M.Tech Computer Engineering 1st Semester Examinations 2017

Second Sessional

Advanced Computer Architecture

Max Marks: 15 Max Time: 1 hr

Note: Attempt all questions.

1. Define Hypernet. Draw the topology of (3,2) Hypernet. Also construct the (3,3) Hypernet using (3,2) Hypernet. [6]
2. Sketch the structure of the following
   a. Buslet
   b. Treelet
   c. Cubelet [3]
3. Construct the following 8 X 8 networks
   a. Omega Network
   b. Baseline Network

   Show the conflict between any two pair of connections in both the networks [6]

M.Tech. Computer Engineering – I[st] Semester, 2017

Second Sessional Test

Subject: ADBMS

Time: 1 Hour | Max. Marks: 15

Note: Attempt all questions.

Q1. Consider a relation TENANT (NAME, CITY, STREET, APT, APT_TYPE, RENT, LANDLORD, ADDRESS), where following functional dependencies hold 5

APTSTREETCITY→ADDRESS

ADDRESS→APT_TYPE

NAMEADDRESS→RENT

LANDLORDAPT_TYPE→RENT

Now answer the following:

i. Are the following relation scheme in 3NF?

APARTMENT(APT_TYPE, ADDRESS, RENT)

DWELLAR(NAME, ADDRESS, RENT)

ii. What updating & insertion anomalies do you foresee in TENANT, APARTMENT, and DWELLER relations?

iii. Do the APARTMENT and DWELLER relations have lossless join?

iv. Find a key of this relation. How many keys does TENANT have?

v. Find the decomposition of TENAT in 3 NF having lossless join and preserving dependencies.

Q2. A relation R(A,B,C,D,E,F) has the following functional dependencies: 4

A→CD, B→C, F→DE, F→A

Is the decomposition of R in X(A,B,C),Y(A,F,D),Z(E,F) dependency preserving and lossless decomposition?

Q3. Explain Hash join algorithm. Analyze its cost in terms of block transfer. 3

Q4. Discuss several variations of nested loop join. Also analyze their respective costs in terms of block transfer. 3

Shilpi

M.Tech. (Computer Engg.) Ist Sem. , II Sessional Test- November 2017

Cryptography & Network Security

Time:1 Hr. Attempt all questions. MM: 15[5+5+5]

Note: Show all the steps of calculation clearly.

Q1. Suppose that the round key for the round 8 of AES is:

E A D 2 7 3 2 1 B 5 8 D B A D 2 3 1 2 B F 5 6 0 7 F 8 D 2 9 2 F.

Find the value of round key of round number 9.

Q2. Assume that Alice uses Bob's ElGamal public key (e1=2) to send two messages P1= 17 and P2= 37 using the same random integer r= 9. Eve intercepts the cipher text and somehow find the value of P1 = 17. Show how Eve can use a known plain text attack to find the value of P2. Assume the value of modulus p= 53 and d= 3.

Q3. For SHA-512,

i. Show the equation for the values of W_{16} and W_{19} .

ii. Find the value of padding field and the value of length field if the length of the message is 1920 bits.

M. Tech. (Computer Engineering) I Semester 2017

Second Sessional Test

DATA COMMUNICATIONS AND COMPUTER NETWORKS

MM: 15(4+3+4+4) Time: 1 Hour

1. The following is the dump of a TCP header in hexadecimal format (4)

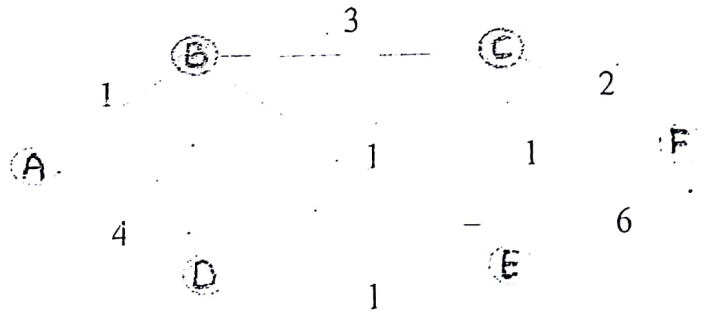
05320017 00005071 00210000 500207FF 000003C0

a) What is the source port number?
b) What is the destination port number?
c) What is the sequence number?
d) What is the acknowledgment number?
e) What is the length of header?
f) What is the type of the segment?
g) What is the window size?
h) What is the urgent Pointer?

2. Consider building a CSMA/CD network running at 1 Gbps with a frame size of 625 bytes. The signal speed in the network cable is 200 000 km/sec. No repeaters are used in the network. What is the maximum cable length? (3)

3. In the computer network given below, delays between the routers are given in milliseconds. (4)

a. Apply Dijkstra's algorithm for Router A. In applying the algorithm, establish a table with the labels showing the minimum delay value and the corresponding path from Router A to all other routers for each iteration step.
b. Briefly explain at which iteration and why the algorithm ends.
c. Indicate which labels will be stored in the routing table of Router A.



4. Explain how collision is avoided in CSMA/CA. (4)

OR

What are the messages types used in ICMP. Briefly explain.

M.Tech Second Sessional Test 2017

Algorithm Design (MCEN-104)

MM:15

Time: 1 Hour

Note: Attempt any **three** questions. All questions carry equal marks

Q1. Show that two polynomials $f(x)$ and $g(x)$, each having degree n, can be multiplied in $O(n^{\log 3})$ time using divide-&-conquer technique.

Q2. Design a dynamic programming algorithm to solve the sum of subset problem (to detect if a subset from a given set of N positive integers that sums up to a given value.

Example: Input : set [ ] = {1, 3, 9, 2, 7}, sum = 6
Output : True

Q3. Given a rod of length n inches and an array of prices that contains prices of all pieces of size smaller than n. The goal is to determine the maximum value obtainable by cutting up the rod into optimal numbers and selling the pieces. For example, if length of the rod is 8 and the price values of different pieces for the two instances are given below, then maximum obtainable value is 22 in instance-1 (by cutting in two pieces of lengths 2 and 6) and 24 in instance-2 (by cutting in eight pieces of lengths 1). Design a dynamic programming algorithm to solve this problem.

Examples:

length	1	2	3	4	5	6	7	8
price	1	5	8	9	10	17	17	20

Ans = 22

length	1	2	3	4	5	6	7	8
price	3	5	8	9	10	17	17	20

Ans = 24

Q4. The task scheduling problem is to schedule given set of tasks on minimum number of machines, each task have its start and finish time. We schedule the tasks, in order, on machines so that they don't overlap or conflict. Find the minimum number of machines required to complete all the following tasks, and give a schedule for doing so. Also, exclusively mention the steps of your approach.

i	1	2	3	4	5	6	7	8	9	10	11
si	1	2	2	3	3	4	5	5	6	7	8
fi	3	4	7	5	7	6	6	8	10	9	10

i	9	11	10	8	3	5	6	7	4	2	1
si	6	8	7	5	2	3	4	5	3	2	1
fi	10	10	9	8	7	7	6	6	5	4	3