UL (7) - DWH & DM

2022 New (A)

Time: 3 hours *Full Marks: 70*

Candidates are required to give their answers in their own words as far as practicable,

The figures in the margin indicate full marks.

Answer any five questions.

1. a) How is data warehouse different from a database? How are they similar? (3)
   b) Compare star and snowflake schema dimension table.(4)
   c) Differentiate between Agglomerative and Divisive Hierarchical Clustering method (4)
   d) Explain web content mining. (3)

2. a) Explain with suitable examples the various OLAP operations in a multidimensional data model.(7)
   b) Describe ROLAP, MOLAP and HOLAP (7)

3. a) Briefly explain the Apriori algorithm for frequent itemset generation. (4)
   b) Generate frequent item sets for the following data with support=50%. (6)

TID	100	200	300	400
Items	{1,3,4}	{2,3,5}	{1,2,3,5}	{2,5}

   c) Explain the following terms with example. (4)
   (i) Rule generation (ii) Computational Complexity

4. a) Define Data warehouse. Explain the multi-tier architecture of data warehouse. (7)
   b) Explain K-means algorithm with example. (7)

5. a) What is meant by metadata in the context of a Data warehouse? Explain the different types of meta data stored in a data warehouse with a suitable example.(7)
   b) Describe the various functionalities of Data mining as a step in the process of knowledge Discovery.(7)

6. Write short notes on (14)
   (i) Web mining (ii)Temporal mining
   (ii) BIRCH Algorithm (iv) ROCK Algorithm

7. a) Suppose a Data warehouse consist of three measures customer, account and branch and two measures count (no. of customers in the branch) and balance. Draw the schema diagram using snow flake scheme. (6)
   b) Real world data tend to be incomplete, noisy and inconsistent. What are the various approaches adopted to clean the data. (8)

8. a) Differentiate between density based and grid based clustering method. (5)
   b)Explain DBSCAN algorithm. Sate the pros and cons of this method. (9)

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The questions are of equal value.Answer Any **FIVE** Questions

1. (a) Explain why it is important to model the context of a system that is being developed. Give two examples of possible errors that could arise if software engineers do not understand the system context.

   (b) Draw state diagrams of the control software for an automatic washing machine that has different programs for different types of clothes.

2. (a) What are the major technical and nontechnical factors that hinder software reuse? Do you personally reuse much software and, if not, why?

   (b) What are the differences between black box and white box testing?

3. (a) Differentiate the features of various software lifecycle models highlighting their advantages and disadvantages.

   (b) What is waterfall model for software development? Explain the situation in which theiterative model will be preferred over waterfall model.

4. (a) A program is to be developed to simulate the operations of a scientific calculator. List the facilities that to be provided by this calculator. Analyze this using a DFD 0-level and 1- level diagram.

   (b) Explain the role and responsibilities of the following personnels in the s/w developmentprocess:
   (i) Project Manager
   (ii) Project Leader
   (iii) System Analyst
   (iv) Developer

5. (a) What are the different architectural style applied for software development? Explain withdiagram.

   (b) What is acceptance testing? Explain briefly alpha testing and beta testing with suitableexample.

6. (a) Discuss the important activities that are carried out during the feasibility study phase.

   (b) Explain software reverse engineering and software reengineering.

7. (a) What is UML? Explain the following in context to UML.
   (i) Sequence Diagram
   (ii) State Diagram

   (b) What are the major technical and nontechnical factors that hinder software reuse? Do you personally reuse much software and , if not, why ?

8. Write short notes on any two of the following.

   a. SRS

   b. Software Prototyping

   c. Object Oriented Design concept and method

 UL (7)-Crypto.

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The figures in the margin indicate full marks. **Answer any five questions**

1) a) Explain Ceasercipher, Mono alphabetic cipher, One time pad cipher. [7]

b) Discuss the prime objectives of modern cryptography? [7]

2) a) Find the result of $(21)^{24}$ mod 8. [7]

b) Solve the equation $3x + 4 \cong 6 (\text{mod } 13)$. [7]

3) a) What are the design parameters of Feistel cipher network?[7]

b)State and explain the principles of public key cryptography. [7]

4)a) Explain the Key generation of DES algorithm in detail. [7]

b)What are the requirements for message authentication? [7]

5) a) What requirements should a digital signature scheme should satisfy?[7]

b) Write and explain the Digital Signature Algorithm. [7]

6.) a)Briefly explain DeffieHellman key exchange with an example. [7]

b) Explain firewalls and how they prevent intrusions.[7]

7) a) Explain the architecture of IP Security.[7]

b) State the differences between threats and attack?[7]

8.) Write short notes on any two of the following: [7 + 7]

a) Trusted systems. b) PGP.

c) Crypto system. d) SHA-1.

