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

(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.

1		Attempt any **four**	**[20]**
	a)	What are Feed Forward Neural Network?	
	b)	Explain Gradient Descent in Deep Learning.	
	c)	Explain the dropout method and it's advantages.	
	d)	What are Undercomplete Autoencoders?	
	e)	Explain Pooling operation in CNN.	
2	**a)**	What are the Three Classes of Deep Learning, explain each?	**[10]**
	b)	Explain the architecture of CNN with the help of a diagram.	**[10]**
3	**a)**	What are the different types of Gradient Descent methods, explain any three of them.	**[10]**
	b)	Explain main components of an Autoencoder and it's architecture.	**[10]**
4	**a)**	Explain LSTM model, how it overcomes the limitation of RNN.	**[10]**
	b)	What are the issues faced by Vanilla GAN models?	**[10]**
5	**a)**	What are L1 and L2 regularization methods?	**[10]**
	b)	Explain any three types of Autoencoders.	**[10]**
6	**a)**	What is the significance of Activation Functions in Neural Networks, explain different types Activation functions used in NN.	**[10]**
	b)	What are Generative Adversarial Networks, comment on it's 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 Write short notes on: **[20]**
a) Big Data and its characteristics
b) Distance measures for Big Data
c) The Map and Reduce Tasks
d) Bloom filter for stream data mining

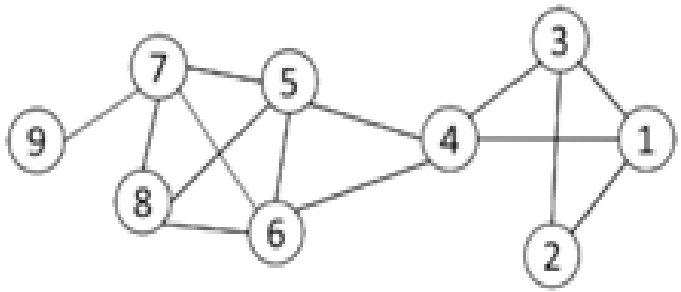
Q2 a) Explain HDFS architecture. **[10]**
b) Explain Column family store and Graph Store NoSQL architectural pattern with example. **[10]**

Q3 a) Write a Map reduce pseudo code to multiply two matrices. Illustrate with an example showing all the steps. **[10]**
b) Explain Issues in Data stream query processing **[10]**

Q4 a) List the main components of Map reduce execution pipeline. **[10]**
b) Explain DGIM algorithm. **[10]**

Q5 a) Explain Collaborative filtering system. How is it different from content based system . **[10]**

b) What is clique percolation method Write an algorithm on (CPM). **[10]**
Also show how the CPM finds clique for the following graph. Explain with steps.



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Q6 a) Explain PageRank algorithm. **[10]**
b) Explain CURE algorithm. **[10]**

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

N.B. 1. Question No. 1 is compulsory.
2. Attempt any three questions out of remaining five.
3. All questions carry equal marks
4. Assume Suitable data, if required and state it clearly.

1 Attempt any four: **20**

(a) How is fuzzy logic different from probability? Define fuzzy set?
(b) Define core support and boundary of a membership function?
(c) Define characteristics of a Neuro fuzzy system?
(d) Explain Maxnet neural network and its weight update formula?
(e) Explain the term associative memory network?

2 (a) For the given two fuzzy sets **10**

μ(x)	0	1	2	3	4
A	0.1	0.2	0.4	0.6	1
B	1	0.5	0.7	0.3	0

Find a) A U B b) A ∩ B
c) $\overline{A}$ U B d) $\overline{A \cap B}$
e) $\overline{B}$ U B

(b) Elaborate the architecture and algorithm of kohonen self-organizing map ? **10**

