THE OPEN UNIVERSITY OF SRI LANKA
B.Sc. DEGREE PROGRAMME: LEVEL 05
DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
FINAL EXAMINATION 2015/2016
CPU3245 – COMPUTER NETWORKS AND SECURITY
DURATION: Three Hours (3 hours)

Date: 20/01/2017 **Time: 1.30 pm – 4.30 pm**

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

QUESTION 1

1.1) Give brief description on LAN and WAN network classifications.

1.2) Briefly explain functionality of the layers of TCP/IP network model.

1.3) Give the color codes of the EIA/TIA 568-B standard UTP cable.

1.4) Raid array of a file server has a data transfer rate of 2500Mbps per second. Local network link has a speed of 2000Mbps. All the bandwidth and the transfer rates are equally distributed among connected clients. Common operating system read/write overhead of the server is 10Mbps and increase to 50Mbps after 2 minutes of a large data transfer for each client. Suppose five clients are connected at the same time to the server using LAN to download 30GB file. Calculate the time required to download 30GB file to a client PC.

QUESTION 2

2.1) Briefly explain four (4) switching techniques of a network switch..

2.2) Explain the two techniques the *bit stuffing* and the *byte stuffing* that are used in determining the start and the end of a data frame.

2.3) Compare *unrestricted simplex* protocol and *simplex stop and wait* protocol.

2.4) A message sized 16384 bytes has to be sent over an Ethernet communication channel. The channel has the default maximum transferable unit size (MTU). Assume TCP header length of 20 bytes and IP header length of 8 bytes are present. Calculate the minimum number of segments required to transfer the above message. State your assumptions.

QUESTION 3

3.1) What is an *OU (organizational unit)* in a Windows domain ?

3.2) List the public and the private address ranges of the IP classes in the IP version 4.

3.3) Sanhinda company has several branches and PCs (number given within brackets) located in Gampaha (190), Hatton (100), Pollonnaruwa (58) and Badulla(18). Company is having plans of opening a branch in Kegalle (36) as well. An IP address of the main IP block of the company is given as 124.140.100.120/21.

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 into sub networks.

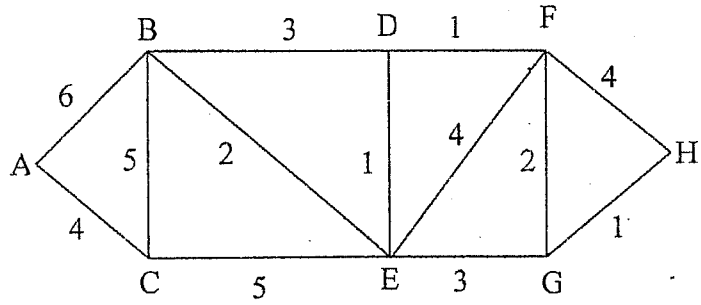
b) Subnet the given network (based on the answer of 3.3.a) to all the existing and proposed branches. Provide the network address, subnet mask, starting host address and the broadcast address of each subnet allocated to a particular branch.

c) Suppose the Gampaha branch has to be further subnetted into 2 departments namely Finance and sales each having the same number of PCs. Based on the answer of 3.3.b give the network address, starting host address and ending host address of the each department in the Gampaha branch.

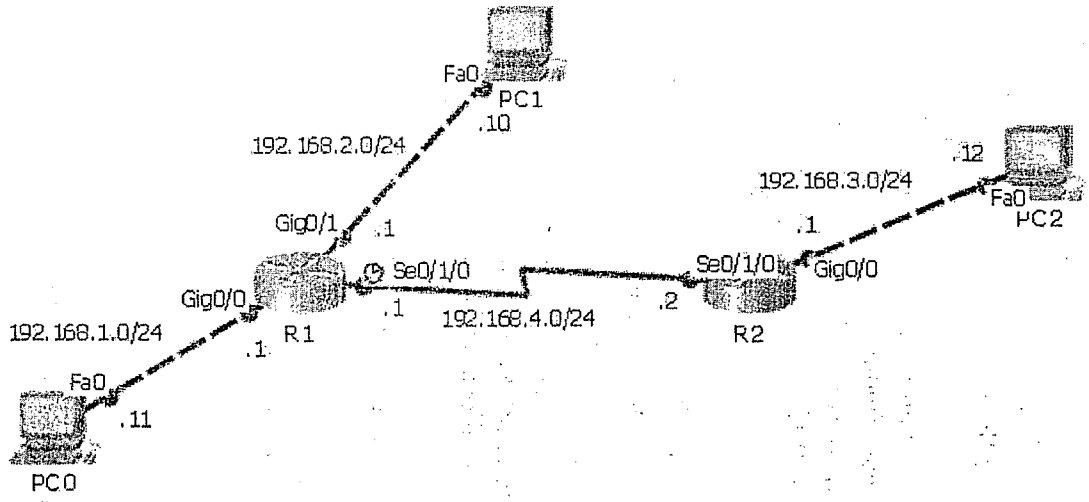
QUESTION 4

4.1) What is the difference between *packet switching* and *circuit switching* in the context of computer networks?

4.2) Calculate the shortest path from Node A to Node H using the Dijkstra algorithm. Draw diagrams to show node traversal path and intermediate calculations done at each node. A-H are the router node labels and numbers are the distance between the nodes.



4.3) Use the following topology and information provided to answer the rest of the question. The .1 , .2 , .10 , .11 or .12 shown close to each interface of the equipment is the last octet number of the IP address assigned to each interface. 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 commands to set the hostname of the Router 2 to R2.

b) Configure R1 console password to *ahasausata* and the login banner to "*hi this is block 4 router*".

c) Write commands to setup the IP addresses of the interfaces of the router R1 and R2.

d) Give the command to list all the IP addresses that you assign for router interfaces in a specific router.

e) Configure RIP routing in all the routers.

QUESTION 5

5.1) Give the functionality of the forward lookup zone and the reverse lookup zone in a DNS server

5.2) List the functionality of the following types of records in a DNS.

a) A type
b) NS type
c) MX type

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

a)
```
iptables -A INPUT -p tcp --syn -m limit --limit 10/s \
    -i eth1 -j ACCEPT
```

b)
```
iptables -A FORWARD -s 0/0 -i eth0 -d 192.168.1.50 \
    -o eth1 -p TCP --sport 1024:65535 --dport 8080 -j ACCEPT
```

c)
```
iptables -A OUTPUT -p icmp --icmp-type echo-request -j ACCEPT
```

QUESTION 6

6.1) What is the purpose of having a *DMZ* in a computer network?

6.2) What are the differences between active and passive network monitoring?

6.3) Explain in steps how public/private key mechanism is used to verify sender and the receiver.

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

sushitweostnisrwhalseiaaledrxnihfteiacuweohctositsntmb