Duration: 3hrs **Max Marks:80**

N.B. : (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

Q1 Attempt any **FOUR** from the following [20]

A Explain any five business applications of Machine learning.

B What is dimensionality reduction? Explain how it can be utilized for classification and clustering task in Machine learning.

C Explain performance evaluation metrics for binary classification with suitable example.

D Explain Gini index along with an example.

E Explain the concept of k fold cross validation.

Q2 A Write a short note on issues in Machine Learning. [10]

B Compare Bagging and Boosting with reference to ensemble learning. Explain how these methods help to improve the performance of the machine learning model. [10]

Q3 A Consider the example below where the mass, y (grams), of a chemical is related to the time, x (seconds), for which the chemical reaction has been taking place according to the table. Find the equation of the regression line. Also explain performance evaluation measures for regression. [10]

Time, x (seconds)	**5**	**7**	**12**	**16**	**20**
Mass, y (grams)	**40**	**120**	**180**	**210**	**240**

B What is Density based clustering? Explain the steps used for clustering task using Density-Based Spatial Clustering of Applications with Noise (DBSCAN) algorithm. [10]

Q4 A Explain Clustering with minimal spanning tree along with example. [10]

B Consider the dataset given below with 3 features Color, Wig, Num. Ears and one output variable Emotion [10]

Color	**G**	**G**	**G**	**B**	**B**	**R**	**R**	**R**	**R**
Wig	**Y**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**Y**
Num. Ears	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**3**
Emotion	**S**	**S**	**S**	**S**	**H**	**H**	**H**	**H**	**H**

i) Find root node of decision tree using GINI index

ii) Explain techniques can be used to handle over fitting in decision trees?

Q5 A Consider the use case of Email spam detection. Identify and explain the suitable machine learning technique for this task. [10]

B Explain the Dimensionality reduction technique Linear Discriminant Analysis and its real-world applications. [10]

Q6 A Define following terminologies with reference to Support vector machine: [10]
Hyper plane, Support Vectors, Hard Margin, Soft Margin, Kernel

B Explain Ensemble learning algorithm Random Forest and its use cases in real world applications. [10]

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Time: 03 Hours **Marks: 80**

Note: 1. Question 1 is compulsory

2. Answer any three out of the remaining five questions.

3. Assume any suitable data wherever required and justify the same.

Q1 a) Explain how big data problems are handled by Hadoop system. [5]

b) Mention four characteristics of big data and explain in detail. [5]

c) List and explain the core business drivers behind the NoSQL movement. [5]

d) Explain the concept of bloom filter with an example. [5]

Q2 a) What is graph store? Give an example where a graph store can be used to effectively solve a particular business problem. [10]

b) Write a map reduce pseudo code for word count problem. Illustrate with an example showing all the steps. [10]

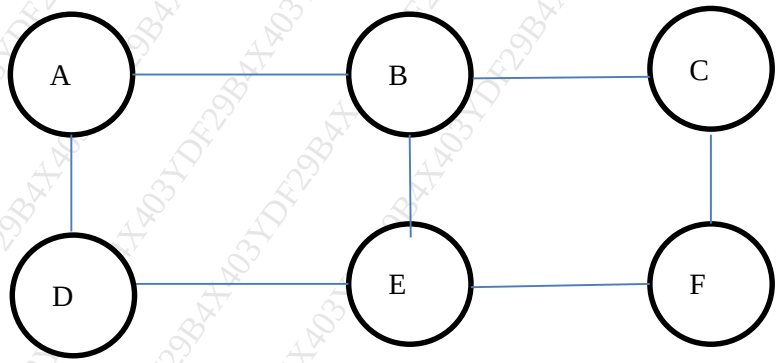
Q3 a) Suppose the stream is S = {4, 2, 5 ,9, 1, 6, 3, 7}. Let hash functions h(x) = 3x + 7mod 32 for some a and b, treat result as a 5-bit binary integer. Show how the Flajolet- Martin algorithm will estimate the number of distinct elements in this stream. [10]

b) Describe applications of data visualization. [10]

