

Con. 3484-10.

ME ~~SEM VII~~ ~~ABC~~

Comp

BB-1735

31 MAY 2010

(3 Hours)

-I sem.

①

[Total Marks : 100]

~~31 MAY 2010~~  
~~31 MAY 2010~~

N.B. 1. Question No. 1 is compulsory.

2. Attempt any Four out of remaining.

3. Assume suitable data if necessary and justify the assumptions.

4. Figures to the right indicate full marks.

Algorithms & Subj: ABC  
Complexity

Q1.A. Write a function for Bubble sort and show computation of its space and time complexity. [10]  
 B. Give a dynamic-programming solution to the 0-1 Knapsack Problem that runs in  $O(nW)$  Times, where  $n$  is the number of items and  $W$  is the maximum weight of items that the thief can put in his knapsack. [10]

Q2.A. Prove that Clique is NP-Complete. [10]  
 B. Compute Longest common subsequence for  $A = 0001101100$  and  $B = 1110010010$ . [10]

Q3.A. Find a feasible solution or determine that no feasible solution exists for the following systems of difference constraints. Write the algorithm for the same and give its complexity. [10]

$$x_1 - x_2 \leq 4$$

$$x_1 - x_5 \leq 5$$

$$x_2 - x_4 \leq -6$$

$$x_3 - x_2 \leq 4$$

$$x_4 - x_1 \leq 3$$

$$x_4 - x_3 \leq 5$$

$$x_4 - x_5 \leq -3$$

$$x_5 - x_3 \leq -4$$

$$x_5 - x_4 \leq -8$$

B. Discuss the Bitonic Sorting Technique. [10]

Q4.A. Insert the following keys 5, 6, 9, -3, 28, 89, 50, 32, 96, 0 in a hash table of length  $m=13$  using open addressing with primary hash function  $h(k) = k \bmod m$ . show results inserting keys using [10]

i. Linear probing

ii. Quadratic probing with  $C_1 = 1$  and  $C_2 = 3$ .

B. Give RSA encryption algorithm. [10]

Consider a RSA key set with  $p=29$ ,  $q=11$ ,  $n = 319$  and  $e=3$ .

What value of 'd' should be stored in secret key ?

What is the encryption of the message  $M = 100$  ?

Q5.A. Find an optimal parenthesization of a matrix-chain product whose sequence of dimensions is  $\langle 5 \ 10 \ 3 \ 5 \ 15 \ 30 \ 6 \rangle$ . [10]

B. Given Below is the weight matrix  $W$  for the graph consisting of five nodes  $\{S, B, C, D, E\}$ . Find the shortest path from node  $S$  to all other nodes. [10]

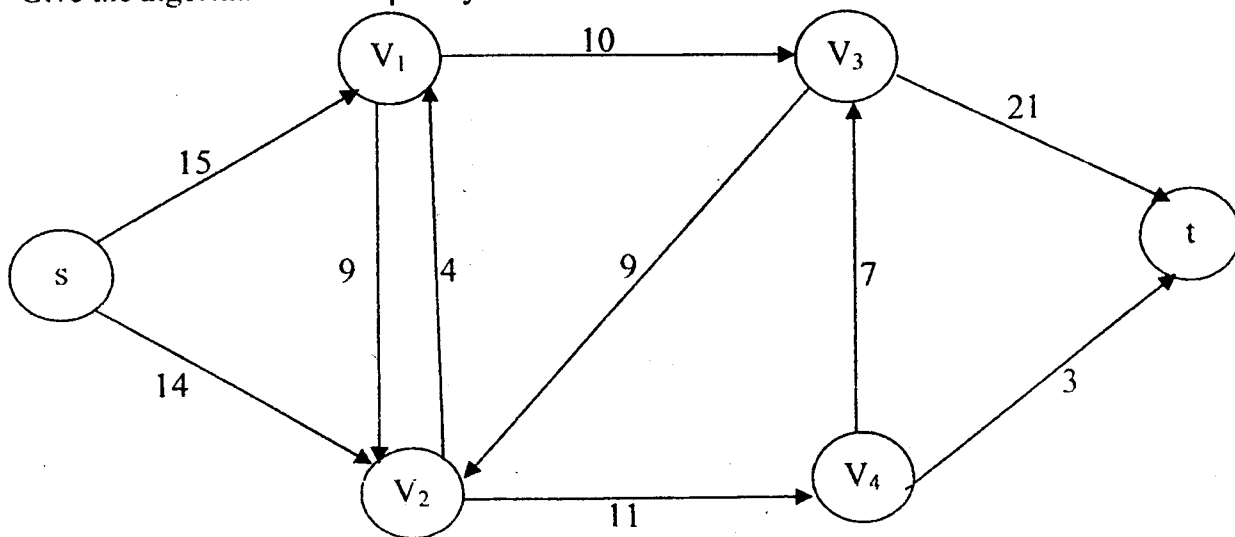
Weight matrix  $W =$ 

	S	B	C	D	E
S	0	10	$\infty$	$\infty$	5
B	$\infty$	0	1	$\infty$	2
C	$\infty$	$\infty$	0	-4	$\infty$
D	7	$\infty$	6	0	$\infty$
E	$\infty$	-3	9	2	0

