

2010

Full Marks – 70

Time – As in the programme

The figure in the right hand margin indicate marks.

Answer ALL questions.

1. What is data mining ? with a suitable block diagram explain the architecture of typical data mining system and its major components. [7]
- (b) Why data cleaning is necessary ? What are the different steps for data cleaning ? Explain the different steps with suitable example. [7]

OR

- (a) What are the issues and challenges in DM ? Discuss some application of DM. [7]
- (b) Explain various normalization technique to be used for data transformation. [7]
2. Explain and draw the stars, snow flakes and fact constellation schemas for multidimensional data bases for the example given below:

Consider, sales has four dimensions : time, item, branch and location. [14]

OR

[Cont.

- (a) Define Indexing. Explain different indexing methods for data warehouses. With the help of the table given below: [8

RID	item	city	Note
R1	H	V	H for "home entertainment"
R2	C	V	C for "Computer"
R3	P	V	P for "Phone"
R4	S	V	S for "Security"
R5	H	T	
R6	C	T	V for "Vancouver"
R7	P	T	
R8	S	T	T for "Toronto"

- (b) Explain the following term [6

- (i) Enterprise ware house .
 - (ii) Data mart,
 - (iii) Virtual Warehouse
3. Find frequent using given transition data base where min . suport = 22% and minimum confidence= 70% [10

Transition - ID	List of items
T 100	I_1, I_2, I_3
T 200	I_2, I_4
T 300	I_2, I_3
T 400	I_1, I_2, I_4
T 500	I_1, I_3
T 600	I_2, I_3

T 700

 I_1, I_3

T 800

 I_1, I_2, I_3, I_5

T 900

 I_1, I_2, I_3

- (b) Write down the Apriori algorithm: [4]

OR

- (a) Briefly explain Bayesian's classification. How it works? [8]

- (b) For the below database "middle - aged", "high", "yes" and "excellent" for the attributes age, income student and credit rating respectively. What would a Bayesian classification of the buys computer for the tuple be. [6]

Age	Income	Student	credit rating	class buys computer
Youth	high	no	Fair	no
Youth	high	no	Excellent	no
Middle aged	high	no	fair	yes
senior	medium	no	fair	yes
senior	low	yesq	fair	yes
senior	low	yes	excellent	no
middle aged	low	yes	Excellent	no
Youth	medium	no	fair	no
Youth	low	yes	fair	yes
Senior	medium	yes	fair	yes

- (c) Define Neural network. Explain how classification can be done by back propagation feed forward artificial neural network for the following problem

Let learning rate 0.9 Given i/p tuple (1,0,1) where class level is 1. The initial weights.

X_1	X_2	X_3	W_{14}	W_{15}	W_{24}	W_{25}	W_{34}	W_{35}	W_{56}	W_{46}	Q_4	Q_5	Q_6
1	0	1	0.2	-0.3	0.4	0.1	-0.5	0.2	-0.3	0.2	-0.4	0.2	0.1

OR

- (a) Explain the different types of association rules with suitable examples. [8]
- (b) Explain lift analysis in terms of correlation. [6]
5. How does classification differs from clustering. Explain decision tree bases classification. [14]

OR

- (a) Briefly explain the k- means and k- mediods algorithm. [8]
- (b) Give two object represented by the tuples (22, 1, 42, 10) and (20, 0, 36, 8)
- (i) Computer the Minowski distance between the two objects using $q=3$.
- (ii) Compute the Manhattan distance between the two objects. [6]

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The questions are of equal value.

Answer ALL questions.

- 1.(a) Define token, lexeme and pattern ? Find out the tokens and lexemes of the below code segments:

```
main ()  
{  
int a = 5;  
int b [11];  
while (a <= 5)  
b [a] =3* a;  
}
```

- (b) What is a cross compiler ? Differentiate it from two pass and one pass compiler. [4

OR

- (a) Define compiler ? Describe the functions of different phases of a compiler in detail with a suitable diagram ? [10]
- (b) Differentiate between front end and back end of a compiler ? [4]
- 2.(a) Construct the NFA for the regular expression $a(a/b)^*ab$. Design the DFA by applying subset construction rules. [14]