Q4 a) Explain selection and projection relational algebraic operation using MapReduce. [10]

b) Explain DGIM algorithm for counting ones in a stream with example. [10]

Q5 a) Determine communities for the given social network graph using Girvan- Newman algorithm. [10]



b) Consider the following data frame given below: [10]

course	id	class	marks
1	11	1	56
2	12	2	75
3	13	1	48
4	14	2	69
5	15	1	84
6	16	2	53

i. Create a subset of course less than 5 by using [ ] brackets and demonstrate the output.

ii. Create a subset where the course column is less than 4 or the class equals to 1 by using subset () function and demonstrate the output.

Q6 a) i. Write a script to create a dataset named data1 in R containing the following text. [10]

Text: 2, 3, 4, 5, 6.7, 7, 8.1, 9

ii. Explain the various functions provided by R to combine different sets of data.

b) Describe collaborative filtering in recommendation system. [10]

Duration: 3hrs **[Max Marks: 80]**

N.B.: (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required, and state it clearly.

Q1a) Explain the applications of Natural Language processing. **5M**

Q1b) Illustrate the concept of tokenization and stemming in Natural Language processing. **5M**

Q1c) Discuss the challenges in part of speech tagging` . **5M**

Q1d) Describe the semantic analysis in Natural Language processing. **5M**

Q2a) Explain inflectional and derivational morphology with an example **10M**

Q2b) Illustrate the working of Porter stemmer algorithm **10M**

Q3a) Explain hidden markov model for POS based tagging. **10M**

Q3b) Demonstrate the concept of conditional Random field in NLP **10M**

Q4a) Explain the Lesk algorithm for Word Sense Disambiguation. **10M**

Q4b) Demonstrate lexical semantic analysis using an example **10M**

Q5a) Illustrate the reference phenomena for solving the pronoun problem **10M**

Q5b) Explain Anaphora Resolution using Hobbs and Cantering Algorithm **10M**

Q6a) Demonstrate the working of machine translation systems **10M**

Q6b) Explain the Information retrieval system **10M**

(3 Hours)

(Total Marks: 80)

N.B.: 1. Question No. 1 is compulsory.

2. Answer any three out of the remaining questions.

3. Assume suitable data if necessary.

4. Figures to the right indicate full marks.

Q1. Attempt the following (any 4): (20)

a. Explain Gas and Ethers in detail.

b. What is the fundamental difference between a hot wallet and a cold wallet in the context of blockchain and cryptocurrency storage?

c. Explain the concept of an orphaned block.

d. Describe how solidity supports multiple inheritance with an example.

e. Compare Bitcoin and Ethereum.

Q2. Attempt the following:

a. Differentiate between public, private and consortium blockchain. (10)

b. Differentiate between PoW, PoS, PoB & PoET. (10)

Q3. Attempt the following:

a. Explain Merkle Tree with the help of an example. (10)

b. What is mining difficulty and how is it calculated in a proof-of-work? Explain with an example. (10)

Q4. Attempt the following:

a. Write and elaborate a code in solidity to explain visibility and activity qualifiers. (10)

b. Explain view function and pure function in solidity with suitable examples. (10)

Q5. Attempt the following:

a. Explain state machine replication with suitable example. (10)

b. Explain RAFT consensus algorithm with a suitable example. (10)

Q6. Write short notes on (any 2): (20)

a. Role of smart contracts in decentralized finance (DeFi)

b. Ripple

c. Ethereum Virtual Machine (EVM)

d. Mining pool and its methods

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(3 Hours) **[Total Marks :80]**

Notes:
1. **Question No 1** is **compulsory.**
2. Answer **any 3** from remaining questions.
3. **Illustrate** you answers with **neat sketches** wherever necessary.
4. Write proper **Question** and **sub question numbers** as assigned in this question paper.

