

B. Tech.

(SEM VI) EVEN SEMESTER

MAJOR EXAMINATION 2021-2022

Subject Name: Data Mining &amp; Data Warehousing

Time: 3 Hrs

Max Marks: 50

Notes: Attempt all questions. Each questions carry equal marks.

1 Attempts any Five parts of the following:

(5×2=10)

- Differentiate ROLAP, MOLAP and HOLAP server functionalities.
- Explain 3-tier Architecture of Data Warehouse with a neat sketch.
- What is Data Binaryzation? Define the measure confidence in association rule mining.
- What is the role of meta data repository in data warehouse? Define confidence of an association rule.
- Differentiate between data retrieval and data mining
- What is Data Mining? Explain data mining as a step-in knowledge discovery process.
- Explain the various phases in knowledge discovery process with a neat diagram.

2 Attempts any Two parts of the following:

(2×5=10)

- What is frequent pattern analysis? Why is frequent pattern mining important? How does frequent pattern mining support business analysis?
- How to compute confidence for an association rule  $X \rightarrow Y$ ? Quote an example for quantitative association rule.
- Find the frequent item sets and strong association rules for the following transactional database table using Apriori algorithm. Consider the thresholds as support = 30% and confidence = 40%.

TID	ITEM IDs
1	I1,i2,i3,i5
2	I2,i5,i9
3	I1,i3,i5,i7
4	I2,i4,i6,i8
5	I1,i2,i3,i4
6	I2,i3,i4,i5
7	I3,i4,i5,i6
8	I4,i5,i6,i7
9	I5,i6,i7,i8,i9
10	I9,i1,i2,i5
11	I8,i2,i9,i7
12	I5,i6,i3,i2

**3 Attempts any Two parts of the following:**

**(2×5=10)**

- (a) What are patterns that appears frequently in a data set? What types of patterns can be identified from association rule mining? Why is association mining also known as frequent pattern mining explain?
- (b) Demonstrate construction of FP-tree for the data from Question2.(c)
- (c) Describe constraint-based association mining with suitable example.

**4 Attempts any Two parts of the following:**

**(2×5=10)**

- (a) Demonstrate computation of the following measures for similarity/ dissimilarity among data:
  - i. Cosine measure
  - ii. Euclidean distance
  - iii. Manhattan measure.
- (b) Define information gain and explain its importance in decision tree induction.
- (c) Compare k-means with k-medoids algorithms for clustering.

**5 Attempts any Two parts of the following:**

**(2×5=10)**

- (a) Explain DBSCAN algorithm. How the parameters are selected.
- (b) What is prediction? Explain the various prediction techniques. Explain about Decision tree induction classification technique.
- (c) Describe the data classification process with a neat diagram. How does the Naïve Bayesian classification work? Explain.

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B TECH  
EVEN SEMESTER  
MAJOR EXAMINATION 2021 - 2022  
ARTIFICIAL INTELLIGENCE

Time: 3 Hours

Marks: 50

1. Attempt any Five parts of the following:

5\*2=10

- (a) What do you understand by Artificial Intelligence and what are the types of AI? Explain in brief.
- (b) Iterative deepening is sometimes used as an alternative to breadth first search. Give one advantage of iterative deepening over BFS, and give one disadvantage of iterative deepening as compared with BFS. Be concise and specific.
- (c) Explain with suitable example use of the Queue data structure in BFS search strategy.
- (d) Compare and contrast Best First search with Breadth First Search.
- (e) Let  $h_1(s)$  be an admissible  $A^*$  heuristic. Let  $h_2(s) = 2h_1(s)$ . State whether the following statements are True or False with justification.
  - (i)  $A^*$  tree search with  $h_2(s)$  is guaranteed to return the shortest path.
  - (ii)  $A^*$  tree search with  $h_2(s)$  is guaranteed to return a path which is at most twice as long as the optimal path.
- (f) Write down the Characteristics of an intelligent agents.
- (g) Explain in your own words the terms of constraint satisfaction problem with suitable example.

2. Attempt any Two parts of the following:

2\*5=10

(a) Consider a formula:

 $\alpha: (\forall x)(P(x) \rightarrow Q(f(x), c))$  and the following interpretation: $D: \{1, 2\}; c=1; F(1)=2; f(2)=1$  $I[P(1)]=F, I[P(2)]=T$  $I[Q(1, 1)]=T, I[Q(1, 2)]=T$  $I[Q(2, 1)]=F, I[Q(2, 2)]=T$ 

Find the truth value of

 $\alpha: (\forall x)(P(x) \rightarrow Q(f(x), c))$



- (b) Explain why depth-first search is used in the search tree for Constraint Satisfaction Problems. Compare it with breath-first search.
- (c) Explain Goal Stack Planning with example in brief.