OR

Consider the grammar [14]

$$S \rightarrow aAB \mid bA \mid \epsilon$$

$$A \rightarrow aAb \mid \epsilon$$

$$B \rightarrow bB \mid C$$

- (i) Remove left recursion from the above grammar.
- (ii) Construct LL (1) parsing table for the resulting grammar.
- (iii) State whether the grammar is LL (1)
3. Consider the grammar. [14]

$$E \rightarrow (L) \mid a$$

$$L \rightarrow L, E \mid E$$

$$B \rightarrow bB \mid C$$

- (i) Constructs SLR (1) parsing table for the above grammar.
- (ii) Show the parsing action of an SLR (1) parser for the input string ((a), a, (a,a))

OR

- (a) What is LEX ? Write a lex programm to tokenize a C- program ? [7]
- (b) Explin the role symbol table and error table ?
- 4.(a) What do you mean by three address code ? Write quadruples, triples and indirect triples for the following code segment: [10]

Main ()

{

int a = 1;

int b [10];

While (a <= 10)

B [a] = 2* a ;

}

- (b) What is dynamic storage allocation ? [4]

OR

- (a) What are the principle sources of optimization? [4]

(b) Consider the below fragment:

```

begin
  prod := 0
  i := 1;
  do begin
    prod := prod + a [ i ] * b [ i ];
    i := i + 1 ;
  while ( i < 20)
end

```

Construct the flow graph.

5.(a) What is peep hole ? Explain peep hole code optimization technique with suitable examples?

(b) ^{DAG} $d := (a - b) + (a - c) + (a - c)$

[7]

[7]

OR

(a) What are the issues in the design of the code generator ? Explain. [7]

(b) What is a DAG Draw a DAG for the code $a := b * c + b * c$. Write the code generation algorithm. [7]

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Answer ALL questions

- 1.(a) Discuss the use of keyword static with suitable examples. [8]
- (b) Write a program to find out the distance between two points when they are expressed in (x,y) [6]

OR

- (a) A class student contains student information such as name and roll no. A class Exam is derived from student and it contains the marks of the student. An interface sports is created which contains the sports mark. A class

Result is extended from Exam which implements the interface sports. Write program to enter the required information and display them. [8]

- (b) What is garbage collector ? Explain the use and working of it with suitable example.[6]
2. (a) What is multithreading ? Write a program to create thread and discuss the methods of thread class. [8]
- (b) Write a program to create a user defined exception. The program prompts the user to input his age. If the age is less or equal to 0 then the user defined exception is thrown which displays a message 'invalid age'. [6]

OR

- (a) Differentiate between java applet and java standalone application. Discuss the life cycle of applet.

(b) Write a program to enter your name, roll no and phone no and write them into a file named as 'infor. txt'. Then read the information from the file and display them.

[6]

3. (a) Write and explain the important attributes of the following tags: [8]

, <body>, <hr>, <frame>.

(b) What is image map? How can it be created?

[6]

OR

(a) Discuss all the form elements. [8]

(b) Create a web page for the registration form to appear in the 5th sem MCA examination in your university. [6]

4. (a) What is javascript? Discuss the advantages and application of javascript. [6]

[4]

- (b) What are the dialog boxes in javascript
Explain with suitable example. [8]

OR

- (a) Write a javascript program to check whether
a number is pallindrom or not. [6]
- (b) Discuss the document object model. [8]
5. (a) Describe the tier architecture of internet. [6]
- (b) What is CGI ? What are its advantages ? How
does it work ? [8]

OR

- (a) Differentiate between web browser and web
server. [6]
- (b) What is Internet ? How are computer
connected to the internet ? What are its
advantages ? [8]

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The questions are of equal value.

Answer ALL questions.

- 1.(a) Show that for any real constants a and b ,
where $b > 0$. $(n + a)^b = \Theta(n^b)$
- (b) Use a recursion tree to solve the recurrence
 $T(n) = T(\alpha n) + T((1-\alpha)n) + n$, where α is a
constant in the range $0 < \alpha < 1$.

OR

- (a) Use the master method to give asymptotic
bounds for the following recurrences.
- (i) $T(n) = 4T(n/2) + n$,
- (ii) $T(n) = 4T(n/2) + n^2$
- (iii) $T(n) = 4T(n/2) + n^2$.