3 (a) Consider two relation **10**

$$\underline{A} = \begin{bmatrix} 0.8 & 1 & 0.5 & 0.1 & 0 & 0 \\ 0.1 & 0.2 & 0.3 & 0.2 & 1 & 0 \\ 0.1 & 0.6 & 0.2 & 0.7 & 1 & 0 \\ 0.1 & 0.4 & 0.5 & 0.8 & 1 & 0.9 \end{bmatrix}$$

$$\underline{B} = \begin{bmatrix} 0.1 & 0.2 & 0.5 & 0.9 & 0 \\ 0.1 & 0.2 & 0.5 & 0.9 & 0 \\ 0.1 & 0.2 & 0.5 & 0.9 & 0 \\ 0.3 & 0.4 & 0.7 & 0.6 & 1 \\ 0.3 & 0.4 & 0.7 & 0.6 & 1 \\ 0.3 & 0.4 & 0.7 & 0.1 & 1 \end{bmatrix}$$

Find a Relation A o B using
a) Max min Composition
b) Max Product Composition

(b) Explain the training algorithm Radial Basis Network? **10**

4 a) Two fuzzy sets P and Q are defined on x as follows **10**

μ(x)	X1	X2	X3	X4	X5
P	0.1	0.2	0.7	0.5	0.4
Q	0.9	0.6	0.3	0.2	0.8

Find the following :

(a) $P_{0.2}$, $Q_{0.3}$

(b) $(P \cup Q)_{0.6}$

(c) $(P \cup P)_{0.8}$

(d) $(P \cap Q)0.4$

b) Explain the bidirectional associative memory unit (BAM) network and compare Discrete and continuous BAM? **10**

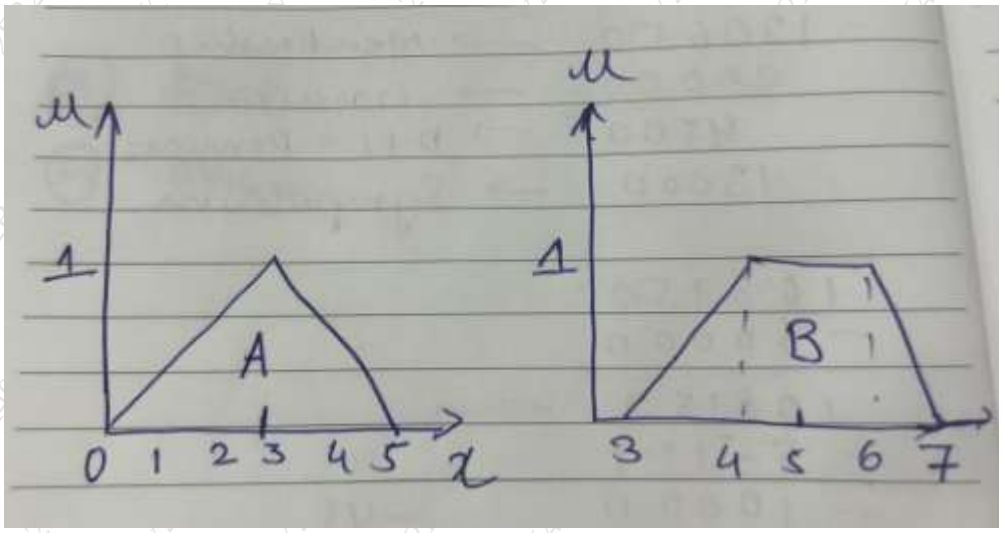
5 a) Compare : **10**

a) Soft computing and Hard Computing

b) Fuzzification and Defuzzificaion

b) Elaborate extreme learning machine model and its applications? **10**

6 a) Apply centre of sum, centre of gravity, weighted average sum and maxima method of defuzzification for the following set? **10**



b) Explain the Adaptive resonance theory algorithm with flow chart? **10**

Time: 3 hour **Total Marks: 80**

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

2. Attempt any three questions from remaining five questions

3. Assume suitable data if necessary and justify the assumptions

4. Figures to the right indicate full marks

Q1		**Answer the Following.**	20
	A	Compare derivational and inflectional morphology with suitable example	05
	B	Discuss various challenges in processing natural language.	05
	C	Discuss Information Retrieval vs Information Extraction in detail	05
	D	What do you mean by word sense disambiguation (WSD)? Explain machine learning based (Naive based) approach for WSD.	05
Q2	A	Write a note on Syntactic and Semantic Constraints on Coreference.	10
	B	Explain Porter's Stemming algorithm with example.	10
Q3	A	Explain with suitable example following relationships between word meanings: Homonymy, Polysemy, Synonymy, Antonymy, Hypernomy, Hyponomy, Meronomy.	10
	B	What is Natural language processing (NLP)? Discuss various stages involved in NLP process with suitable example.	10

