Tribhuvan University
Institute of Science and Technology
2076

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Master Level / First Year/ IInd Semester/ Science
Computer Science and Information Technology (CSc. 558)
(Compiler Optimization)

Full Marks: 45
Pass Marks: 22.5
Time: 2 hours.

Candidates are required to give their answers in their own words as for as practicable.
The figures in the margin indicate full marks.

Group A

Attempt any two questions.   (10×2=20)

1. Define different types of subscript pair with example. Find dependence of statement
   - S1 upon itself
   - S2 upon itself

```
N=8
do k=1 , 4 , 1
        do j = 1, 4,1
            do i=1,5,1
            s1: X(I+2,7J+3k+3,k+1) = X(I+1,J+k,k) *2
            s2: Y(N)= Y(8) + 1
        enddo
enddo
```

2. Define dead code. Write and explain an algorithm for dead code elimination.

3. How can loop skewing parallelize statements in nested loops? Perform loop skewing in the following code.

```
do i = 1,6
    do j = 1,5
        A(i,j) = A(i-1,j+1)+1
    enddo
enddo
```

Group B

                                                                       (5×5=25)

Attempt all questions.

4. Explain briefly about the challenges for compiler in architecture with processor parallelism and multiple instruction issue processor.

5. Explain with example, the different types of dependence on the basis of load-store.

6. What do you understand by alignment in loop optimization? Explain with an example.

7. Explain different types of branching and their optimization with appropriate example.

8. Explain the terms reference and modification side effects and alias analysis in interprocedural analysis.

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Master Level / First Year/ IInd Semester/ Science
Computer Science and Information Technology (CSc. 561)
(Machine Learning)

Full Marks: 45
Pass Marks: 22.5
Time: 2 hours.

Candidates are required to give their answers in their own words as for as practicable.
The figures in the margin indicate full marks.

Group A

Attempt any two questions.

(10x2=20)

1. Explain why locally weighted linear regression are used for local window of data with suitable derivations?

2. Explain Kernels with appropriate feature mapping. Explain how kernel trick is used to calculate $K(x,z)$ with only $O(n)$ time complexity?

3. Define the terms associated with Markov decision processes (MDP) with example. Describe policy iteration to find optimal policy in reinforcement learning.

Group B

Attempt All questions.

(5x5=25)

4. Define sigmoid function. Derive the update rule for theta (θ) in logistic regression model using likelihood estimation.

5. Explain Naïve Bayes classification algorithm with suitable derivations.

6. Explain the relationship between training error and generalization error using Hoeffding inequality.

7. What is the concept of principle components in PCA? Explain PCA and its applications.

8. Write short notes on:
   a. Laplace smoothing.
   b. Mixing and Unmixing matrix in Independent Component Analysis.

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Master Level / First Year/ IInd Semester/ Science
Computer Science and Information Technology (CSc. 564)
(Data Warehousing and Data Mining)

Full Marks: 45
Pass Marks: 22.5
Time: 2 hours.

Candidates are required to give their answers in their own words as for as practicable.
The figures in the margin indicate full marks.

Group A

Attempt any two questions.

(10×2=20)

1. What do you mean by classification? Explain how ID3 algorithm partitions the data while building the decision tree.

2. How does back propagation algorithm work? Illustrate it with suitable example.

3. "Data mining systems intrude the privacy of individuals" Justify with example.

Group B

Attempt ALL questions.

(5×5=25)

4. What is a frequent item set? Write any five applications of frequent pattern Analysis. Explain. (5)

5. What are different methods for data cleaning? Describe. (5)

6. List and describe five primitives in DMQL for specifying data mining tasks. (5)

7. How does OLAP technology help in discovery driven exploration of data cube? Describe. (5)

8. Describe in brief (Any TWO): (2×2.5=5)
   a. Time Series Data Analysis
   b. Data Cube Computation
   c. Outlier Dectection Methods

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Master Level / First Year/ IInd Semester/ Science
Computer Science and Information Technology (CSc. 559)
(Web Systems and Algorithm)

Full Marks: 45
Pass Marks: 22.5
Time: 2 hours.

Candidates are required to give their answers in their own words as for as practicable.
The figures in the margin indicate full marks.

