration	**: 2 hours**

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **(Number)** questions in **(Number)** pages.
3. Answer **four (4)** questions only. All questions carry equal marks.
4. Answer for each question should commence from a new page.
5. Draw fully labeled diagrams where necessary
6. Involvement in any activity that is considered as an exam offense will lead to punishment
7. Use blue or black ink to answer the questions.
8. Clearly state your index number in your answer script

THE OPEN UNIVERSITY OF SRI LANKA
B.Sc. DEGREE PROGRAMME: LEVEL 04 / 05
DEPARTMENT OF COMPUTER SCIENCE
FINAL EXAMINATION 2020 / 2021
CSU4303 / CSU5316 – COMPUTER NETWORKS
DURATION: Two Hours (2 hours)

Date: 28/03/2022 **Time: 1.30 pm – 3.30 pm**

Answer **FOUR** Questions **Only**

QUESTION 1

1.1) What is the best topology in terms of providing redundancy in computer networks?

1.2) Explain three (3) switching techniques in computer networks.

1.3) An ADSL link has 256 channels. Each channel has 50 Kbps transfer speed. Sixteen (16) channels are reserved for voice and control. 80% of the remaining channels are used for download. Stating all your assumptions, calculate *upload speed* of the ADSL line.

1.4) ABC company has 4 tape drives at its head office in Colombo where each drive capable of writing 256 MBps to Ultrium tapes. There are 4 tape readers in Kandy branch where each reader can read data up to 512 MBps. (Hint: MBps = Mega Bytes per second) Supposing 1 hour is required to transfer tapes from Head office to Kandy branch and there will be no time lag in dividing files to segments, read/write files from disk and combining them in to a single file,

1. Calculate time required (in seconds) to transfer 16 TB file from Head office to Kandy branch.

2. What is the effective data transfer rate (in MBps) from Head office branch to Kandy branch?

QUESTION 2

2.1) List the speed and cable type of 10BaseT, 10Base2, 10Base5, 100BaseSX network cable specifications.

2.2) Explain the difference between PURE ALOHA and SLOTTED ALOHA.

2.3) Draw TCP and IP segment headers with all relevant component names. (Explanation of the components is not required)

2.4) Explain the functionality of Persistent and Non-Persistent CSMA protocols. List the pure aloha, slotted aloha, non-persistent CSMA, 0.5-persistent CSMA, 0.01-persistant CSMA, and 1-persistent CSMA protocols from least to highest throughput order.

QUESTION 3

3.1) State the standard port numbers of following services and protocols.

(i) HTTP	(v) TELNET
(ii) HTTPS	(vi) FTP
(iii) MYSQL	(vii) SMTP
(iv) SSH	(viii) IMAP

3.2) Identify Public and Private IP addresses from the List below.

(i) 192.168.250.5	(v) 127.0.0.3
(ii) 11.10.10.11	(vi) 192.248.5.7
(iii) 172.15.10.10	(vii) 223.15.14.1
(iv) 190.15.12.1	(viii) 10.11.10.10

3.3) ABC company has several branches and PCs (Numbers are given within brackets) located in Kandy (700), Nuwara-Eliya (160), Polonnaruwa (70), Badulla (12) and Kegalle (41). An IP address of the main IP block of the company is given as 190.100.124.100/21.

Answer the following questions;

a) Find the network address of the main IP block of the company. What is the maximum number of hosts that could be accommodated for the company without breaking down into sub networks?

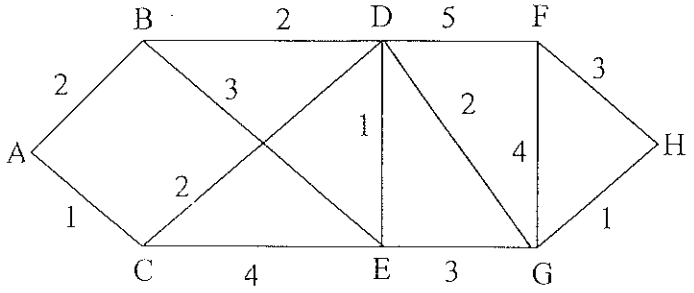
b) Subnet the given network (based on the answer of 3.3.a) to all the branches. Provide the network address, subnet mask, starting host address and the broadcast address of each subnet allocated to a particular branch.

c) Suppose the Nuwara-Eliya branch needs to be divided in to four (4) equal subnets, calculate the network addresses and subnet masks of each sub net.

