



Master Level / First Year / 2nd 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 far as practicable.
The figures in the margin indicate full marks.

Group A

Attempt any two questions.

(10x2=20)

1. What is definition use graph? Explain the process of dead code elimination using definition use graph. def use live kill reuse
2. Discuss safety and the profitability of loop interchange with example.
3. Explain the Management of inter-procedural analysis and optimization. Loop? elimi

Group B

Attempt all questions.

(5x5=25)

4. Explain, how does pipelining improve performance?
5. Explain the strong-SIV test for dependence testing with an example.
6. What is loop normalization? Normalize the following loop:

$$\begin{aligned} &\text{DO } I = 1000, 1, -2 \\ &\quad A(I) = A(I) + B \\ &\text{ENDDO} \end{aligned}$$

Explain the benefits of normalization on loops.

7. What is static single assignment graph? Explain with example.
8. Explain the if-conversion with an example.

guard variable
branches removal

$I \geq 1$ to 100
if $A(I) > 0$ goto
 $A(I) = A(I) + 1$

$25 + 25 = 0$

$\frac{0-1+1}{2}$
in 5 ML

$$d = \frac{c_2 - c_1}{a}$$

$$L \leq d \leq U$$

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Master Level / First Year/ 2nd 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 far as practicable.
The figures in the margin indicate full marks.*

Group A

Attempt any two questions.

(10×2=20)

1. A research company has assigned you to architect the intelligent application. Explain the functionality and your data. How can data can be collected from the web.
2. Explain about the working principle of search engine. How does link analysis contribute in ranking the documents? Explain.
3. What is the concept of distance and similarity? How does recommender system add intelligence in modern IR? List the disadvantages of collaborative filtering recommendation system.

255
Raj Raj
2073

Group B

Attempt ALL questions.

(5×5=25)

4. What is the defect of K - Means algorithm? How does it differ from K - Medoids.
5. Consider the following documents D and queries Q for the following.
Doc1 : you say goodbye
Doc2 : hello goodbye hello goodbye hello
Doc3 : I say hello
Query1 : I hello
Query2 : hello goodbye
Rank the documents for each query.
6. What is the semantic meaning that click refers to in web? Explain about how does ID3 algorithm help in building Decision Tree?
7. Explain different test to compare multiple classifier.
8. Describe in brief (Any two):
a) RDF (Resource Description Framework)
b) Fallacies of Intelligent applications
c) Machine learning and Data mining

3-8 pm
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Chitra Raj Upadhyay 2023

M.Sc. CSc. 561-2074 ☆

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Master Level / First Year/ 2nd 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 far as practicable.
The figures in the margin indicate full marks.

ben / 90%
Chen / 100%

$$P(y; u) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{(y-u)^2}{2}\right)$$

Group A

Attempt any two questions.

path creases
for learning

(10x2=20)

1. Define machine learning and list most common application areas. Explain the difference between supervised, unsupervised and reinforcement learning.
2. What is exponential family distribution? Show that the Bernoulli and the Gaussian distributions are the examples of exponential family distributions.
3. Provide the suitable example of text classification to describe the terms Naïve Bayes (NB) assumption and explain the Naïve Bayes classifier algorithm.

Group B

Attempt All questions.

(5x5=25)

4. Describe the concept of functional and geometric margin used for optimal margin classifier. List the optimization problem for optimal margin classifier.
5. Define the terms training error and generalization error. Explain uniform convergence result using Hoeffding inequality.
6. Explain principal component analysis (PCA) model with a motivational example. Describe different important applications of PCA model.
7. Define the terms associated with Markov decision processes (MDP) that formalizes the reinforcement learning with concrete example.
8. Write short notes on:
 - a. Sigmoid function
 - b. Online learning

SA(P_n) & P

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Master Level / First Year/ 2nd 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 far as practicable.
The figures in the margin indicate full marks.*

Group A

Attempt any two questions.

(10×2=20)

1. Explain the logical architecture of data warehouse. Why query scheduling is one of the important responsibility of query manager? Justify.
2. List and explain the future requirements for implementing data warehouse. What types of access patterns can be defined for data warehouse? Give your own view.
3. A database has four transactions. Let min_sup=60% and min_conf=80%

TID	items bought
T100	{K, A, D, B}
T200	{D, A, C, E, B}
T300	{C, A, B, E}
T400	{B, A, D}

Find all frequent itemsets and association rules using Apriori.

50
100
20

Group B

Attempt ALL questions.

(5×5=25)

4. How K - Medoids algorithm solve the problem of K - Means algorithm? Explain.
5. Compare and contrast OLTP and data warehouse.
6. List and describe five primitives in DMQL for specifying data mining tasks.
7. Explain how ID3 algorithm partitions the data while building the decision tree.
8. Describe in brief (Any TWO):
 - a) Outlier Analysis
 - b) OLAP Server
 - c) Spatial Data mining

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

Group A

Attempt any two questions.

