Shahjalal University of Science and Technology
Department of Computer Science and Engineering
3rd Year 2nd Semester Final Examination, Dec 2019 (Session: 2016-17)
Course Code: CSE 361 Credits: 3 Course Title: Computer Networks
Time: 3 hrs Total Marks: 100

Group A
[Answer all the questions]

1. Answer any FIVE. **5*2=10**

a) What are the two most important network-layer functions in a datagram network?

b) What is a loopback address? What is default gateway?

c) How many host addresses are available on the **192.168.10.128/26** network? Change the mask to a prefix length: **255.255.255.192**

d) What is the minimum and maximum size of an Ethernet Frame?

e) Suppose you want to send the data bits 101110 in an Ethernet frame. The value of generator is 1011 and number of CRC bits is 3. Calculate the CRC and write the bit sequence that will be sent.

f) A client residing on a host with IP address 112.12.5.9 sends a message to the corresponding server residing on a host with IP address 158.32.49.75. If the well-known port is 161 and the dynamic port is 52500, what are the pair of socket addresses used in this communication?

g) Find the network address and the broadcast address of **123.56.77.55/29**.

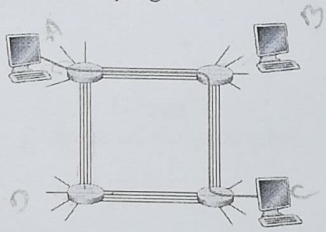
h) What is static route?

2. Answer any FOUR. **4x5=20**

a) Consider the circuit-switched network in the following figure where there are 4 circuits on each link. Label the four switches **A**, **B**, **C** and **D**, going in the clockwise direction.

i) What is the maximum number of simultaneous connections that can be in progress at any one time in this network? (2.5)

ii) Suppose that all connections are between switches **A** and **C**. What is the maximum number of simultaneous connections that can be in progress? (2.5)



b) Assume that Bob uses an e-mail client (a mail reader) such as Outlook to send an e-mail to Alice who uses a Web-based e-mail account (such as Gmail). The IP address of Alice's mail server is initially unknown to Bob's mail server. List all the transport and application layer protocols that are involved from the time when Bob sends the e-mail to the time when Alice reads it. Clearly indicate in which part of the transfer of the e-mail these transport/application layer protocols are used. (5)

c) i) What are the primary functions of MAC sub layer? (1.5)

ii) Write the basic functions of ARP. What are the issues of ARP? (3.5)

d) Suppose there are three routers between a source host and a destination host. Ignoring fragmentation, an IP datagram sent from the source host to the destination host will travel over how many interfaces? How many forwarding tables will be indexed to move the datagram from the source to the destination? Explain with a figure. (5)

e) i) Consider the count-to-infinity problem in the distance vector routing. Will the count-to-infinity problem occur if we decrease the cost of a link? Why? How about if we connect two nodes which do not have a link? (2.5)

ii) Compare and contrast the advertisements used by RIP and OSPF. (2.5)

f) Suppose you want to visit the URL http://cse.sust.edu. Explain step by step how IP address of the web server is obtained using Domain Name Service. (5)

3. Answer any TWO. **2x10=20**

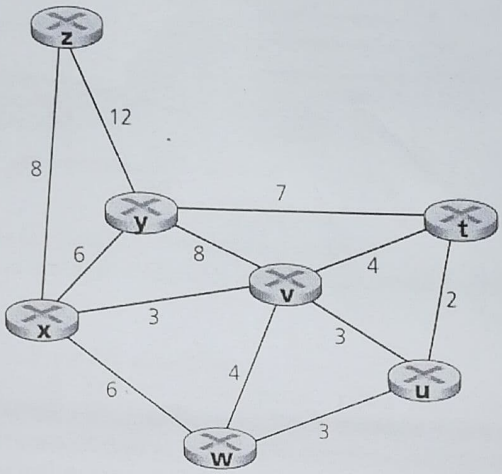
a) i) List six access technologies. Classify each one as home access, enterprise access, or wide-area wireless access. (5)

