00061

THE OPEN UNIVERSITY OF SRI LANKA
B.Sc. DEGREE PROGRAMME: LEVEL 05
DEPARTMENT OF COMPUTER SCIENCE
FINAL EXAMINATION 2017 / 2018
CPU3245 – COMPUTER NETWORKS AND SECURITY
DURATION: Three Hours (3 hours)

Date: 10/04/2019 **Time: 1.30 pm – 4.30 pm**

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

QUESTION 1

1.1) How a *crimping tool* and a *punch down tool* used in computer network cabling?

1.2) List the seven (7) layers of OSI model and one (1) protocol operate in each layer.

1.3) An ADSL link has 256 channels. Each channel has 30 Kbps transfer speed. Eight (8) channels are reserved for voice and control. 75% of the remaining channels are used for download. Stating all your assumptions, calculate *upload speed* of the ADSL line.

1.4) OUSL has a 32MBps VPN link at Colombo. There are 12 MBps links for A & B regional centers while 16 MBps links are available for C & D centers. Suppose a file of 10 GB hosted in the Colombo center needs to be copied simultaneously to those 4 regional centers. Links of A & B regional centers get reduced to 1 MBps after 5 minutes due to a technical trouble. The total bandwidth of Colombo link is equally distributed when file coping is started. Moreover, the regional links with lower speeds due to the technical trouble are utilized to their maximum speeds. Calculate the time required (in seconds) to copy the file from Colombo to the regional centers A and D separately. (Hint: MBps = Mega Bytes per second)

QUESTION 2

2.1) List the cable types of 10BaseT, 10Base2, 10Base5, 100BaseBX, 100BaseSX network cable specifications.

2.2) List three (3) methods of marking the start and the end of a frame in the data link layer.

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

2.4) Consider the following four (4) code words. C1 = 000000000000, C2 = 111111000000, C3=000000111111, C4 = 111111111111

(i) Calculate the hamming distance using the two code words C1, C2.

(ii) If an erroneous code word comes as 111100000000, what could be the correct code word?

QUESTION 3

3.1) What are the standard services operating in the following ports?

(i) 80 (v) 443
(ii) 3389 (vi) 110
(iii) 21 (vii) 22
(iv) 25 (viii) 8080

3.2) Explain the functionality of the Network Address Translation (NAT) in computer networking.

3.3) Latha & Sons company has several branches and PCs (Numbers are given within brackets) located in Kandy (660), Nuwara-Eliya (174), Polonnaruwa (88), Badulla (20) and Kegalle (38). An IP address of the main IP block of the company is given as 150.150.140.100/18.

Answer the following questions;

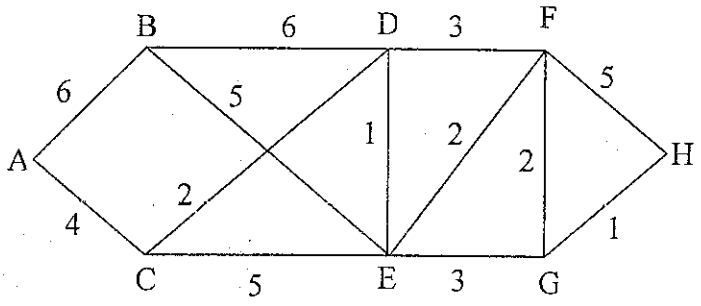
a) Find the network address of the main IP block of the company. What is the maximum number of hosts that could be accommodated for the company without breaking down into sub networks?

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

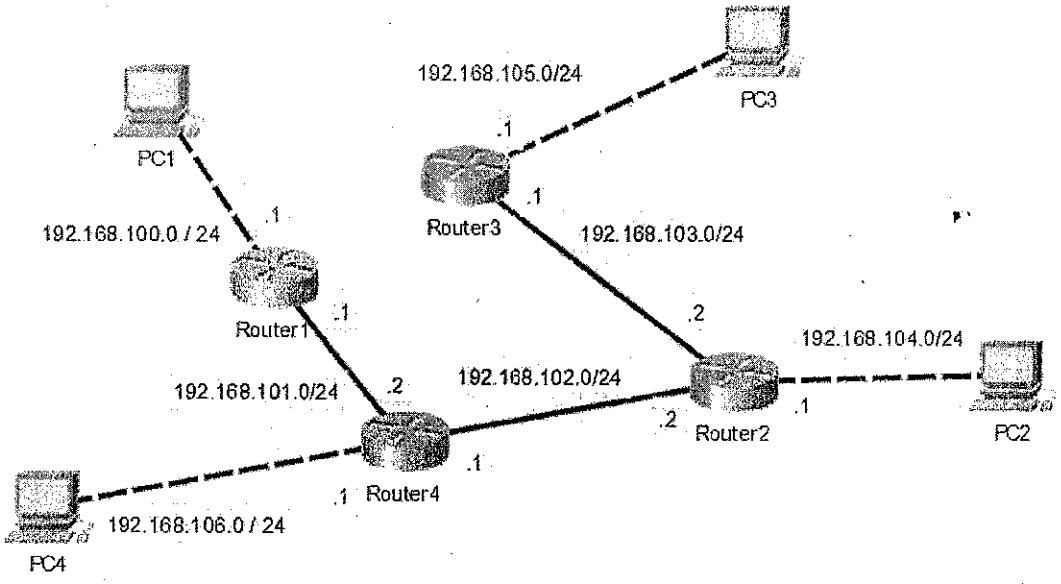
QUESTION 4

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

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 1 to Router 4) for static routing in the given topology.

b) List the commands that are required in Router 1 for dynamic routing in the given topology.

QUESTION 5

5.1) Write the algorithm of the simplex protocol for noisy channel.

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

5.3) What is the command to update group policies manually in an active directory?

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 -i eth0 \
--dport 25 -j ACCEPT
```

b)
```
iptables -A FORWARD -s 0/0 -i eth2 -d 192.168.11.51 \
-o eth1 -p TCP --sport 1024:65535 --dport 80 -j ACCEPT
```

QUESTION 6

6.1) List two (2) security scanning tools used in computer and network security.

6.2) What is Kerckhoff's principle in cryptography?

6.3) Draw a diagram to show the process of encryption/decryption of a symmetric cipher.

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

eoftlpilateatstrctahushbshetsoriavtussyeyggaaatiamhfenrrwospewloaywnheeaetuahicd yebsortbegenacsowdi