

Reg No.: _____

Name: _____

0520MCA283122101
APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Third Semester MCA (2 Year) Degree Examination December 2021

Course Code: 20MCA283

Course Name: DEEP LEARNING

Max. Marks: 60

Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

Marks

- | | | |
|----|---|-----|
| 1 | Distinguish Soft Max and Sigmoid activation function. | (3) |
| 2 | Explain Mc Culloch Pitts Neuron. | (3) |
| 3 | Explain the role of Dropout in training neural network. | (3) |
| 4 | Discuss the importance of the validation curve in a neural network. | (3) |
| 5 | What is Max Pooling in CNN, and how does it work? | (3) |
| 6 | Describe the Alexnet architecture. | (3) |
| 7 | Explain the vanishing gradient problem. | (3) |
| 8 | Write short note on GRU. | (3) |
| 9 | What are auto encoders? | (3) |
| 10 | Explain the loss function cross entropy. | (3) |

PART B

Answer any one question from each module. Each question carries 6 marks.

Module I

- | | | |
|----|--|-----|
| 11 | a Explain the Perceptron model. | (3) |
| | b) Implement OR function using Perceptron model. | (3) |

OR

- | | | |
|----|--|-----|
| 12 | Illustrate the back propagation algorithm in a neural network. | (6) |
|----|--|-----|

Module II

- | | | |
|----|---|-----|
| 13 | Explain the role of batch normalization in training a neural network. | (6) |
|----|---|-----|

OR

- | | | |
|----|--|-----|
| 14 | Explain the ideas of Rank, Shape and Type with an example in the context of a Tensor data structure. | (6) |
|----|--|-----|

Module III

- 15 With a suitable numerical example, illustrate convolution operation. (6)

OR

- 16 Illustrate the working of Lenet. (6)

Module IV

- 17 Explain the working of truncated back propagation through time (6)

OR

- 18 With a diagram, explain the working of LSTM. (6)

Module V

- 19 Describe the concept of Auto Encoders. (6)

OR

- 20 Explain how a Generative Adversarial Network is trained? (6)

Reg No.: TUE20MCA2021

Name: Robin S

0520MCA203122101

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester MCA (2 Year) Degree Examination December 2021

Course Code: 20MCA203

Course Name: DESIGN & ANALYSIS OF ALGORITHMS

Max. Marks: 60

Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

Marks

- 1/ Differentiate space and time complexity. (3)
- 2/ Solve the following recurrence equation using iteration method. (3)
$$T(n) = 2T(n/2) + n$$
- 3/ Define the control abstraction of Greedy strategy. (3)
- 4 Explain the pseudocode of Bellman ford algorithm for finding the single shortest path. (3)
- 5/ Describe the working of Backtracking problem with a suitable example (3)
- 6/ Write a comparison-based sorting algorithm used by lower bound theory technique (3)
- 7/ Explain Clique problem with an example. (3)
- 8 Explain the Bipartite matching problem with an example. (3)
- 9/ Describe approximation ratio in approximation algorithm. (3)
- 10/ What are the two different types of Randomized algorithms? (3)

PART B

Answer any one question from each module. Each question carries 6 marks.

Module I

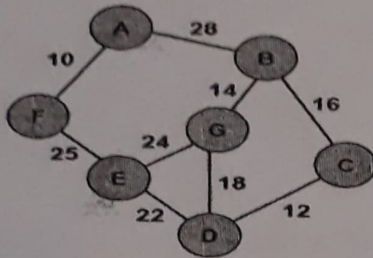
- 11 Describe different Asymptotic notations used for expressing time complexity of algorithms. (6)

OR

- 12/ Explain the Merge sort algorithm and give its worst-case analysis (6)

Module II

- 13/ Explain the different steps used to find the minimum cost spanning tree for the below graph using Prim's algorithm (6)



OR

- 14 Give the different steps for finding the shortest path in the all-pair shortest path algorithm with a suitable example. (6)