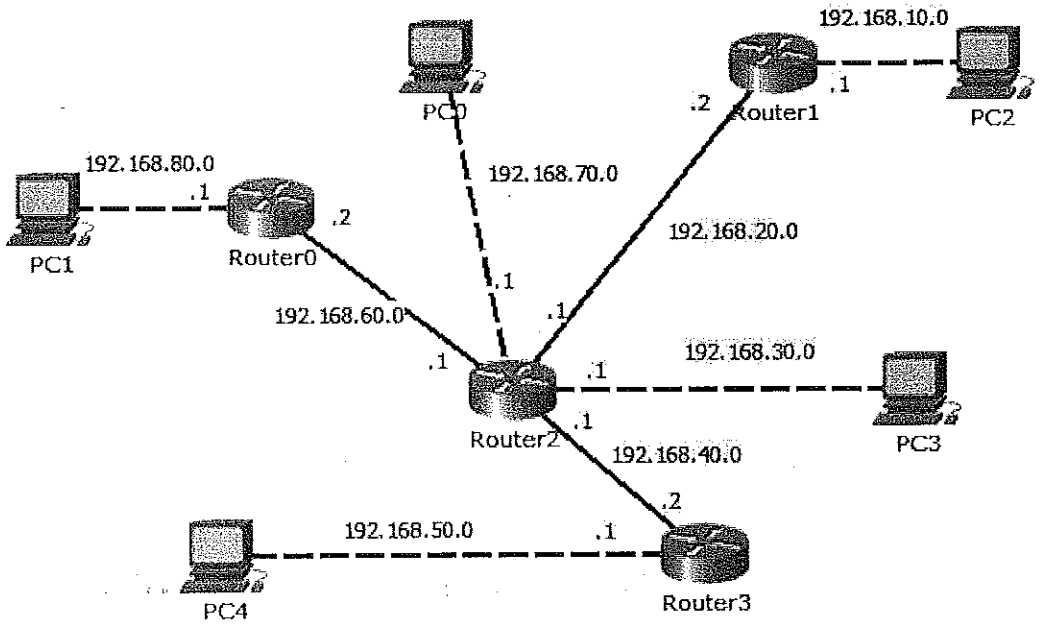
QUESTION 4

4.1) Explain the *count to infinity problem* in the distance vector routing.

4.2) Find the shortest path from Node A to Node H using Dijkstra's shortest path algorithm. Your answer should contain successive diagrams to depict the intermediate steps.



4.3) Use the following topology and information provided to answer the rest of the question. The .1 and .2 shown close to interfaces of the equipment are the last octet numbers of the IP addresses assigned to respective interfaces. Always assume that you are at the USER mode login prompt. Give appropriate commands to be entered in the console for each of the routers.



a) Write the commands that are required in configuring each router (Router 0 to Router 3) for static routing in the given topology.

QUESTION 5

5.1) Draw a diagram to show TCP connection release. (Assume: Normal operation without errors).

5.2) A network with DMZ, internal and public network is having a single firewall. List 6 types of directional rules that need to be configured in the firewall.

5.3) Describe capabilities of three (3) generations of firewalls used in computer networks

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5.4) Explain the operations of the following IP tables commands. \ is used to write the command in two lines.

a)
```
iptables -A INPUT -p tcp --sport 1024:65535 -s 0/0 \
-i eth1 --dport 110 -j ACCEPT
```

b)
```
iptables -A FORWARD -s 0/0 -i eth1 -d 192.168.10.50 \
-o eth2 -p TCP --sport 1024:65535 --dport 3389 -j ACCEPT
```

QUESTION 6

6.1) List four (4) symmetric key cryptographic algorithms.

6.2) List one (1) network scanning tool and one (1) security scanning tool used in computer networks.

6.3) Describe two principles of cryptography.

6.4) Decode the following cipher text and obtain the plain text using *transposition cipher*. Use the key "proactive".

otlhsmenoedoesonnioaspceuyetnevdttuuleuri2thit1crnyeuemwsapfebdmcaloeo
hrch1llo
camuowcydtkn0eamh9ylahcctest2alpepgofvflotresogdieasosltpoericsy-i