UL(T)—Machine Learning

Time: 03 hour

2022(A) (New)

Full Marks: 70

Candidate are required to give their answer in their own words as far as practicable.
Figures on the right-hand side margin indicate full marks.
Answer any **five** questions.

1. a) What do mean by Machine learning? Explain different challenges in ML? 7
   b) What do you mean by well-defined system? Explain T,P and E in machine learning with suitable example. 7
2. a) What is zero conditional probability? Imagine that you have given following set of training examples.Each feature can take up to three nominal values a, b and c. 7

F_1	F_2	F_3	Class
a	c	a	+
c	a	c	+
a	a	c	-
b	c	a	-
c	c	b	-

How would the Naive system classify the following test example- F_1= a, F_2= c, F_3= b

   b) What do you mean by overfitting and under-fitting? Explain with suitable diagram and mention commonly used regularization technique to avoid overfitting. 7
3. a) What is Marov decision process (MDP) in reinforcement learning? Explain significance of Bellman equation with suitable example. 7
   b) Consider following data and execute DBScan algorithm. Assume ε = 3.5 and MinPts= 3. Find core, boundary and noise point. 7

Feature	D1	D2	D3	D4	D5	D6	D7	D8
X	5	8	3	4	3	6	6	5
Y	7	4	3	4	7	7	1	5

4. a)What do you understand by learning in neural network? Explain different requirement for learning law? 7
   b) What is ADALINE in ANN? Explain with suitable example. 7
5. a) What is principal component analysis? Explain various steps involved in PCA. 7
   b) Explain linear separable problems? Implement AND logic gate using perceptron model with assuming necessary parameter. 7
6. a) Explain gradient descent and delta rule in brief? 7
   b) Write the significance of ensemble learning in machine learning? Explain with suitable example? 7
7. a) Implement Genetic algorithm for a problem of maximizing a function. Consider x ranges from 0 to 31. The function is- 7

$$f(x) = \frac{-x^2}{10} + 3x$$

   b)What is the necessity of evolutionary algorithm (EA)? Mention application areas where EAs can be used. 7

8. Write short notes on following- **(Any two)** 2x7 = 14
   (a) Concept learning
   b) Weight update in hidden layer of BPN
   (c) Confusion Matrix
   d)Machine learning Vs Artificial Intelligence

2022(A) New

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*Answer any **five** questions.*

1. a) What is state space search? Explain Tic-Tac-Toe problem as state space search. 7
   b) Discuss the various in-built functions used in PROLOG with example. 7
2. a)What is uninformed search strategy in Artificial Intelligence? Discuss its advantages and disadvantages. 7
   b)Compare Breadth first search and Depth first search in terms of time complexity, space complexity, completeness, optimality, systematicity. 7
3. a) What is need of heuristic function? Explain heuristic function of A* algorithm with example. 7
   b) Define Hill climbing search. Write the algorithm for Simulated Annealing search and discuss the process of simulated annealing. 7
4. a) Discuss Constraint Satisfaction problem with an algorithm for solving a Cryptarithmetic problem. 7
   b) Explain the Min Max game playing algorithm with an example. 7
5. a) What is Dempster-shafer theory? Explain with suitable example. 7
   b) How reasoning is done using Fuzzy Logic. Explain with an example. 7
6. a) Define Expert system. Explain the expert system architectures. 7
   i) Blackboard System Architecture.
   ii) Neural Network architecture.
   b) Discuss any seven real time applications of expert systems. 7
7. a) Explain the concept of knowledge representation using Frame based system. What are the reasoning actions that can be performed using frames? 7
   b)Write the resolution procedure for propositional logic. 7
8. Write short notes on any two. 2* 7
   i) Conceptual graphs.
   ii) Learning by induction.
   iii) Truth Maintenance system.
   iv) Bayesian probabilistic inference.