[TURN OVER]

Q4 A Explain N-gram model with example. 10

B Explain in detail Stochastic (HMM) tagging. 10

Q5 A Consider following Training data: 10

<s> I am Sam </s>

<s> Sam I am </s>

<s> Sam I like </s>

<s> Sam I do like </s>

<s> do I like Sam </s>

Assume that we use a bigram language model based on the above training data. What is the most probable next word predicted by the model for the following word sequences?

(1) <s> Sam ...

(2) <s> Sam I do ...

(3) <s> Sam I am Sam ...

(4) <s> do I like ...

B What is parsing? Explain types of parsing in NLP. 10

Q6 Write Short Notes.(5 marks each) 20

a) Named Entity Recognition

b) Wordnet

c) Reference Resolution problem

d) Machine Translation

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

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

1.	(a)	List down examples of AI in healthcare sector?	**5**
	(b)	Explain what you understand by Electronic Health Record (EHR) and its benefits?	**5**
	(c)	Discuss the challenges of AI in healthcare?	**5**
	(d)	Explain the need of NLP in healthcare?	**5**
2.	(a)	Explain Evolutionary Algorithms and the general pseudo-code for an evolutionary algorithm.	**10**
	(b)	What is an Ensemble? Explain its techniques in detail.	**10**
3.	(a)	What is Association Rule Mining? Explain FP-Growth algorithm in detail.	**10**
	(b)	What are hyper parameters? Differentiate hyper parameters and model parameters.	**10**
4.	(a)	Explain various evaluation metrics used in healthcare.	**10**
	(b)	Explain in detail the key components of an NLP model.	**10**
5.	(a)	Explain Genetic Algorithm. How GA can be used for genetic research?	**10**
	(b)	Explain dimension reduction techniques in detail.	**10**
6.		Write a short note on	**20**
	(a)	Ethics while applying AI in healthcare domain.	
	(b)	Connected Medicines	

[Duration: 3Hours] **[Total Marks: 80]**

Note: 1. Question 1 is compulsory
2. Answer any three out of remaining questions
3. Assume suitable data where required

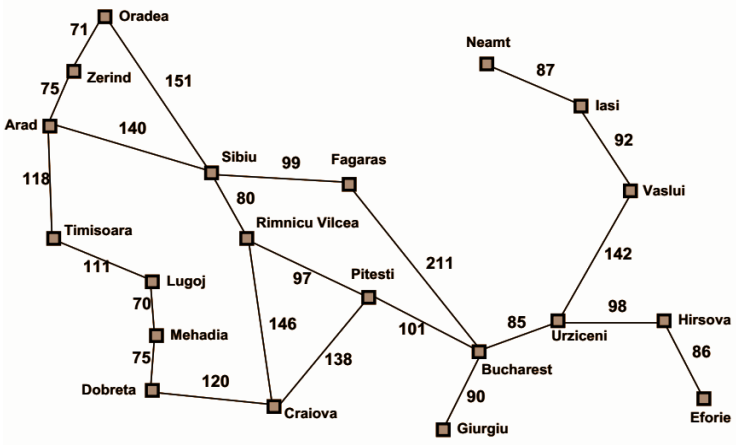
Q1	Solve **any 4**	
a)	Explain user's conceptual cognition	**5**
b)	Explain Usability Testing Process	**5**
c)	Demonstrate the benefits of virtual reality	**5**
d)	Define the Interface to the Virtual World-Input & output- Visual, Aural and Haptic Displays	**5**
e)	What Is An Interactive Digital Prototype	**5**
Q2		
a)	What are some popular UX testing methods and techniques?	**10**
b)	Discuss the various key Elements of Virtual Reality Experience	**10**
Q3		
a)	Explain 5 visual-design principles that impact UX	**10**
b)	What is Aural Representation and Haptic Representation in VR	**10**
Q4		
a)	Explain the Information Design and Data Visualization	**10**
b)	Why do UI/UX designers use Wireframes? What are the different types of wireframes?	**10**
Q5		
a)	Discuss in detail, why Understanding the Business Requirements/Goals is important.	**10**
b)	Consider a Healthcare Information Portal: In the context of a healthcare information portal, what methods and tools would you use to gather user feedback and identify usability issues? How would you prioritize these issues for improvement?	**10**
Q6	Write a short note on	**20**
a)	The benefits of creating a usability test plan	
b)	mental models	
c)	Prototyping and its types	
d)	Applications of Virtual Reality	