Group A

Attempt any two questions. (10×2=20)

1. How does the web application benefits with intelligent? Does it help in extracting information through semantic web? Describe how click improves the search results. (3+3+4)

2. Mention any two mechanisms to find the good value of K in K-Means algorithm. Build a decision tree from following training data set using ID3 algorithm as attribute selection. (2+8)

Outlook	Temperature	Routine	WearCoat (Class)
Sunny	Cold	InDoors	No
Sunny	Warm	OutDoors	No
Cloudy	Warm	InDoors	No
Sunny	Warm	InDoors	No
Cloudy	Cold	InDoors	Yes
Cloudy	Cold	OutDoors	Yes
Sunny	Cold	OutDoors	Yes

3. Can we rank documents without link? Justify. Given the following web graph of four pages' domain, rank the pages A, B, C and D, using Page Rank Algorithm, after the information obtained upto 3rd iterations. (2+8)
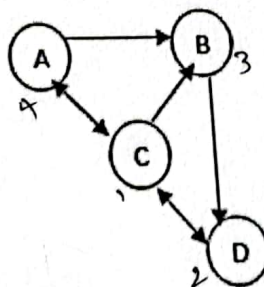
Group B

(5×5=25)

Attempt ALL questions.

4. Describe the significances of combining the classifier. Can we get more accurate result by combining the classifier rather than using a single classifier? (3+2)

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5. How friends help in recommending the item? Explain with limitations too. (5)

6. What is the effect of damping factor in page ranking as its values increases? How does HITS work? (1+4)

7. Perform the clustering operation using Hierarchical clustering from the following distance matrix. (5)

	A	B	C	D	E
A	0				
B	2	0			
C	6	3	0		
D	11	9	7	0	
E	9	8	5	4	0

8. Write short notes on (Any *TWO*): (5)
   a. Web Ontology
   b. ROCK
   c. Precision and Recall

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Master Level / First Year/ IInd Semester/ Science
Computer Science and Information Technology (CSc. 565)
(Systems Programming)

Full Marks: 45
Pass Marks: 22.5
Time: 2 hours.

Candidates are required to give their answers in their own words as for as practicable.
The figures in the margin indicate full marks.

Group A

Attempt any two questions. (10x2=20)

1. Consider following assembly program written for SIC/XE computer and answer the questions that follow.

Label	Source statement	
WRITE	START	00000
	EXTREF	BUFER,LENGTH, BUFEND
	CLEAR	X
	CLEAR	A
	CLEAR	S
	LDT	MXLEN
RLOOP	TD	INPUT
	JEQ	RLOOP
	RD	INPUT
	COMPR	A,S
	JEQ	EXIT
	+STCH	BUFFER,X
	TIXR	T
	JLT	RLOOP
EXIT	+STX	LENGTH
	RSUB	
INPUT	BYTE	X'F1'
MAXLEN	WORD	BUFEND- BUFFER
	END	WRITE

a) Generate LOC columns (3)
b) Generate object code column for the above program (7)
(Mnemonic Code as: CLEAR=B4,TD=E0, JEQ=30,RD=D8,COMPR= A0,STCH=54, TIXR=B8, JLT=38, STX=10, RSUB=4C) LDT = 02

2. For the assembly language program given in Question No. 1, provide solution as indicated in following questions:
a) Create object code file (6)
b) Load object code file into memory and show all data structure used by loader. Assume that the (4) program is loaded from memory location 1000.

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(4x2.5=10)

3. Write brief answer of the following questions
   a) Write the major pass of assembler.
   b) Explain the different addressing mode in SIC/XE machine.
   c) What is assembler directive?
   d) Explain loading and linking?

Group B

(5x5=25)

Attempt All Questions.

4. Explain how loader uses the modification records.

5. Consider the macro definition given below and show macro expansion for the macro call statement RDBUFF F1,BUFFER, LENGTH, (04). Show all data structure used by macro processor clearly.

REDBUFF	MACRO	&INDEV, &BUFADR, &RECLTH, &EOR
&EORCT	SET	%NITEMS(&EOR)
	CLEAR	X
	CLEAR	A
	+LDT	#4096
LOOP	TD	=X'&INDEV'
	JEQ	$LOOP
	RD	=X '&INDEV'
&CTR	SET	1
	WHILE	(&CTR LE &EORCT)
	COMP	=X'0000&EOR[&CTR]'
	JEQ	$EXIT
&CTR	SET	&CTR+1
	ENDW	
	STCH	&BUFADR, X
	TIXR	T
	JLT	$LOOP
$EXIT	STX	&RECLTH
	MEND	

6. Calculate the addressing mode and target address for the following instruction
   a. 032600
   b. 010030
   c. 03C300
   when (B)=006000, (PC)=003000, (X)=00090

7. Explain any two machine independent Macro Processor features.

8. Consider the following grammar:
   <stmt>::=<read>|<write>
   <read>::= READ(<id-list>)
   <write>::= WRITE (<id-list>)
   <id-list>::=id |<id-list>,id

   Drew the syntax tree for the following statement:
   1) READ (theta)
   2) READ(theta, beta, gamma)
   3) WRITE(beta)