ii) Consider transferring a Web page from a server to a client using HTTP with Non-persistent connections. Explain the steps between the client and the server. (5)

b) Suppose your organization uses the network address of 10.100.128.0/17. The network needs to be partitioned into 11 subnets. Answer the following questions: (10)

a) For creating subnets, how many bits must be borrowed from the host address bits?
b) What is the subnet mask for these subnets, written in decimal?
c) What is the CIDR notation for the last (11th) subnet's network address?
d) In total, how many host addresses will be lost for this subnetting process?
e) What is the range of host addresses for the last (11^{th}) subnet?
f) Suppose you have two more networks each with 2 hosts only and therefore you want to further divide the first subnet of the above 11 subnets, so that, only two usable IP addresses remain in each sub-sub-net. Write the network address along with the subnet-mask in decimal of such a sub-sub-net.

c) Consider the following network. With the indicated link costs, use Dijkstra's shortest-path algorithm to compute the shortest path from x to all network nodes. Show how the algorithm works by computing a table. (10)



Group B

[Answer all the questions]

4. Answer any FIVE. **5*2=10**

a) What is Multicasting?
b) What is Classless Addressing?
c) What is the ***gateway of last resort***?
d) What is CSMA/CA? Where is it used?
e) What is the Class of the address **132.56.8.6**? What is the ***net id*** and ***host id*** of this address?
f) What is the difference between a virus and a worm?
g) What is the function of web proxy server?
h) What is Administrative Distance?

5. Answer any FOUR.

a) i) Consider that an application wishes to pass real time traffic. Which transport protocol should it use – TCP or UDP? Justify your answer, explaining the implications of using each of the two protocols. (3)

ii) What is the difference between a recursive query and an iterated query in the DNS? (2)

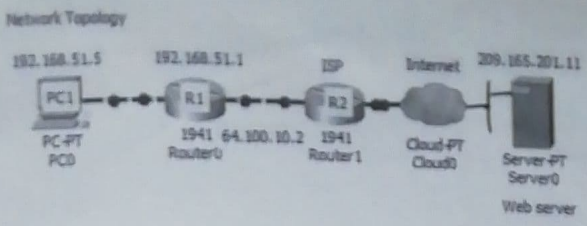
b) i) What is NAT? Will NAT be obsolete once IPv6 is fully deployed? (3)

ii) Why DHCP is required in a Network? (2)

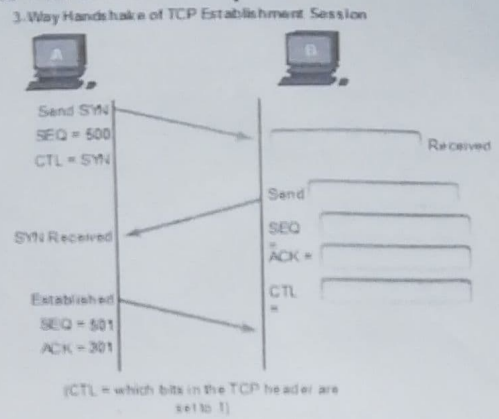
c) Consider the following topology where router R1 is NAT enabled. Write source IP address, source port number, destination IP address, destination port (5)

number for the following communication cases. Choose port numbers from your own where necessary.

i) PC1 to R1
ii) R1 to Web server
iii) Web server to R1
iv) R1 to PC1



d) i) Fill in the boxes with suitable descriptors. (2.5)



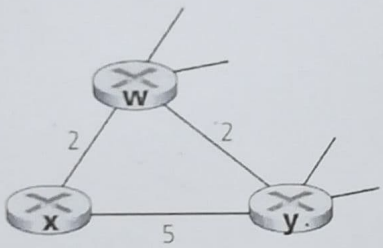
ii) How TCP controls the flow in a congested network? (2.5)

f) Explain how states are managed using cookies with appropriate figures. (5)

