00333

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	: 2019/20
Date	: 16-February-2021
Time	**: 1.30 pm - 3.30 pm**
Duration	**: 2 hours**

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of (6) questions in (4) pages.
3. Answer any **four (4)** questions only. All questions carry equal marks.
4. Answer for each question should commence from a new page.
5. Draw fully labelled 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

QUESTION 1

1.1) Explain what is meant by following standards and abbreviations.

(i) 100BaseT
(ii) 10 Base5
(iii) 802.11
(iv) 802.5

1.2) Give the color codes of both sides of a UTP cross cable that can be used to directly connect two PCs.

1.3) What is the function of a splitter in an ADSL link?

1.4) OUSL has 60Mbps VPN link at Colombo and 20 Mbps links for each of the 4 regional centers A, B, C & D. Suppose a file of 4 GB hosted in the Colombo center need to be copied to those 4 regional centers. Centers A & B start coping the file first and C & D start copying it after 1 minute. The bandwidth of C & D regional center links get reduced to 10 Mbps after 5 minutes of copying the file to C & D due to a technical trouble. The total bandwidth of Colombo link is equally distributed among the centers when file is being copied. However, after the technical trouble, the regional centers that have lower bandwidth are utilizing their maximum speeds. Calculate the time required (in seconds) to copy the file from Colombo to the regional centers A and D separately.

QUESTION 2

2.1) List four (4) methods that can be used to distinguish a FRAME.

2.2) Explain *segmentation* and *multiplexing* in communications using suitable diagrams.

2.3) Using appropriate diagrams, describe three (3) states that a CSMA/CD protocol can be in.

2.4) Write the algorithm of the simplex protocol for a noisy channel.

QUESTION 3

3.1) Draw the TCP and IP headers separately and name all their components clearly. (Explanation of the components is not required)

3.2) Palitha & Sons company has several branches island wide. Each branch has number of PCs (as shown in the brackets) connected to its local network. Branches are located in Kandy (450), Kurunegala (220), Anuradhapura (100), Badulla(25) and Kegalle (12). An IP address of the main IP block of the company is given as 150.140.45.220/18.

Answer the following;

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 main IP block into sub networks?

b) Subnet the given network (based on the answer of 3.2.a) to 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 company wish to establish another branch at Jaffna with 3 departments (HR/finance/Marketing) having 30 machines each.

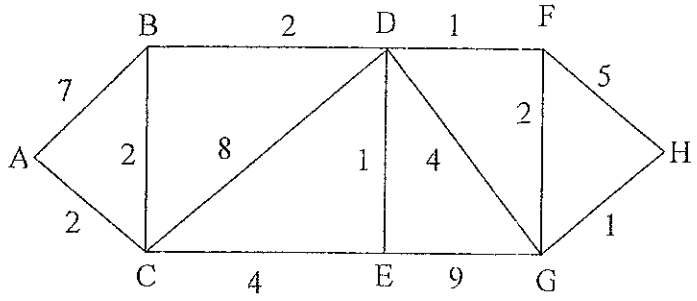
(i) Calculate main network address with mask for the Jaffna branch.
(ii) Calculate sub network addresses with masks of its 3 departments.

QUESTION 4

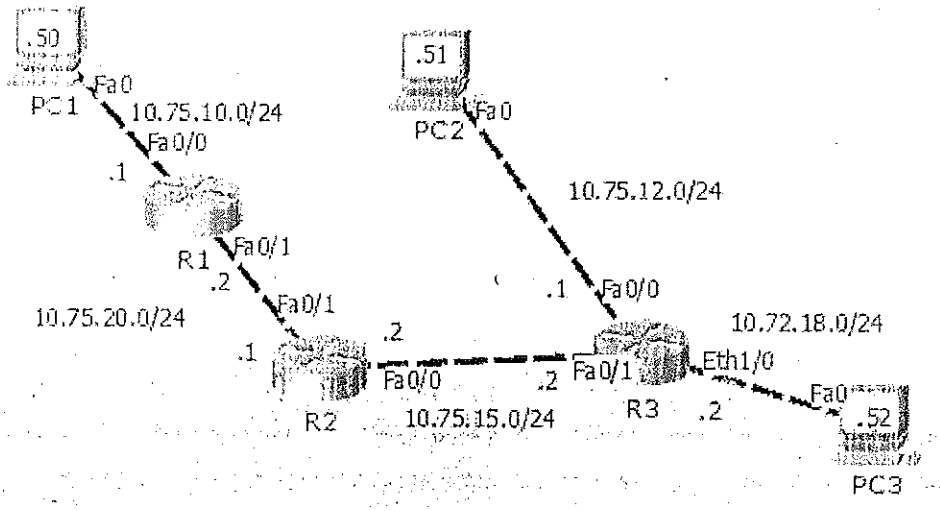
4.1) State a major drawback of distance vector routing algorithm.

4.2) State a major drawback of distance vector routing algorithm.

4.3) Find the shortest path between Node A to Node H using Dijkstra's shortest path algorithm. (show all your steps clearly)



4.4) Use the following topology and the given information to answer the questions below. The numbers .1 , .2 , .50 , .51 and .52 that are shown close to each equipment / interface of the following topology are the last octet numbers of the IP addresses assigned to them. By assuming you are at the USER mode login prompt in each case, give the appropriate commands that need to be entered in the console of the each router.



a) Write commands to set the hostname of the R1 to *LabR*.

b) Configure R1 virtual terminal password to *ab@#4444* and the login banner to "*hi this is general lab router*".

c) PC2 can ping to PC3 but PC2 cannot ping to PC1. What is the reason for that error? Write the commands that are required to solve the above problem in R1, R2 and R3 separately.

QUESTION 5

5.1) Explain the *open loop* and *closed loop* mechanisms in congestion control.

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

5.3) What are the five (5) functions that each router should perform when the link state routing protocol is used?

5.4) Write Linux commands to do the followings. Assume that you are in the "/" directory in each case.

a) Copy files with their names starting with the letter k from lib directory to user/sbin directory.

b) Move a file named "klog" from var/mail directory to the root directory.

c) Display the list of files with their names starting with the letter n in the var directory.

5.5) Write the command to enable Apache web server at the system startup.

a) In Redhat / Centos servers

b) In Debian / Ubuntu servers

QUESTION 6

6.1) Explain the main difference between symmetric and asymmetric key algorithms.

6.2) List four (4) steps in key generation mechanism of RSA algorithm.

6.3) Explain the operations of the following `iptables` commands. Here "\" is used to write the command in two lines.

a)
```
iptables -A FORWARD -s 192.168.5.0/24 --sport 1024:65535 \
-i eth1 -d 192.168.5.50 -o eth2 -p TCP --dport 3389 -j ACCEPT
```

b)
```
iptables -A INPUT -s 0/0 -i eth1 -p TCP --sport 1024:65535 \
--dport 8080 -j REJECT
```

c)
```
iptables -A OUTPUT -o eth2 -p UDP --sport 1024:65535 --dport 53 \
-j DROP
```

6.4) Decode the following cipher text to plain text using *transposition cipher*. Use the key "pandemics".

ahhsvdptotcrrlucuiradsvedeedpoeyed1stiuriaulhoosesmesa9teetkniasillumwpteaodmsce