Module III

- 15 Discuss the sum of subsets algorithm with the following example (6)
 $A = \{1, 2, 5, 6, 8\}$, Find the all-possible combinations whose sum is equal to the given value $M = 9$

OR

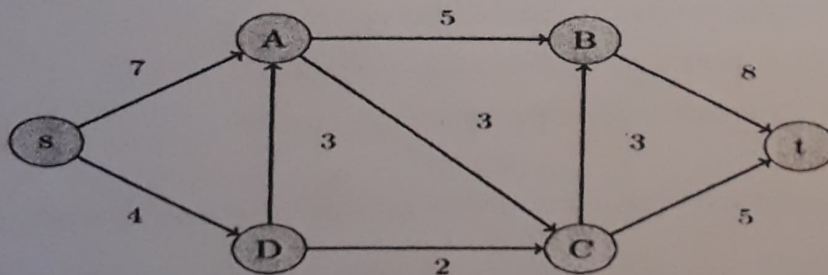
- 16 Explain the Branch and Bound algorithm used for solving a 8-puzzle problem (6)

Module IV

- 17 Discuss Complexity classes. Prove that Vector cover problem is NP Complete. (6)

OR

- 18 Compute the maximum flow in the below network using Ford- Fulkerson algorithm (6)

**Module V**

- 19 Explain the 2-Approximation algorithm for vertex cover and justify its approximation ratio (6)

OR

- 20 What is Randomised Quick sort? Explain its working and why is it used (6)

Reg No.: 11CE2019111111

Name: Shobin

0520MCA263122102

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester MCA (2 Year) Degree Examination December 2021

Course Code: 20MCA263

Course Name: CYBER SECURITY & CRYPTOGRAPHY

Max. Marks: 60

Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

Marks

- | | | |
|----|--|-----|
| 1 | Explicate the need of encryption in the cryptographic applications. | (3) |
| 2 | Write a note on Symmetric cipher model. | (3) |
| 3 | What is avalanche effect? | (3) |
| 4 | Represent how public key cryptosystem achieve Authentication and Secrecy using a neat diagram? | (3) |
| 5 | What are the requirements for a cryptographic hash functions? | (3) |
| 6 | Define Blind Signature. | (3) |
| 7 | Compare IPv4 and IPv6. | (3) |
| 8 | Summarize the services provided by SSL. | (3) |
| 9 | Which are the different forms of XSS and how to prevent it? | (3) |
| 10 | What is injection attack? | (3) |

PART B

Answer any one question from each module. Each question carries 6 marks.

Module I

- | | | |
|----|--------------------------------------|-----|
| 11 | Elucidate OSI Security Architecture. | (6) |
|----|--------------------------------------|-----|

OR

- | | | |
|----|--|-----|
| 12 | Illustrate, Substitution encryption techniques and its features. | (6) |
|----|--|-----|

Module II

- | | | |
|----|---|-----|
| 13 | Describe DES encryption algorithm with a neat figure. | (6) |
|----|---|-----|

OR

- | | | |
|----|--|-----|
| 14 | Explain the steps in Diffie-Hellman Key Exchange algorithm | (6) |
|----|--|-----|

Module III

~~15~~ Write short note on

(a) HMAC

(3)

(b) CMAC

(3)

OR

16 Discuss on

(a) Variations and applications for digital signature

(3)

(b) Digital Signature attacks.

(3)

Module IV

17 Describe S/MIME.

(6)

OR

~~18~~ Explain IP Security architecture.

(6)

Module V

~~19~~ Write a note on any four application Security Risks.

(6)

OR

~~20~~ Explain the attacks scenarios of any four web application security vulnerabilities.