Q.1	Answer any four questions:	**(20)**
a)	Justify the significance of studying Disaster Management, highlighting its role in enhancing resilience, minimizing risks, and promoting sustainable development.	**5**
b)	Define and differentiate between Risk and Vulnerability in the context of disaster management.	**5**
c)	Provide an overview of various types of Manmade disasters, elucidating their causes, characteristics, and impacts.	**5**
d)	Analyze the enduring impacts of disasters on affected communities, infrastructure, and socio-economic systems.	**5**
e)	Discuss Climate change, focusing on its underlying causes, ecological repercussions, and implications for disaster risk management.	**5**
f)	Define Bioshield and explore its utility in disaster mitigation, particularly in addressing specific hazards such as floods, landslides, and coastal erosion.	**5**
Q.2	a) Explore the scope and responsibilities of the NIDM in disaster preparedness, training, research, and policy formulation	**10**
	b) Describe the Search and Rescue (SAR) procedure in disaster response, supported by a case study illustrating its implementation and effectiveness.	**10**
Q.3	a) Investigate the applications of GIS in disaster management, highlighting its role in spatial analysis, risk assessment, and decision-making.	**10**
	b) Assess the contributions of various NGOs in Disaster Management, outlining their roles in emergency response, community engagement, and capacity-building initiatives. Additionally, list major NGOs operating globally in this field.	**10**
Q.4	a) Examine the multifaceted components of Disaster Management, including preparedness, response, recovery, and mitigation strategies.	**10**
	b) Classify different types of droughts and outline structural mitigation measures suitable for drought-prone regions.	**10**

Q.5 a) Evaluate various fundraising mechanisms for disaster management, considering their effectiveness, sustainability, and ethical implications. **10**

b) Define Capacity Development and illustrate its application through a case study of Community-Based Disaster Management (CBDM), emphasizing community empowerment, resilience-building, and sustainable development. **10**

Q.6 a) Enumerate essential Do's and Don'ts for disaster preparedness and response, providing practical guidelines for individuals and communities to mitigate risks and ensure safety. **10**

b) Discuss the roles and functions of various government agencies in Disaster Management in India, emphasizing their coordination and collaboration efforts. **10**

Time: 3 hours **Marks: 80**

N.B.: 1) Question No.1 is compulsory.
2) Attempt any THREE questions out of remaining FIVE questions.
3) Figures to the right indicates full marks.
4) Assume suitable data if necessary.

Q1	**Attempt Any 4**	**20**
a	Explain about digital evidence.	
b	Explain different password cracking techniques.	
c	What are different Security Risks for Organizations?	
d	What is Cybercrime? Who are Cybercriminal? Explain.	
e	Explain about Credit card frauds in Mobile and Wireless Computing era.	
Q.2		
a	If a hacker creates a website similar to university website to cheat student. Identify attack and explain different types it. How to prevent from such attack.	**10**
b	Discuss steps involved in planning of cyberattacks by criminal.	**10**
Q.3		
a	Explain different types of Cybercrimes and how security will provide?	**10**
b	Explain why do we need cyber laws? Discuss about the challenges to Indian cyber laws	**10**
Q.4		
a	Explain Steps for SQL Injection attack. How to prevent SQL Injection attacks?	**10**
b	If an attacker creates heavy traffic on the college website so that it becomes inaccessible to the legitimate user. Which is this attack. Explain in details with it's types.	**10**
Q.5		
a	What are illegal activities observed in Cyber Cafes? What are safety and security measures while using the computer in Cyber Café?	**10**
b	What are basic security precautions to be taken to safeguard Laptops and Wireless devices? Explain?	**10**
Q.6	**Write short notes on any FOUR**	**20**
a	Salami attack	
b	HIPAA	
c	Mobile/Cell Phone attacks	
d	Cyberstalking and harassment	
e	SOX	
f	Buffer overflow attack	