THE OPEN UNIVERSITY OF SRI LANKA
B.Sc. DEGREE PROGRAMME: LEVEL 05
DEPARTMENT OF COMPUTER SCIENCE
FINAL EXAMINATION 2016/2017
CPU3245 – COMPUTER NETWORKS AND SECURITY
DURATION: Three Hours (3 hours)

Date: 16/01/2017 **Time: 1.30 pm – 4.30 pm**

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

QUESTION 1

1.1) Give 2 examples each for the following types of equipment/media that can be connected to a network.
(i) Host
(ii) Shared peripherals
(iii) Networking devices
(iv) Networking Media.

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

1.3) Why the speed of Upload is less than the Speed of Download in an ADSL link? Explain with suitable diagrams

1.4) OUSL has 16Mbps VPN link at Colombo and 10 Mbps links for each of the 4 regional centers A, B, C & D. Suppose a file of 4 GB hosted in the Colombo center needs to be copied simultaneously to those 4 regional centers. Links of C & D regional centers get reduced to 2 Mbps after 10 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.

QUESTION 2

2.1) List the names of 802.3, 802.11, 802.15 and 802.16 network standards.

2.2) Explain the functionality of the CSMA/CD protocol with suitable diagrams

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

2.4) Explain three (3) services provided by the data link layer to the network layer.

QUESTION 3

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

3.2) Explain the difference between *public* and *private* address mechanisms. List the public and the private address ranges of the IP classes in the IP version 4.

3.3) Manike & Sons company has several branches and PCs (number given within brackets) located in Kandy (970), kurunegala (274), Anuradhapura (78), Badulla(21) and Kegalle (39). An IP address of the main IP block of the company is given as 125.140.145.120/16.

Answer the following;

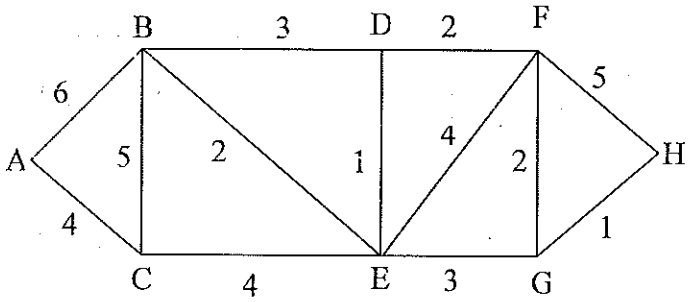
a) Find the Network address of the main IP block of the company. What is the maximum number of hosts that could be accommodated for the company without breaking down into sub networks.

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.

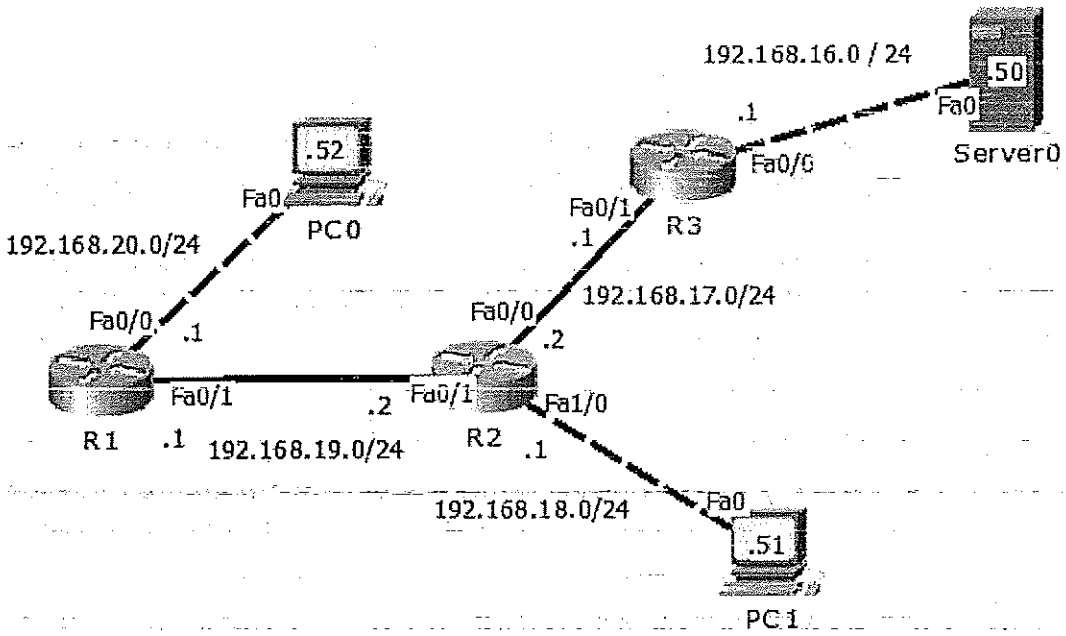
QUESTION 4

4.1) Explain the *count to infinity* problem in network routing algorithms using suitable diagrams.

4.2) Draw the link state packets of Node A to Node H using the *Link State* routing algorithm.



4.3) Use the following topology and information provided to answer the rest of the question. The .1 , .2 , .50 , .51 or .52 shown close to each interface of the equipment is the last octet number of the IP address assigned to each interface. In each part of the question, 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 R2 to *SpecialLabR*.

b) Configure R1 console password to *a@#auto* and the login banner to "*hi this is special lab router*".

c) Write commands to setup static routing in the R1, R2 and R3 separately.

QUESTION 5

5.1) Explain two types of choke packets that are used in congestion control of a computer network.

5.2) What is a half open TCP connection? Explain the 3-way handshake of the TCP/IP connection establishment with a diagram with proper sequence numbers.

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

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

5.4) Explain the operation 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 eth1 \
--dport 3389 -j ACCEPT
```

b)
```
iptables -A FORWARD -s 0/0 -i eth1 -d 192.168.1.50 \
-o eth2 -p TCP --sport 1024:65535 --dport 8080 -j ACCEPT
```

QUESTION 6

6.1) Explain the *redundancy* and *freshness* cryptographic principals.

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

6.3) Decode the following cipher text to plain text using *transposition cipher*. Use the key "fashionbug".

hat4ahfpectursegpeeeelsdhwebtha2strewoatgieb3tfecytlsohdsahsdmrilnaedetlotshmo iglnuamrcdmvdaiatstaiafuoaenwrltaridc5neotloedayweunopxlhuehtc