(10x2=20)

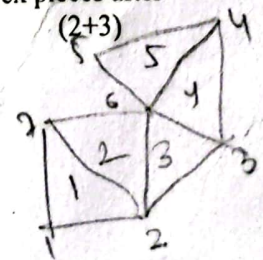
1. What do you mean by output sensitive algorithm? Given a box in 3D, how can you compute its convex hull? Do you think incremental approach for finding convex hull in 3D is better than the divide and conquer approach? Why or why not? Give proper justification to your answer. (2+2+6)
2. How applicable Voronoi diagrams are, mention the application areas? What is Nearest Neighbor Problem? How Voronoi diagram can be used while computing nearest neighbor. Illustrate with an example. (3+2+5)
3. How colinearity of points in 2D can be tested? How mouth of a polygon differs from ear? How income test can be used to determine whether a diagonal is internal or external to a polygon? Show with example. (2.5+2.5+5)

Group B

Attempt All questions.

(5x5=25)

4. Write an algorithm to check convexity of a polygon. Suppose we have a set of n points P in the plane such that exactly h of them lie on the convex hull of P . How many triangles are in any triangulation of convex hull of P . Justify your answer. (3+2)
5. What do you mean by global vertex numbering? Given elements to vertex representation of mesh, now sketch the mesh triangulation using the vertex numbering listed below, (2+3)
 Triangle 1: 1, 2, 7
 Triangle 2: 2, 6, 7
 Triangle 3: 2, 3, 6
 Triangle 4: 3, 4, 6
 Triangle 5: 4, 5, 6
6. What do you mean by motion planning problem? Write a generic algorithm for moving a Robot which may be either disc or polygon. (1+4)
7. What do you mean by orthogonal range search? How range searching can be used to interpret database queries geometrically? Illustrate with an example. (2+3)
8. Give you justification to the statement that there can be at most two essential diagonals at any reflex vertex. For a polygon with n reflex vertices, what can be the optimal number of convex pieces after partitioning? (2+3)



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Master Level / First Year/ 2nd 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 far 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 machine architecture and provide solutions as indicated in following questions: {10}
a) Generate LOC column {3}
b) Generate object code column for the program {7}

Main	START	0
	EXTDEF	A,B
First	LDA	Five
Five	EQU	5
	STA	A
	LDA	=X'07'
	STA	B
	+JSUB	Display
A	RESW	1
B	RESW	1
	END	First

Display	START	0
	EXTREF	A,B
Repeat	TD	=X'F1'
	JEQ	Repeat
	+WD	A
	+WD	B
	RSUB	
	END	

Assume following mnemonic codes: {LDA=00, STA=0C, JSUB=48, RSUB=4C, TD=E0, WD=DC, JEQ=30}

2. For the assembly language program given in question number 1, provide solutions as indicated in following questions: {10}
a) Create Object code file. {5}
b) Load object code files into memory and show linking process along with data structures used by linking loader. Assume that programs are loaded from memory location 2000 contiguously {5}
3. Write brief answer of following questions. {4x2.5=10}
a) How forward references are handled in one pass assembler?
b) Differentiate between Symbol Defining constant and Literal constants with example?
c) Why relative addressing modes are preferred over absolute addressing modes? Explain briefly.
d) How absolute loaders are different from relocatable loaders? Explain.

Group BAttempt All Questions.

{5x5=25}

4. Consider the macro definition given below and show macro expansion for the macro call statement "Sum X,," Show all data structures used by macro processor clearly {5}

Sum	MACRO	&A,&B
	If	&A EQ"
	LDA	#0
	ADD	&B
	Else	
	LDA	#0
	ADD	&A
	Else	
	LDA	&A
	ADD	&B
	ENDIF	
	ENDIF	
	STA	R
	MEND	

5. Write down interpretation for each of the following three sequences of statements. {5}

LDA #5	LDA =X'05'	Five EQU 5
		LDA Five

6. Calculate addressing modes and target address for each of the following Instructions. Assume that b=4000 PC=2000 and x=30. {5}

- a) 021B456C
b) 032307

7. Consider the following BNF grammar, devise token coding scheme for this, and then design finite automata to recognize tokens. Explain any assumptions made in designing automata. Assume that id must start from character always and value can be any integer constants. {5}

<write> → Write(<exp-list>)
 <exp-list> → <exp>, <exp-list> | <exp>
 <exp> → id <opr> id | val <opr> id | id <opr> val | id | val
 <opr> → + | -

8. Write short notes on
 a) SIC/XE Format-3 Instructions
 b) Program Blocks

{2x2.5=5}

remove name for register

IOST,TU