18/5/2022(M)

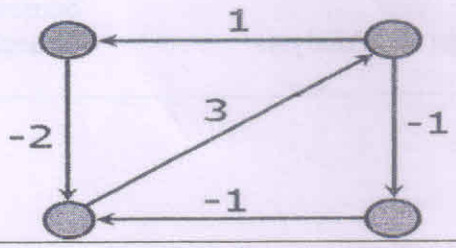
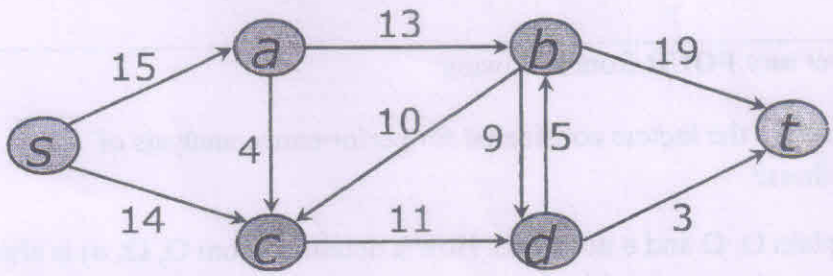
K. J. Somaiya College of Engineering, Mumbai-77
(Autonomous College Affiliated to University of Mumbai)

End Semester Examinations
May-June 2022

Max. Marks: 100 **Duration: 03hrs**
Class: LY Semester: VIII
Name of the Course: Advanced Algorithms: Design and Analysis Branch: Computer
Course Code: 2UCE813

Instructions:
(1) **All Questions are Compulsory**
(2) **Draw neat diagrams**
(3) **Assume suitable data if necessary**

Question No.		Marks
Q 1	Answer **any FOUR** from following 1. What are the factors considered for performance analysis of algorithms? 2. Explain O, Ω and ɵ notations. How a notation (from O, Ω, ɵ) is chosen for expressing an algorithm's time complexity ? 3. Solve by Master's theorem i) $T(n) = 3\ T(n/4) + n\log n$ ii) $T(n) = T(2n/3) + 1$ 4. Solve by substitution for finding time complexity $T(n) = 2\ t_{(n-1)} + n$ 5. What are NP-Complete and NP-HARD class of problems? Give 2 examples of each. 6. Compare algorithm complexity calculation methods: Master's theorem and recursion tree method. 7. "All NP class problems belong to NP-complete class. " Is this statement true? Justify your answer.	20
Q2 (a)	How do you justify choosing dynamic programming strategy for a given problem? Solve following Matrix chain multiplication problem showing all steps. A_1 (5x4), A_2 (4x6) , A_3 (6x2) , A_4 (2x7).	10

Q2 (b)	Write 02 key points of each algorithmic strategy: Divide & Conquer, Greedy strategy, Dynamic programming, backtracking, branch & bound.	10
Q3 (a)	Write Johnson's algorithm and Solve by Johnson's algorithm for shortest distance computation for the given graph. 	10
Q3 (b)	Find the maximum flow in the given graph from S to T by Ford-Fulkerson Algorithm  **OR** Explain Relabel to Front algorithm with an example.	10
Q4 (a)	Create a red black tree by inserting following sequence of numbers. Show all steps. **Numbers: 8, 18, 5, 15, 17, 25, 40, 80**	10
Q4 (b)	What is binomial heaps data structure? What are the uses of such data structure? **OR** Explain with appropriate examples basic operations on binomial heaps.	10
Q5	Write short notes on **any Four.** a) Randomized algorithms b) Las Vegas algorithm c) $\alpha - \beta$ pruning d) Facebook Graph search e) Growth of function in time complexity analysis	20

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Max. Marks: 100 **Duration: 3 Hrs.**
Class: LY Semester: VIII
Name of the Course: **Deep Learning** Branch: Computer
Course Code: **2UCE817**

