

Tribhuvan University
Institute of Science and Technology
2078



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 far as practicable.
The figures in the margin indicate full marks.

Group A

(2x10=20)

Attempt any two questions.

1. Define dependence testing. Find the dependence of s1 and s2 upon themselves in the following code.

```

N=6
do k=1, 5, 1
  do j=1, 5, 1
    do i=1, 5, 1
      S1: X(i+1, 7j+3k+3, k+2) = X(i, j+k, k+1) / 2
      S2: Y(N)=Y(6) + 6
    enddo
  enddo
enddo

```

2. Define loop normalization. Apply normalization, and constant folding by hand to the following loop:

```

Y = 25;
DO I = 1, 50
  A(I)=A(I) *2
  DO J = 50, 1, -1
    A(J) = X(I) +Y
  ENDDO
ENDDO

```

3. Why is it important to optimize a loop structure? Explain loop peeling and alignment with examples.

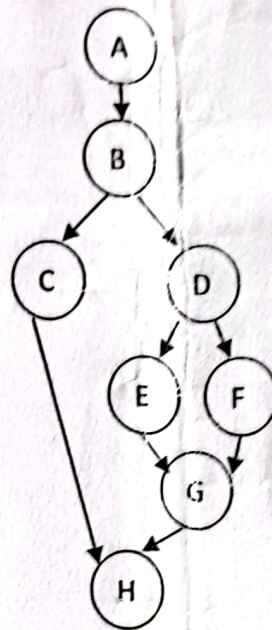
Group B

(5x5=25)

Attempt all questions.

4. Explain briefly about the importance and the theme behind code optimization.
5. Prove that "any reordering transformation that preserves every dependence in a program preserves the meaning of that program".

6. Find out the dominance frontier of each node of the graph in the figure.



7. What is branch optimization? Explain different types of branches in control flow analysis with examples.
8. Write short notes on management of interprocedural analysis and optimization.

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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 far as practicable.
The figures in the margin indicate full marks.

Group A

(2×10=20)

Attempt any two questions.

1. What does the machine can learn from human click? Suppose you are assigned to develop a game application, and then describe how this application can benefit from intelligence. Explain the significances of bagging and boosting.
2. Compare the user based and item based collaborative filtering. Consider the following training data set.

Data	Fever	Vomiting	Diarrhea	Shivering	Class
D1	No	No	No	No	Healthy(H)
D2	Average	No	No	No	Influenza(I)
D3	High	No	No	Yes	Influenza(I)
D4	High	Yes	Yes	No	Salmonella Poisoning (S)
D5	Average	No	Yes	No	Salmonella Poisoning (S)
D6	No	Yes	Yes	No	Bowel Inflammation (B)
D7	Average	Yes	Yes	No	Bowel Inflammation (B)

Use Bayesian classifier to classify the person with high fever, who suffers from vomiting and shivering.

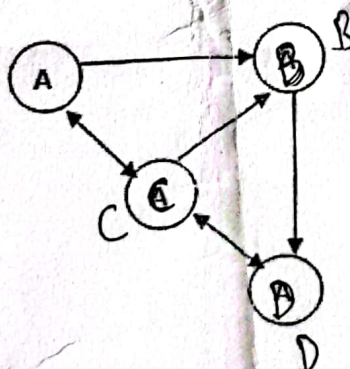
3. How can you rank the pages with link? What is the effect of precision and recall in case of ranked pages? Explain the working mechanism of DBSCAN.

Group B

(5×5=25)

Attempt ALL questions.

4. How does K-medoid minimize the sensitivity of outlier over K-means? Explain.
5. Rank the pages of the following graph using Pagerank algorithm after two iterations.



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6. Can we increase the accuracy of the model by combining classifier rather than using single classifier?
Give example to support your view.
7. Explain any five fallacies of intelligent application.
8. Write short notes on (Any Two)
 - a. Ontology
 - b. Large scale implementation issues
 - c. Indexing

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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 far as practicable.
The figures in the margin indicate full marks.

Group A

Attempt any two questions.

[2×10=20]

1. What is supervised learning? Derive the update rule for the training of machine learning model using gradient descent algorithm. How the prediction can be done using locally weighted linear regression? Explain. [2+5+3]
2. What is Independent Component analysis? How it can be used to separate signals from independent sources from a mixed signal? Also explain some of the applications of ICA algorithm. [2+5+3]
3. Explain Markov decision process (MDP) in detail with proper example. Also, differentiate between value iteration and policy iterations for solving finite state MDPs. [5+5]

Group B

Attempt all questions.

[5×5=25]

4. What is overfitting and underfitting? How the training error can be measured and minimized? [3+2]
5. How k-fold cross validation is different from hold-out cross validation? Explain in detail. [5]
6. What is SVM? Also explain how the optimal margin classifier can be generated using SVM? [1+4]
7. How Eigen faces can be used for face detection? Explain. [5]
8. What is a continuous state MDP? How discretization can be used while solving the continuous state MDPs? Explain. [2+3]

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Master Level / First Year/ IInd Semester/ Science
Computer Science and Information Technology (CSc. 562)
(Computational Geometry)

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.

(2×10=20)

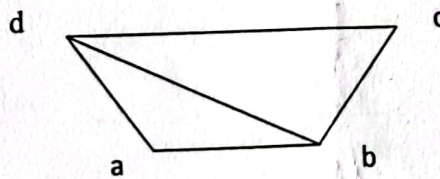
1. What is polygon partitioning problem? Write an algorithm for partitioning monotone polygon into triangles. Perform complexity analysis of the algorithm. (2+6+2)
2. What does it mean to compute convex hull of a set of points? How Graham Scan can be used to find convex hull of points. Illustrate with an example. (3+7)
3. Discuss the applications of Voronoi diagrams. Given a set of pointsets in 2D, how Voronoi diagrams are constructed for the pointsets? Illustrate with example. (4+6)

Group B

Attempt all questions.

(5×5=25)

4. Given a floor plan of a room, how many guards are necessary to guard the room? Justify your answer based on Fisk's proof. (5)
5. What is visibility graph? How visibility graph is used for determining collision free path of a point Robot? (1+4)
6. What is DCEL? Construct a DCEL for following object. (2+3)



7. How Mesh can be generated using topological and geometrical decomposition approaches? (5)
8. What is range search? Discuss how binary search tree can be used in 1D range search? (1+4)

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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 far as practicable.
The figures in the margin indicate full marks.

Group A

(2x10=20)

Attempt any two questions.

1. Differentiate between classification and clustering. How does ID3 algorithm partition the data while building the decision tree?
2. What is query directed mining? Explain LIFT with example.
3. What are the demerits of k-means algorithm? How does k-medoids work?

Group B

(5x5=25)

Attempt ALL questions.

4. How does Density Based Clustering Algorithm work? Describe.
5. What is data generation? Explain attribute oriented induction approaches.
6. What is web mining Taxonomy? Describe its challenges.
7. Compare and contrast OLTP and data warehouse.
8. Write short notes (Any Two)
 - a. Decision Tree
 - b. Outlier Analysis
 - c. Spatial Data Mining