3. Attempt any Two parts of the following:

2\*5=10

- (a) What do you mean by Planning Graph? How preconditions and effects are represented in the planning graph? Explain with suitable example.
- (b) Examine the working of bidirectional search.
  - (i) Would bidirectional state-space search be a good idea for planning?
  - (ii) What about bidirectional search in the space of partial-order plans?
  - (iii) Devise a version of partial-order planning in which an action can be added to a plan if its preconditions can be achieved by the effects of actions already in the plan. Explain how to deal with conflicts and ordering constraints. Is the algorithm essentially identical to forward state-space search?
- (c) Draw a semantic network representing the following knowledge:  
 Every vehicle is a physical object. Every car is a vehicle. Every car has four wheels. Electrical system is a part of car. Battery is a part of electrical system. Pollution system is a part of every vehicle. Vehicle is used in transportation. Swift is a car.

4. Attempt any Two parts of the following:

2\*5=10

- (a) Write the steps involved in Machine Learning. You are further required to describe any one step with suitable example.
- (b) A dealer has a warehouse that stores a variety of fruits and vegetables. When fruit is brought to the warehouse, various types of fruit may be mixed together. The dealer wants a model that will sort the fruit according to type. Justify with reasons how machine learning model is efficient compared to feature-based classification technique.
- (c) Consider the following data of table:

Day	Weather	Temperature	Humidity	Wind	Play?
1	Sunny	Hot	High	Weak	No
2	Cloudy	Hot	High	Weak	Yes
3	Sunny	Mild	Normal	Strong	Yes
4	Cloudy	Mild	High	Strong	Yes
5	Rainy	Mild	High	Strong	No
6	Rainy	Cool	Normal	Strong	No
7	Rainy	Mild	High	Weak	Yes
8	Sunny	Hot	High	Strong	No
9	Cloudy	Hot	Normal	Weak	Yes
10	Rainy	Mild	High	Strong	No

You are required to draw a decision tree for the above data table.

5. Attempt any Two parts of the following:

2\*5=10

- Explain the working of Reinforcement Learning with its components and diagram.
- What is a regular expression and what makes it so important?  
Explain with suitable real-life example.
- Consider the following grammar:

- $S \rightarrow NP VP$
- $VP \rightarrow VERB$
- $VP \rightarrow VERB NP$
- $NP \rightarrow NAME$
- $NP \rightarrow PREP ART NOUN$
- $NP \rightarrow ART NOUN$

Define an appropriate lexicon and construct a trace of the pure top-down parse tree of the following sentence:

-John ate the carrot.

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Subject Code BIT-35

Roll No.

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B. Tech.

(SEM - VI) EVEN SEMESTER

MAJOR EXAMINATION 2021-22

Network Security & Cryptography

Time: 3 Hrs.

Max. Marks: 50

Note: Attempt all questions. Each question carries equal marks.

Q 1. Attempt any five parts of the following.

5×2 = 10

- (a) What is the Masquerade and Replay attacks ? Give one example of both.
- (b) What is Digital Envelope? In what manner Digital Envelope is better than Digital Signature.
- (c) Describe the working of Cipher Feedback (CFB) mode encryption process with a suitable diagram.
- (d) Implement the Euclidean Algorithm to obtain gcd (53947, 64873).
- (e) Describe Fermat's Theorem with a suitable example.
- (f) List the various steps of Diffie-Hellman Key Exchange Algorithm.  
Alice and Bob want to establish a secret key using the Diffie-Hellman Key Exchange protocol. Assuming the values as  $n = 11$ ,  $g = 5$ ,  $x = 2$  and  $y = 3$ , find out the values of A, B and the secret key (K1 or K2).
- (g) Describe Steganography along with its advantages and disadvantages.

Q 2. Attempt any two parts of the following.

2×5 = 10

- (a) What is the significance of Message Digest in Cryptography? Describe the working principle of SHA-1 with a suitable diagram.
- (b) Illustrate the various steps involved in complete operation of Hash-based Message Authentication Code (HMAC) with a suitable diagram.
- (e) What is Digital Signature? How can RSA be used for performing Digital Signature? Explain with a suitable diagram.



Q 3. Attempt any two parts of the following.