Instructions:
(1) All Questions are Compulsory
(2) Draw neat diagrams
(3) Assume suitable data if necessary

Question No.		Marks
Q 1 (a)	1. Illustrate the concept of Stochastic Gradient Descent with small example. 2. Explain the terms Overfitting and Underfitting with suitable example.	10
Q 1 (b)	1. What is a capacity of the Model? 2. Define the terminologies Training set, Validation set and Testing set. Assume, I have 1000 training samples. Training and testing set is divided as 80:20. How many tuples will be there in validation set. State your assumptions.	10
Q2 (a)	**"Convolution Network employees Sparse connectivity"**. Discuss with neat diagram the concept of multidimensional Kernal of CNN and how it helps solving complex classification problem more efficiently. **OR** **"Pooling helps to make the representation become approximately invariant to small translations of the input in CNN network"**. Justify the statement with suitable examples and diagrams.	10
Q2 (b)	How CNN processes inputs with varying spatial extents? Describe the concept with supporting figures and examples. **OR** Describe different Kernals and functions used for pooling in CNN.	10
Q3 (a)	Discuss Challenges in Neural Network Optimization. Discuss the methodologies to overcome Local Minima Problem OR Discuss Challenges in Neural Network Optimization. Discuss the vanishing and exploding gradient problem in detail.	10

Q3 (b)	How parameter Learning Rate is used to fine-tune Stochastic Gradient Descent algorithm. Specify the algorithm first and then explain the significance of learning rate in the process. OR Comment on different Parameter Initialization Strategies and their effect on optimization.	10
Q4 (a)	Explain the working of LSTM in RNN with neat diagram. Describe each block and its working clearly. **OR** Bring out the differences and similarities between Recurrent net and Recursive net.	10
Q4 (b)	For sequential data, which deep learning network will you select? Give detailed explanation. **OR** Describe Gated RNN model and its use and applications	10
Q5 (a)	1. What is autoencoder? Differentiate compression and denoising autoencoders? 2. Describe applications of autoencoders.	10
Q5 (b)	1. Describe Adversarial Generative Machine 2. What is Probabilistic PCA? Give the basic notion of Probabilistic PCA and its use in deep learning.	10

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End Semester Examinations
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Max. Marks: 100 | **Duration: 3 hrs**
Class: LY Btech | Semester: VIII
Name of the Course: Speech & Language Processing | Branch: Computer Engineering
Course Code: 2UCE818

Instructions:
(1) **All Questions are Compulsory**
(2) **Draw neat diagrams**
(3) **Assume suitable data if necessary**

Question No.		Marks
Q 1 (a)	What is morphological analysis in NLP? Briefly explain the following morphology operations with proper examples: i. Compounding ii. Derivation iii. Inflection **OR** What is Stemming? Explain Porter's stemmer algorithm in detail.	10
Q 1 (b)	Why NLP is hard? Explain any **five** reasons in short.	10
Q2 (a)	Explain in detail Noisy channel for real-word spell correction. **OR** Compute the minimum edit distance using dynamic programming between **'AWAY' & 'PRAY'**.	10
Q2 (b)	Consider the following training data: <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 a bigram language model based on the above training data. Answer following: i. Which of the following sentences is better, i.e., gets a higher probability with this model? <s> Sam I do I like </s> <s> Sam I am </s> <s> I do like Sam I am </s>	06 + 04

