THE OPEN UNIVERSITY OF SRI LANKA
B.Sc. DEGREE PROGRAMME: LEVEL 04/05
DEPARTMENT OF COMPUTER SCIENCE
FINAL EXAMINATION 2024/2025
CSU4303/CSU5316 – COMPUTER NETWORKS
DURATION: Two Hours (2 hours)

Date: 14/05/2025 **Time: 9.30 am – 11.30 am**

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

QUESTION 1

1.1) What is Computer Network? (2 marks)

1.2) Explain what is meant by following standards and abbreviations. (8 marks)

(i) 10Base2 (ii) PAN (iii) 802.11 (iv) VPN

1.3) Give the color codes of 568B network cabling standard. (4 marks)

1.4) OUSL has 400Mbps VPN link at Colombo and 200 Mbps links for each of the 4 regional centers A, B, C & D. Suppose a file of 10 GB hosted in the Colombo center needs to be copied to those 4 regional centers. Centers A & B starts file coping first and C & D joins copying after 1 minute. Links of A & B regional centers get reduced to 50 Mbps after 2 minutes due to a technical trouble and speeds are restored at the end of 4th minute. The total bandwidth of Colombo link is equally distributed when file is copied. Moreover, the regional links with lower speeds due to the technical trouble are utilized to their maximum speeds.

(a) Calculate the time required (in seconds) to copy the file from Colombo to the regional centers B and C separately. (8 marks)

(b) Suppose error rate of the Center A's VPN channel is 10%, which require re-transmission. Calculate the time required (in seconds) to copy the file from Colombo (3 marks)

QUESTION 2

2.1) List three (3) specific functions of data link layer. (3 marks)

2.2) List four (4) methods to identify start and end of a frame. (4 marks)

2.3) Compare *persistent* and *non-persistent* CSMA protocols. (6 marks)

2.4) Draw a diagram to compare channel utilization versus load of various random access protocols. (6 marks)

2.5) Write an algorithm for a *simplex stop and wait protocol for a noisy channel.* (6 marks)

QUESTION 3

3.1) Explain the TCP/IP 3-way handshake operation for connection establishment using a diagram. (6 marks)

3.2) Pawani & Sons company has several branches and PCs (number given within brackets) located in Kandy (500), kurunegala (235), Anuradhapura (110), Badulla (55) and Kegalle (24). An IP address of the main IP block of the company is given as 160.160.160.200/20.

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. (4 marks)

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 (10 marks)

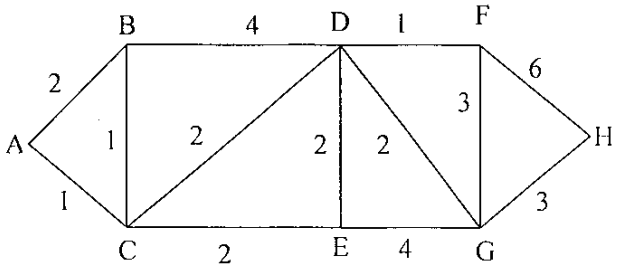
c) Suppose the company wish to establish another branch at Jaffna with 3 departments (HR/finance/Marketing) having 30 machines each. Calculate main network address with mask for the Jaffna branch and subnetwork / masks of its 3 departments. (IP addresses of Jaffna must not overlap with other branch IPs)

(5 marks)

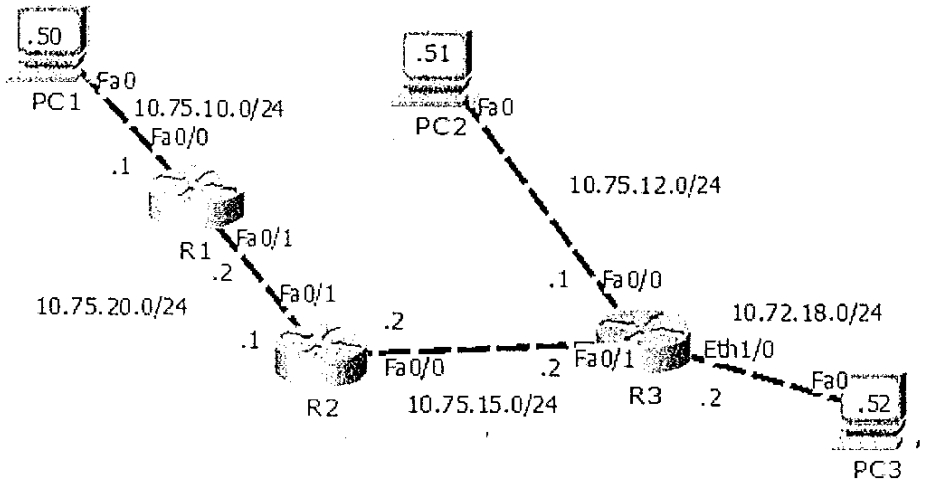
QUESTION 4

4.1) State a major drawback of distance vector routing algorithm. (2 marks)

4.2) Find the shortest path between Node A to Node H using Dijkstra's shortest path algorithm. (show your steps) (10 marks)



4.3) Use the following topology and information provided to answer the rest of the question. The .1, .2 , .50 , .51 and .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 Special*R*. (2 marks)

b) Configure R3 virtual terminal password to *bb@#111* and the login banner to "*hi this is main router*". (6 marks)

c) PC2 can ping to PC3 but PC2 cannot ping to PC1. What is the reason for that error? Write commands required to solve that problem the R1, R2 and R3 separately. (5 marks)

QUESTION 5

5.1) Explain the functionality of static routing protocol named Flooding. (5 marks)

5.2) Draw TCP header and IP header separately. (8 marks)

5.3) Describe open-loop and closed-loop congestion control solutions (6 marks)

5.4) Describe functionality of *warning-bit* and *choke packet* in congestion control of networks (6 marks)

QUESTION 6

6.1) List two fundamental cryptographic principles. (2 marks)

6.2) Explain the difference between symmetric and asymmetric key algorithms (3 marks)

6.3) What is DMZ in a computer network? (4 marks)

6.4) Decode the following cipher text to plain text using *transposition cipher*. Use the key "consumable". (10 marks)

oaedcrctnuaaiglwemnastecoetadbtldaaaiasohcwrlhtisttgiyhuurse

6.5) Explain the operation of the following IP tables commands. \ is used to write the command in two lines. (6 marks)

a)
```
iptables -A FORWARD -s 192.168.5.0/24 --sport 1024:65535 \
-i eth0 -d 192.168.7.200 -o eth1 -p TCP --dport 80 -j REJECT
```

b)
```
iptables -A INPUT -s 0/0 -i eth0 -p UDP --sport 1024:65535 \
--dport 21 -j ACCEPT
```