[ TURN OVER

Q6.A. Find the maximum flow for the network given below.  
Give the algorithm and complexity

[20]



Q7. Write a short note on any **four** of the following.

[20]

- Discuss the various models of computation.
- B<sup>+</sup> Tree with operations insertion and deletion
- Versions of Problems.
- Master method for recurrences
- RB Tree with operation insertion
- Chinese Remainder Theorem.

(3 Hours)

[ Total Marks : 100

N.B.: (1) Question no. 1 is compulsory.(2) Answer any **four** out of the remaining questions.

- |  |    |
|--|----|
| 1. (a) Discuss any two evolutionary software process models in detail  | 10 |
| (b) Explain process , project, product and software team structure.  | 10 |
| 2. (a) Explain the approach used by Software Engineering Institute(SEI) to determine an organization's current state of process maturity | 10 |
| (b) Discuss Object oriented Testing  | 10 |
| 3. (a) Explain the task of Software configuration Management   | 10 |
| (b) Explain the role of functional independence cohesion and coupling in effective modular design.                                       | 10 |
| 4. (a) Explain design steps involved in transform mapping in the design of software architecture   | 10 |
| (b) Discuss functional Modeling for Real Time Systems  | 10 |
| 5. (a) Define Reliability , Availability and explain their measures  | 10 |
| (b) Explain RMMM,RIS and its format.   | 10 |
| 6. (a) Explain how project scheduling and tracking is done for a software development project.   | 10 |
| (b) What are different Testing strategies ? Explain  | 10 |
| 7. Write short notes on any <u>two</u> :-  | 20 |
| (i) Formal Technical Review  |    |
| (ii) Function Oriented metrics   |    |
| (iii) Debugging Approaches.  |    |

(3 Hours)

[ Total Marks : 100

N.B.: (1) Question No. 1 is Compulsory.  
(2) Attempt any Four Questions out of remaining Six Questions.

- |  |    |
|--|----|
| 1. (a) Explain set associative cache organization with example.                                    | 10 |
| (b) Discuss various parallel processing applications.  | 10 |
| 2. (a) Discuss different performance enhancement methods for SIMD array processors.                | 10 |
| (b) Discuss vector optimization methods.   | 10 |
| 3. (a) What are the factors affecting the performance of pipelined computers?                      | 10 |
| (b) Explain use of data flow graphs with examples.   | 10 |
| 4. (a) Explain different bus arbitration algorithms used in multiprocessor.                        | 10 |
| (b) Explain the principles for designing pipeline processor.                                       | 10 |
| 5. (a) Discuss in detail parallel language features for vector processing with example.            | 10 |
| (b) Write note on 'Conditional critical sections' and 'Monitors'.                                  | 10 |
| 6. (a) What are the different hazards in a pipeline processor? How are they detected and resolved? | 10 |
| (b) What is multi cache problem in MIMD processors? Explain dynamic coherence check in detail.     | 10 |
| 7. Write Short notes on any two:-  | 20 |
| (a) I/O processors and I/O channels  |    |
| (b) Classification of pipeline processor   |    |
| (c) Cube interconnection Network.  |    |

M. E. Computer Sem I

14106110

Sub: Network Protocols & Networking

3

P4-Con No-6

Con. 3044-10.

BB-1753

(3 Hours)

[Total Marks : 100

- N.B. :** (1) Question No. 7 is compulsory.  
(2) Attempt any five question from seven questions.