	ii. Consider again the same training data and the same bigram model. Compute the perplexity of sentence given below: <s> I do like Sam	
Q3 (a)	Below are the rules of a context free grammar: S → NP VP S → N VP NP → J N VP → V NP VP → V N N → teacher N → strikes N → kids J → teacher J → idle V → strikes V → idle What is CKY algorithm for parsing? Create and fill in (using dynamic programming) the CKY chart that parses the sentence **"Teacher strikes idle kids".** How many valid parses are there?	10
Q3 (b)	Explain the role of Context-Free Grammar (CFG) in NLP; explain top-down parsing with suitable example. **OR** What is Probabilistic Context-free grammars (PCFGs) in NLP; state its features and how to find the most likely parse in PCFGs.	10
Q4 (a)	Describe how Yarowsky's algorithm for word sense disambiguation works for the example texts. Illustrate each stage of the algorithm with an example. **OR** Write a note on Syntactic and Semantic Constraints on Coreference.	10
Q4 (b)	How to find word similarity in WordNet; explain any two methods in detail.	10
Q5	Write a short note on following: **(Any Four)** i. Zipf's Law ii. POS Tagging iii. NLP Applications (min five) iv. Distinguish between homonymy and polysemy v. Term Frequency Inverse Document Frequency (TFIDF) vi. Pointwise Mutual Information (PMI)	20

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End Semester Examinations
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Max. Marks: 100 | **Duration: 3 Hrs**
Class: LY. BTech | Semester: VIII
Name of the Course: Game Programming | Branch: Comp
Course Code: **2UCE812**

Instructions:
(1) All Questions are Compulsory
(2) Draw neat diagrams
(3) Assume suitable data if necessary

Question No.		Marks
Q 1 (a)	Explain the similarities and differences between Game Views for Human Player and Game Views for AI Agents.	10
Q 1 (b)	Explain the process of creating and initializing the actors in a game.	10
Q2 (a)	What are the smart code design practices that can be used for creating a good software design? Explain. OR How source code branching can be used to facilitate parallel development of software system?	10
Q2 (b)	What are the different ways of data sharing to facilitate communication between the components of the game?	10
Q3 (a)	Illustrate the use of resource cache for the improvement of game performance. OR Explain the different ways of organizing the main loop of the game.	10
Q3 (b)	Illustrate on the different steps that must be taken for a game to have a decent exit.	10
Q4 (a)	Explain the different components of Game Logic Layer. OR What is the significance of debugging? Explain the different windows that are used during the debugging process.	10
Q4 (b)	Explain the process of building a game on the following points: (i) Automated Build Scripts (ii) Normal Builds (iii) Milestone Builds	10
Q5 (a)	What are the different types of game data files? Explain their formats and storage requirements.	10
Q5 (b)	Write a short note on any one of the following: (i) Smart Pointers and Naked Pointers (ii) DirectX	10

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Max. Marks: 100 **Duration:** 3 Hrs.
Class: L.Y. B.Tech Semester: VIII
Name of the Course: IoT Security Branch: Comp
Course Code: 2UCE814

Instructions:
(1) All Questions are Compulsory
(2) Draw neat diagrams
(3) Assume suitable data if necessary

Question No.		Marks
Q 1 (a)	Any 02 1 what do mean by IoT ? 2 Application of IoT with example 3 Comment on security and trust on IoT	10
Q 1 (b)	Any 01 1 Explain the layered Architecture in IoT 2 Explain in detail Smart-X application with respected to privacy	10
Q2 (a)	In detail comment on Various point to be consider while deployment of IoT	10
	OR	
Q2 (b)	With suitable example explain the challenges for governance and security.	10
Q3 (a)	Any 02 1 Explain methods to be adopted to maintain privacy by design for deployment 2 Details of threat while developing modeling in IoT 3 Explain security protection while implementation in IoT	10
Q3 (b)	Explain in details of life cycle security controls for IoT devices with suitable example	10
Q4 (a)	Explain in detail data protection method in sensitivity area of IoT	10
Q4 (b)	What do you mean by trust and how trust based security is achieved in IoT	10
Q5	Write Short Notes On (Any 04) 1 Security guidance 2Audit framework for the organization's IoT 3 IoT vulnerabilities 4 IoT attacks in details 5 Authentication / authorization for deployment of IoT 6 comment IoT ~~frame~~ framework assessment	20

Q2(a) (OR part) Discuss the functional view specifications of IoT. 10.