(6)

Reg No.: TUC20MCA-2033

Name: Robin

0520MCA201122101

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester MCA (2 Year) Degree Examination December 2021

Course Code: 20MCA201

Course Name: DATA SCIENCE AND MACHINE LEARNING

Max. Marks: 60

Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

Marks

- | | | |
|----|--|-----|
| 1 | What is data science and why do we need data science? | (3) |
| 2 | Explain the different types of data. | (3) |
| 3 | Explain the differences between supervised and unsupervised machine learning algorithms. | (3) |
| 4 | What are the strengths and weaknesses of K-NN algorithm | (3) |
| 5 | How to simplify a decision tree by pruning. | (3) |
| 6 | Explain the Ordinary Least Square method in regression. | (3) |
| 7 | Define activation function. Give two examples. | (3) |
| 8 | What is maximum margin hyperplane? | (3) |
| 9 | What is K-fold cross validation? | (3) |
| 10 | Explain bootstrap sampling | (3) |

PART B

Answer any one question from each module. Each question carries 6 marks.

Module I

- 11 Explain the various processes for preparing a dataset to perform a data science task. (6)

OR

- 12 The tensile strength in megapascals for 15 samples of tin were determined and found to be: 34.61, 34.57, 34.40, 34.63, 34.63, 34.51, 34.49, 34.61, 34.52, 34.55, 34.58, 34.53, 34.44, 34.48 and 34.40. Calculate the mean and standard deviation from the mean for these 15 values, correct to 4 significant figures. (6)

Module II

- 13 Based on the survey conducted in an institution the students are classified based on the 2 attributes academic excellence and other achievements. Consider the data set given. Find the classification of a student with value of X is 5 and Y is 7 (6)

based on the data of trained samples using KNN algorithm. Choose $k = 3$

X [Academic Excellence]	Y [Activities]	Z [Classification]
8	6	Outstanding
5	6	Good
7	3	Good
6	9	Outstanding

OR

- 14 Consider a training data set consisting of the fauna of the world. Each unit has 3 features named "Swim", "Fly" and "Crawl". Let the possible values of these features be as follows: (6)

Swim - Fast, Slow, No

Fly - Long, Short, Rarely, No

Crawl - Yes, No

For simplicity, each unit is classified as "Animal", "Bird" or "Fish". Let the training data set be as in the table below. Use naive Bayes algorithm to classify a particular species if its features are (Slow, Rarely, No)

Sl. No.	Swim	Fly	Crawl	Class
1	Fast	No	No	Fish
2	Fast	No	Yes	Animal
3	Slow	No	No	Animal
4	Fast	No	No	Animal
5	No	Short	No	Bird
6	No	Short	No	Bird
7	No	Rarely	No	Animal
8	Slow	No	Yes	Animal
9	Slow	No	No	Fish
10	Slow	No	Yes	Fish

11	No	Long	No	Bird
12	Fast	No	No	Bird

Module III

(6)

15 Consider the following set of training examples:

Instance	Classification	a1	a2
1	+	T	T
2	+	T	T
3	-	T	F
4	+	F	F
5	-	F	T
6	-	F	T

- a) Find the entropy of this collection of training examples with respect to the target function "classification"? (3 marks) †
- b) Calculate the information gain of a2 relative to these training examples? (3 marks) 0

OR

- 16 How to estimate the parameters of a linear regression model ? (6)

Module IV

- 17 Discuss the basic idea behind the back propagation algorithm. (6)

OR

- 18 a) Define linearly separable dataset. Give an example each of a dataset that is linearly separable and of a dataset that is not linearly separable. (3 marks) (6)

- b) Define kernel function. Explain the kernel trick to construct a classifier for a dataset that is not linearly separable. (3 marks)

Module V

- 19 Suppose 10000 patients get tested for flu; out of them, 9000 are actually healthy and 1000 are actually sick. For the sick people, a test was positive for 620 and (6)

negative for 380. For the healthy people, the same test was positive for 180 and negative for 8820. Construct a confusion matrix for the data and compute the precision and recall for the data.

OR

20 Explain the concepts of bagging and boosting.

(6)