1. (a) Explain the TCP State Transition Diagram? 5  
(b) Explain Nagle's Algorithm and Clark's solution? 5  
(c) Explain how TCP handles Lost Segment and lost acknowledgement. 10
2. (a) System "A" and "B" are on the same network connected through Ethernet and having ETH address 0XB234567890AB and 0XB23456781234, IP address of system A and B are 10.10.1.10 and 10.10.1.20 respectively. Show ARP request and reply packet. 10  
(b) How many number systems can be connected on single network having Ethernet interface card? Explain? 10
3. (a) IP is connection-less protocol, why? 5  
(b) How padding is used in IP datagram? 5  
(c) Explain in detail how you can synchronize clock using ICMP message. 10
4. (a) What are the five areas of network management? Explain any two of them. 10  
(b) Explain the functional architecture for network monitoring system. Draw the four network monitoring configurations. 10
5. (a) What are the five areas of network management? Explain any two of them. 10  
(b) Explain the functional architecture for network monitoring system. Draw the four network monitoring configurations. 10
6. (a) A DNS client is looking for a IP address of 192.160.10.1. Show the query message with value for each field. 10  
(b) Explain SNMP client server setup to monitor the network. 10
7. Write a short note on any 4 from the following :- 20
  - (a) IPv4 and IPv6
  - (b) Datagram fragmentation
  - (c) SMTP
  - (d) Layer 3 switching
  - (e) UDP vs TCP
  - (f) Socket programming (Port no and application).

**N.B. :** • Question 1 is compulsory.

- Attempt any four questions out of remaining six questions.

1. (a) Discuss the following scenarios for retrieval of a buffer in UNIX environment

i) The kernel cannot find the block on the hash queue, and the free list of buffers is empty.

ii) The kernel finds the block on the hash queue, but its buffer is currently busy .

(10)

(b) In context with RPC, state in brief what happens if :-

i) The server crashes after receiving a request from a client.

ii) The client crashes after sending a request to the server.

(10)

2.(a) Discuss the UNIX i-node structure . Convert virtual address 67387247 to (block no, offset) pair. What is the maximum no of bytes that can be held in a file in this structure?

(10)

(b) i) Discuss "Bully Election Algorithm".

ii) What will happen in Bully Algorithm , when two or more processes almost simultaneously discover that the coordinator has crashed?

(10)

3. (a) Differentiate between :-

i) Stateless and Stateful Server

(5)

ii) DOS and NOS .

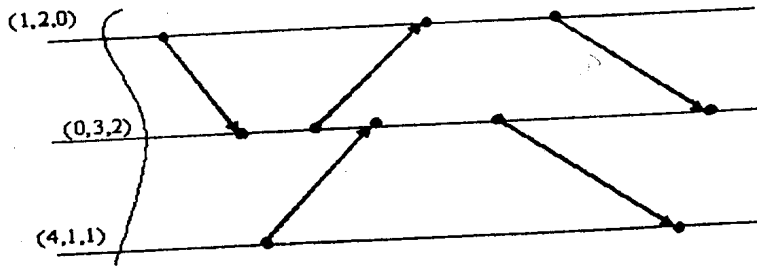
(5)

(b) Discuss the formats of the RPC messages. When is it proper to bind a client to a server?

(10)

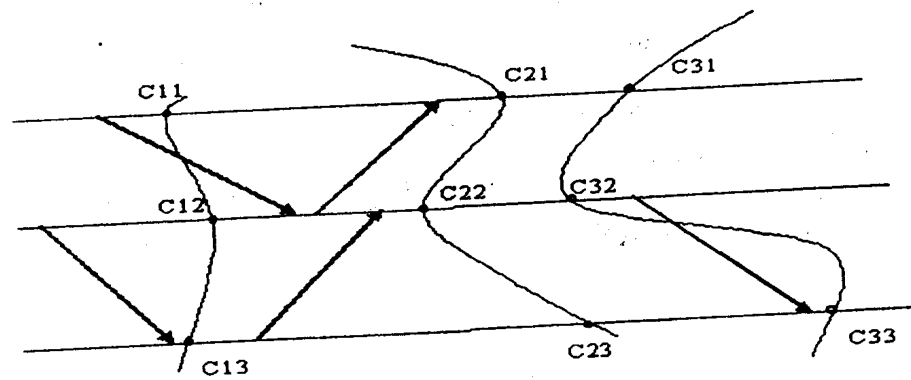
4. (a) What is the need of clock synchronization in DOS ? Discuss the "Happens-before relationship of Lamport Algorithm. Find the Vector clock timestamp values of the following events, after the cut shown .

[ TURN OVER



(12)

(b) Define Consistent Cut and Inconsistent Cut and Strongly consistent cut, and determine types of the following cuts :



(08)

5. (a) Explain the sender-initiated and receiver-initiated algorithms of Load balancing. (10)
- (b) Explain the 'Consistency Models' needed for the shared-memory data. (10)
6. (a) Explain the distributed algorithm for mutual exclusion. Compare it with the centralized and token-ring algorithm. (10)
- (b) Explain RTOS with concept of Hard and soft real-time systems. Explain the EDF scheduling algorithm. (10)
7. Write Short notes on (Any Two) :- (20)
  - a) Fault Tolerance and its significance
  - b) Transparency
  - c) Mach OS
  - d) Replication in DFS.