TIME : 3Hrs **Marks:80**

Note: 1. Question number 1 is **compulsory.**
2. Solve any **three** questions out of the remaining **five** questions
3. Assume suitable data if necessary.
4. Figure to the right indicates full marks.

Q.1 Solve any **Four** of the following.

(a) Consider the graph shown in figure below. Assume that the initial state is Arad and the goal state is Bucharest. Create a search tree to find a path from the initial state to the goal state using Greedy Best First Search. Generate the solution cost using the straight line distance mentioned in figure below. Is it an optimal solution? If not please write the optimal solution. **05**



Straight–line distance to Bucharest	
Arad	366
Bucharest	0
Craiova	160
Dobreta	242
Eforie	161
Fagaras	178
Giurgiu	77
Hirsova	151
Iasi	226
Lugoj	244
Mehadia	241
Neamt	234
Oradea	380
Pitesti	98
Rimnicu Vilcea	193
Sibiu	253
Timisoara	329
Urziceni	80
Vaslui	199
Zerind	374

(b) For a machine learning learning model to work efficiently there is always a tradeoff between bias and variance. Justify **05**

(c) Highlight the usefulness of the confusion matrix in machine learning, and also discuss various terms involved in it. **05**

(d) Demonstrate that impact of outliers on data set. **05**

(e) Illustrate how machine learning helps in enhancing operation of renewable energy systems. **05**

Q.2 **(a)** Describe McCulloch-Pitts Neuron Model and discuss its performance for the implementation of NOT, OR, and AND operations. **10**

(b) Explain reinforcement learning in detail along with the various elements involved in forming the concept. **10**

Q.3 **(a)** State the problem with the perceptron training rule. How gradient descent and delta rule addresses the problem. Derive the gradient descent rule. **10**

(b) The following data of current and voltage level for different electrical appliances was obtained by conducting a load test. Predict the likely value of voltage level for the appliance having current value of 27 A. **10**

Current (A)	Voltage (V)
17	140
21	189
24	210
28	240
14	130
16	100
19	135
22	166
15	130
18	170

Q.4 **(a)** Use agglomerative clustering and draw single link dendrogram for following distance matrix **10**

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

(b) Following dataset represents a substation working pattern for different atmospheric conditions where YES represents smooth working and NO represents that there is some fault developed in the substation. Using Naive Bayes classifier classify the substation working pattern for unseen circumstance {Sunny, Cool, High, Strong} **10**

Outlook	Temperature	Humidity	Windy	Pattern
Sunny	Hot	High	Weak	No
Sunny	Hot	High	Strong	No
Overcast	Hot	High	Weak	Yes
Rain	Mild	High	Weak	Yes
Rain	Cool	Normal	Weak	Yes
Rain	Cool	Normal	Strong	No
Overcast	Cool	Normal	Strong	Yes
Sunny	Mild	High	Weak	No
Sunny	Cool	Normal	Weak	Yes
Rain	Mild	Normal	Weak	Yes
Sunny	Mild	Normal	Strong	Yes
Overcast	Mild	High	Strong	Yes
Overcast	Hot	Normal	Weak	Yes
Rain	Mild	High	Strong	No

Q.5 **(a)** With the help of a suitable constrained power system model, discuss the challenges in static security assessment.. **10**

(b) Define SVM? Explain the following terms: hyperplane, separating hyperplane, margin, and support vectors with suitable examples. **10**

Q.6 Write short notes on any **Four**

(a) Compare informed and uninformed strategies **05**

(b) Data mining **05**

(c) Activation function and its types. **05**

(d) Deep learning **05**

(e) Load forecasting using machine learning **05**

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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	

(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**