- (b) Let $f(n)$ and $g(n)$ be asymptotically non negative functions. Using the basic definition of θ -notation, prove that

$$\max(f(n), g(n)) = \theta(f(n) + g(n))$$

- 2.(a) Write the quick sort algorithm and a brief argument that the running time of partition on a subarray of size n is $\theta(n)$
- (b) Write pseudocode for Merge sort and solve the recurrence equation.

$$T(n) = \begin{cases} 2 & \text{if } n = 2 \\ 2T(n/2) + n & \text{if } \\ & n = 2^k, k > 1 \end{cases}$$

OR

- (a) Show that the running time to build a heap is $O(n)$ if n is the size
- (b) Show that the second smallest of n elements can be found with $n + \lceil \lg n \rceil - 2$ comparisons. in the worst case.
- 3.(a) Find an optimal parenthesizing of a matrix-chain product whose sequence of dimension is $\langle 3, 12, 5, 50, 6 \rangle$

- (b) Determine on lcs of $\langle 1, 0, 0, 1, 0, 1, 0 \rangle$ and $\langle 0, 1, 0, 1, 1, \dots \rangle$

OR

- (a) Show that a full parenthesization of an element expression has exactly $n - 1$ pairs of parentheses.

- (b) Let $R(i, j)$ be the number of times that table entry $m[i, j]$ is referenced by MATRIXCHAIN. ORDER in computing other table entries. Show that the total number of references for

the entire table is

$$\sum_{i=1}^n \sum_{j=1}^n R(i, j) = \frac{n^3 - n}{3}$$

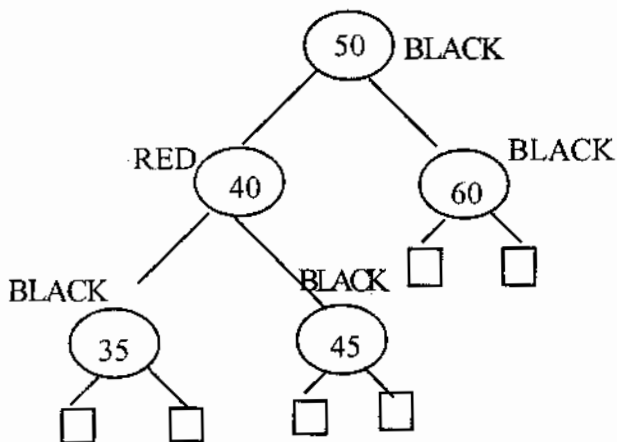
- 4.(a) Show that if a node in a binary search tree has two children, then its successor has no left child and its predecessor has no right child.

- (b) Construct a RED BLACK tree of a list of keys having 10 numbers

$$L = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$$

OR

- (a) Show the characteristic of RED - BLACK tree and how it is equivalent to 2-3-4 tree.
- (b) Draw the red - black tree that results after insert is called on the given tree. If the inserted node is colored red and key is 30, is the resulting tree is red - black tree? What it is colored black.



5. Define the class P, NP and NP complete with examples. Show that HAM CYCLE is NP CLASS.

OR

Find an approximate algorithm for finding the TSP and estimate its error.

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Answer ALL questions.

1. (a) What is a distributed system ? How is it different from a network system .
- (b) Explain the working principle of multiprocessor thimsharing system.

OR

- (a) Explain the advantages of distributed system over centralized systems.
- (b) Explain different kinds of transparency required for a distributed system.

2. Explain how data communication takes place in OSI model. Discuss the functions of each layer of this model.

OR

- (a) What is asynchronous transfer mode? Explain how data communication takes place in this mode.
- (b) Explain how ATM switching works.
3. (a) What is client server model? Discuss its advantages.
- (b) Explain the method used for addressing processes in client server model.

OR

Differentiate between the following in a client server model:

- (a) Blocking versus nonblocking primitives.
- (b) Buffered versus unbuffered primitives.

4. What is remote procedure call (RPC) ? Discuss its basic operation and write its advantages.

OR

Explain th RPC semantics in the presence of following failures :

- (a) Client cannot locate the server
 - (b) Lost Request messages
 - (c) Lost Reply messages
 - (d) Server crashes
 - (e) Client crashes.
5. (a) Differentiate between the following:
- (i) Closed groups verses open groups.
 - (ii) Peer groups verses hierarchical groups.
- (b) Explain different ways of addressing members in a group communication.

[4]

OR

Discuss the following design issues for group communication in a distributed system.

- (a) Atomic broadcast
- (b) Message ordering
- (c) Overlapping groups
- (d) Scalability.



V- (MCA) 5.5 (EL - II)- DS