6. **Answer any TWO.**

a) i) Compare between LS and DV algorithms. (2)

ii) Consider the network fragment shown below. **x** has only two attached neighbors, **w** and **y**. **w** has a minimum-cost path to destination **u** (not shown) of 5, and **y** has a minimum-cost path to **u** of 6. The complete paths from **w** and **y** to **u** (and between **w** and **y**) are not shown. All link costs in the network have strictly positive integer values.



i) Find **x**'s distance vector for destinations **w**, **y**, and **u**. (6)

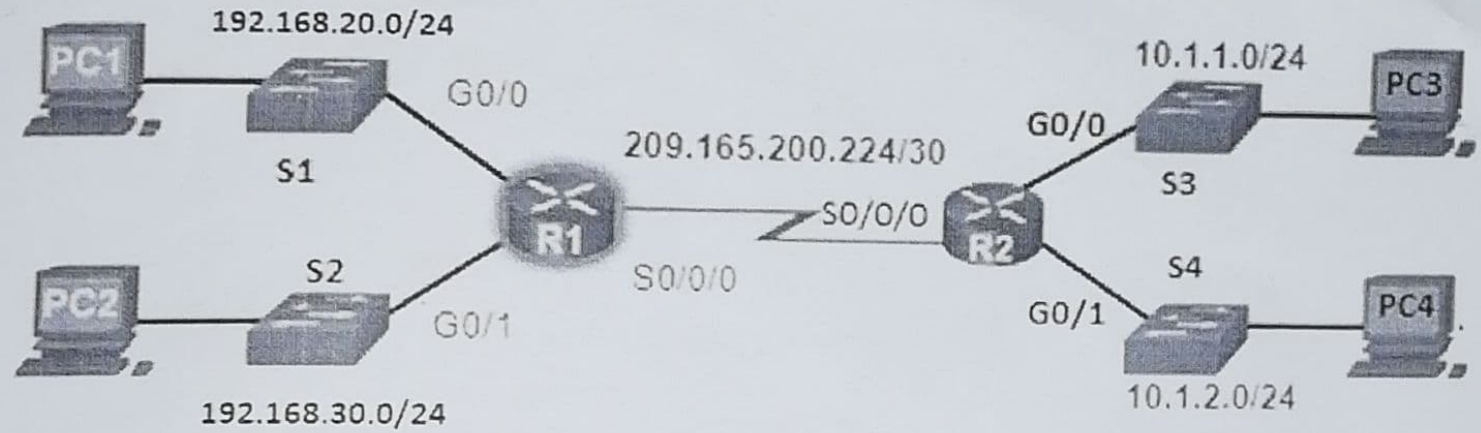
ii) Find a link-cost change for either **c(x,w)** or **c(x,y)** such that x will inform its neighbors of a new minimum-cost path to **u** as a result of executing the distance-vector algorithm. (2)

b) You are given a block of IPv4 addresses of **120.124.80.0/24**. You need to create 3 subnets: one subnet with 110 addresses, one subnet with 40 addresses and one subnet of 9 addresses. Create an efficient subnetworking plan and find out the following for each subnet:

i) The subnetwork address and subnet mask. (6)
ii) The first host, last host and broadcast address for each subnet. (3)
iii) How many host addresses will be lost for this subnetting process? (1)

c) i) Explain the Router Boot-up process. (3)

ii) Fill up the table using the information given in the following figure. (7)



Device Name	Interface	IP Address	Default Gateway
PC1	NIC	?	?
PC4	NIC	?	?
R1	G0/0	?	N/A
	G0/1	?	N/A
	S0/0/0	?	N/A
S2	VLAN1	?	?
R2	G0/0	?	N/A
	G0/1	?	N/A
	S0/0/0	?	N/A
S3	VLAN1	?	?