2×5 = 10

- (a) What is the concept behind Message Authentication Code (MAC)? Describe the Birthday attacks in detail.
- (b) Explain the sequence of steps involved in the message generation and reception in Pretty Good Privacy (PGP) with block diagrams.
- (c) What is the significance of Kerberos in authentication? Describe the working of Kerberos with a suitable diagram.

$$a^b = 1 \pmod{m}$$
$$a^{b-1} = 1 \pmod{m}$$
$$a \cdot a^{b-1} = 1 \pmod{m}$$
$$a = 1 \pmod{m}$$

Q 4. Attempt any two parts of the following.

2×5 = 10

- (a) What is IP Security? Describe the Authentication Header (AH) and Encapsulating Security Payload (ESP) in brief.
- (b) Describe the Internet Key Exchange (IKE) Protocol and Security Association (SA) in detail.
- (c) What are Intruders? Describe the various types of Intruders.

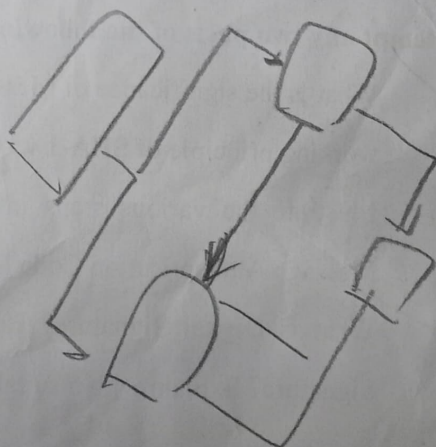
$$a^b = 1 \pmod{m}$$
$$a^{b-1} = 1 \pmod{m}$$
$$a \cdot a^{b-1} = 1 \pmod{m}$$
$$a = 1 \pmod{m}$$

Q 5. Attempt any two parts of the following.

2×5 = 10

- (a) Explain the sequence of steps used in Secure Socket Layer Handshake Protocol for establishing a new session. Draw a diagram which shows the action of Handshake Protocol.
- (b) Illustrate the working principles of Secure Electronic Transaction (SET) and draw a SET model for a typical purchase transaction and explain its working in detail.
- (c) Compare Packet filter and Application-Level Gateways. Explain the various principles of Firewall Design. List the limitations of Firewall also.

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B Tech (IT), 6<sup>th</sup> Sem.

Major Examination, 2021-22

Wireless Sensor Network &amp; IOT

Time: 3 hrs

Marks: 50

Note: Attempt all questions. Each question carries equal marks.

Q1. Attempt any 5 parts of the following.

- (a) Differentiate between Physical and Logical Design of IoT. 2
- (b) Explain NFV in brief. How is it related with COTS? 2
- (c) What is M2M communication? Differentiate between IoT and M2M. 2
- (d) Explain the terms IIoT, CIIoT, SIIoT and IIoH. 2
- (e) Explain the basic architecture of SDN. Also discuss the benefits of SDN. 2
- (f) How SDN is related with IoT? Draw a neat diagram to justify your answer. 2
- (g) What are different IoT enabling technologies? How do they help any IOT? 2

Q2. Attempt any 2 parts of the following.

- (a) How do we measure performance of any IoT model? Explain any ten performance metrics to measure the performance of such IoT schemes. 5
- (b) Explain the various steps involved in designing any IoT application. Write down the name of few dataset sources available in the public domain for such IoT projects. 5
- (c) Provide a discussion on the following IoT applications by mentioning any existing issue and describing the technique to solve that issue: 5
  - (i) Smart Lighting System
  - (ii) Smart Agriculture System

Q3. Attempt any 2 parts of the following.

- (a) Write down the name of some IoT simulation tools. Which softwares would you require to develop an IoT application viz., Secure Vehicular IoT? Justify your answer by providing suitable reasons. What should be your approach to solve this problem? 5



GEAR

(b) How can we integrate machine learning, deep learning, cloud computing, block chain and natural language processing techniques for creating an IOT application viz., Secure Healthcare IOT? 5

(c) Suppose that you are assigned a job to devise a model for any IOT application viz., Smart Forest Fire Detection System. What will be your approach before and after creating your design to solve this problem? 5

Q4. Attempt any 2 parts of the following.

(a) Give a taxonomy on various kinds of routing protocols of the wireless sensor networks. Explain each category with suitable examples. 5

(b) Explain following types of routing in brief: 5

i. Proactive routing

ii. Reactive routing

iii. QOS routing

(c) Describe following protocols of wireless sensor networks in short: 5

i. SPIN

ii. Directed Diffusion

Data centric

Q5. Attempt any 2 parts of the following.