Advanced Database Management Systems

NT-F-1stHf . 515

Con. 3039-10.

6

BB-1952

(3 Hours)

[ Total Marks : 100

N.B. (1) Question No. 1 is compulsory.

(2) Attempt any four of remaining six questions.

(3) Assume any suitable data if necessary and clearly state it.

(a) Consider the relation  $R = \{ A, B, C, D, E, F, G, H, I, J \}$  and the set of FDs : 7  
 $G = \{ \{A, B\} \rightarrow \{C\}, \{B, D\} \rightarrow \{E, F\}, \{A, D\} \rightarrow \{G, H\}, \{A\} \rightarrow \{I\}, \{H\} \rightarrow \{J\} \}$ .  
 What is the key for R? Decompose R into 2NF, then 3NF.

(b) Explain all the steps for mapping an EER to an ODB Schema. 7

(c) How a vertical and a horizontal partitioning of a relation are specified? How can a relation be put back together from a complete vertical and a complete horizontal partitioning? 6

(a) Consider the three transactions T1, T2 and T3, and the schedules S1 and S2 given below. Draw the serializability (precedence) graphs for S1 and S2 and state whether each schedule is serializable or not. If a schedule is serializable, write down the equivalent serial schedule(s). 14

T1: r1(x); r1(z); w1(x)

T2 : r2(z); r2(y); w2(z); w2(y)

T3 : r3(x); r3(y); w3(y)

S1 : r1(x); r2(z); r1(z); r3(x); r3(y); w1(x); w3(y); r2(y); w2(z); w2(y)

S2 : r1(x); r2(z); r3(x); r1(z); r2(y); r3(y); w1(x); w2(z); w3(y); w2(y)

Write down the steps for finding equivalent serial schedules.

(b) Explain any one recovery technique in detail. 6

3. Consider the LIBRARY relational schema shown as below, which is used to keep track of books, borrowers, and book loans.

BOOK (BookId, Title, PublisherName)

BOOK\_AUTHORS (BookId, AuthorName)

PUBLISHER (Name, Address, Phone)

BOOK\_COPIES (BookID, BranchId, No\_Of\_Copies)

BOOK\_LOANS (BookID, BranchId, CardNo, DateOut, DueDate)

LIBRARY\_BRANCH (BranchId, BranchName, Address)

BORROWER (CardNo, Name, Address, Phone)

(i) Map the given relational schema into ODL graphical schema. 5

(ii) Create the ODL classes and specify methods for each class. 10

(iii) Write down OQL statements of the following queries :— 5

(a) For each book that is borrowed from the "CST" branch and whose DueDate is today, retrieve the book title, the borrower's name, and the borrower's address.

(b) Retrieve the names, addresses, and number of books checked out for all borrower's who have more than five books borrowed.

[ TURN OVER



4. Consider the following relations :

**Customer** (Cust\_Id, Cust\_Name, Street, City, Zip, phone)

**Account** (AccNo, AccType, BranchNo, Balance)

**CustAccount** (Cust\_ID, AccNo, Interest)

- Give example of two simple queries that would be meaning for the Account relation for horizontal partitioning.
- Show the derived horizontal partitioning of **CustAccount** based on the partitioning of the **Account**.
- Write a query by which **Customer** may be horizontally partitioned.

5. University database Contains information about the courses and the professors who teach the courses in each Semester. Each course must also have information about the number of students enrolled, Room no., Date and Time (where and when the course is conducted).

- Write DTD rules for above XML document.
- Create an XML schema for above XML document.
- Write X-path to refer "II Semester" and X-Query to retrieve all the courses conducted in Room no. 308 between "12.00 p.m. and 2.00 p.m." on all the days.

6. (a) The Mumbai University wants you to help to design a star schema to record grades for course completed by students. There are four dimensional tables namely, **Course\_section**, **Professor**, **Student**, **Period** with attributes as follows :

- **Course\_section**. Attributes : Course\_ID, Section\_Number, Course\_Name, Units, Room\_Id, Room\_Capacity. The college offers an average of 500 course sections.
- **Professor**. Attributes : Prof\_ID, Pro\_Name, Title, Dept\_ID, Dept\_Name.
- **Student**. Attributes : Student\_ID, Student\_Name, Major. Each course section has an average of 60 students.
- **Period**. Attributes : Semester\_ID, Year. The database will contain data for 30 months periods. The only fact that is to be recorded in the fact table is Course\_Grade.