(a) Which protocols have been developed to make an energy efficient sensor network? Explain any two such protocols in brief. 5

(b) What is the significance of the location based protocols of wireless sensor networks? Describe GEAR protocol in short. 5

(c) Briefly discuss following protocols of wireless sensor networks: 5

i. LEACH

ii. PEGASIS

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B Tech (IT), 6<sup>th</sup> Sem.  
Major Examination 2021-22  
**Machine Learning**

Time: 3hrs

Marks: 50

*Note: Attempt all questions. Each question carries equal marks.*

**Q.1 Attempt any Five parts of the following.**

- (a) Give a taxonomy of different types of Machine Learning Techniques? 2
- (b) What is overfitting? How can we avoid it? 2
- (c) What is Reinforcement Learning? Where do we use it? 2
- (d) Differentiate between Supervised and Unsupervised Machine Learning? 2
- (e) What is Bias and Variance in a Machine Learning Model? 2
- (f) What is specific and general hypothesis in the find S algorithm? 2
- (g) What do you mean by perceptron in neural network? 2

**Q.2 Attempt any Two parts of the following.**

- (a) From the given training data, form clusters using K-Means clustering algorithm where  $K=2$ . 5

S No.	Height	Weight
1.	185	72
2.	170	56
3.	168	60
4.	179	68
5.	182	72
6.	188	77
7.	180	71
8.	180	70
9.	183	84
10.	180	88

- (b) Discuss the types of hierarchical clustering and construct a dendrogram from the following table of distance matrix by using a single linkage approach. 5

	1	2	3	4	5
1	0				
2	9	0			
3	3	7	0		
4	6	5	9	0	
5	11	10	2	8	0

- (c) Discuss the K nearest neighbor algorithm with an example. Consider the data set of words in two languages given as below: 5

Word	Languages
piano	English
Cat	English
kepto	Vinglish
shaito	Vinglish

Suppose that you have to build a nearest neighbors classifier that will predict which languages a word belongs to. Represent each word using the features viz., Length of the word, Number of consonants in the word, and Whether it ends with the letter 'o' (1 if it does, 0 if it doesn't).

For a distance function, use the Manhattan distance:

$$d(a,b) = \sum_{i=1}^n |a_i - b_i| \text{ where } a, b \in \mathbb{R}^n$$

With  $k=1$ , predict the language for the word 'Keto'.

**Q.3 Attempt any Two parts of the following.**

- (a) Explain the decision tree algorithm and construct a decision tree using the following data set: 5

Age	Competition	Type	Profit
Old	Yes	software	Down
Old	No	software	Down
Old	No	hardware	Down
mid	Yes	software	Down
mid	Yes	hardware	Down
mid	No	hardware	Up
mid	No	software	Up
new	Yes	software	Up
new	No	hardware	Up
new	No	software	Up



(b) Discuss the role of the silhouette coefficient in Machine Learning. What do you mean by cohesion and separation ? 5

(c) Discuss k dimension tree with a suitable example. 5

Q.4 Attempt any Two parts of the following.

(a) Discuss the Utility function with an example? Find the marginal utility from the following dataset when pizza consumption goes from 2 to 3. 5

Pizza	Utiles
0	0
1	10
2	16
3	20
4	18
5	10

(b) Explain the following terms of rule models and discuss their significance using suitable examples: 5

i. Learning ordered rule list

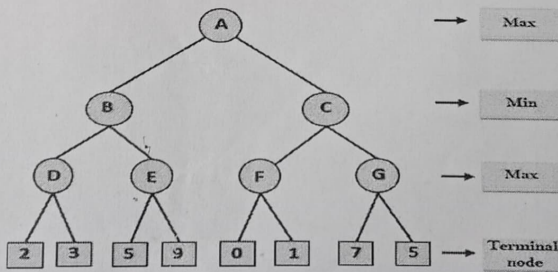
ii. Learning unordered rule list

(c) Discuss the descriptive rule learning and the first order rule learning with suitable examples. 5

Q.5 Attempt any Two parts of the following.

(a) Write in short on Adaptive Dynamic Programming. Where is it used? What is the significance of this programming? 5

(b) Discuss alpha-beta pruning. Solve the following example of two-player search tree by applying alpha beta pruning: 5



(c) Explain the following terms in brief:

i. Active reinforcement learning

ii. Passive reinforcement learning

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