Answer the following questions :

- Design the star schema for this problem.
- Estimate the number of rows in the fact table, using the assumptions stated above and also estimate the total size of the fact table (in bytes), assuming that each field has an average of 5 bytes.
- Can you convert this star schema to a snowflake schema ? Justify your answer and design a snowflake schema if it is possible.

(b) Explain the different types of multimedia sources.

7. Write a short note on the following :—

- Data warehousing
- Temporal DB
- Data mining steps
- Deductive DB with respect to need, optimization.

N.B. (1) Question No. 1 is Compulsory.  
 (2) Attempt any Four Questions out of remaining Six Questions.  
 (3) Assumptions made must be clearly stated.

- 1. (a) What is Customer Relationship Management? Explain the types of CRM. 10  
 (b) Explain Enterprise Resource Planning in detail. 10
- 2. (a) Explain Executive Information System in detail. 10  
 (b) Explain the Transaction Processing Cycle in detail. 10
- 3. (a) Differentiate between DSS and MIS. 10  
 (b) Explain in detail systems approach to problem solving. 10
- 4. (a) What is the need to understand organizational structure and functional activities while designing MIS? 10  
 (b) What are the activities performed during MIS implementation? 10
- 5. (a) What is information? Explain characteristics of quality information. 10  
 (b) What is E-commerce? Explain the clicks and bricks strategy of E-commerce. 10
- 6. (a) Differentiate between internet and intranet. Explain some benefits and limitations of intranet. 10  
 (b) What is business process re-engineering? What are the steps required to make it effective? 10
- 7. Write Short Notes of any four of the following: - 20
  - (a) Data Warehousing
  - (b) Reusability in prototyping.
  - (c) M-commerce
  - (d) Bench Marking
  - (e) OLTP Vs OLAP
  - (f) Website and Web portal.

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m.E-II Sem - Comp  
Image Processing

16/6/2010

27: 1st half. 10-AM(k)

Con. 2824-10.

8

BB-1966

(3 Hours)

[Total Marks : 100

- N.B.:** (1) Question No. 1 is **Compulsory**.  
(2) Attempt any **four** questions from remaining **six** questions.  
(3) Assume suitable data wherever **necessary** and state it **clearly**.

1. (a) Determine a gray scale transformation that maps the darkest 5% of image Pixels to black (0), The brightest 10% of Pixels to white (255), and linearly transforms the graylevels of all remaining Pixels between black and white. 10  
(b) Show that the wiener filter does not restore the power spectral density of the object, where as the geometric mean filter does when  $s = y_2$ , compare the mean square errors of the two filters. 10
2. For the following 4 x 4 image, determine its forward and inverse transforms and compare the inverse transforms with the digized image data :— 20

2 0 1 0  
1 1 0 1  
1 0 0 1  
2 1 2 3

Use the following image transforms :—

- (i) The discrete Fourier transform  
(ii) The Hadamand transform  
(iii) The discrete cosine transform.

3. (a)  $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$  is damging to thin lines and sharp corners. 10  
Give a 3 x 3 mask that can be used for medium filtering and does not exhibit this behaviour.
- (b) Show that the real and imaginary parts of the unitary DFT matrix are not orthogonal matrices in general. 10
4. (a) Take a 512 x 512 image containing noise. Design low-pass, bandpass, and high-pass zonal masks in different transform domains such that their passbands contain equal energy. 10  
(b) For the 2 x 2 transformed image A and the image U. 10

$$A = \frac{1}{2} \begin{bmatrix} \sqrt{3} & 1 \\ -1 & \sqrt{3} \end{bmatrix}, U = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$$

Calculate the transformed image V and the basis images.

5. (a) The output of a binary source is to be coded in blocks of  $M$  Samples. If the successive outputs are independent and identically distributed with  $P = 0.95$  (for a 0), find the Huffman Code for  $M = 1, 2, 3, 4$  and calculate their efficiency. 10
- (b) Show that the  $N \times N$  Cosine transform matrix  $C$  is orthogonal. Verify your proof for the case  $N = 4$ . 10
6. (a) Describe and differentiate point, line and edge detection. Also explain region orientation segmentation. 10
- (b) What are morphological operations? For a region explain Boundary extraction operation and then region filling operation on the extracted boundary. 10
7. Write short notes on the following :— 20
- (a) Uniform and Nonuniform Sampling
  - (b) Translation, Scaling and Rotation
  - (c) Properties of DFT
  - (d) Variable Length Coding
  - (e) Image Restoration.