Time: 2 Hours **[Total Marks: 50]**

N.B: (1) **All questions are compulsory.**
(2) Figures to the **right** indicate full marks.
(3) **Assume additional data if necessary** but state the same clearly.
(4) Symbols have their usual meanings and tables have their usual standard design unless stated otherwise.

Q.1	Attempt **any two** of the following	**(10)**
a)	Explain different types of Machine Learning Systems.	**05**
b)	What is overfitting? What are the possible solutions to reduce it?	**05**
c)	Explain the concept of the ROC Curve.	**05**
d)	Consider the classifier's prediction on a test set given below. True Positive (TP) = 60 True Negative (TN) = 15 False Positive (FP) = 15 False Negative (FN) = 10 Calculate Precision and Recall.	**05**
Q.2	Attempt **any two** of the following	**(10)**
a)	Explain the concept of Linear Regression	**05**
b)	What do you mean by Early Stopping?	**05**
c)	Compare and contrast different types of Gradient Descent algorithms.	**05**
d)	Write a note on Mini-Batch Gradient Descent.	**05**
Q.3	Attempt **any two** of the following	**(10)**
a)	What is soft margin classification?	**05**
b)	Briefly explain the working of SVM.	**05**
c)	Explain the CART Training Algorithm.	**05**
d)	What is a kernel trick? What are different kernel functions available for SVM classifiers?	**05**
Q.4	Attempt **any two** of the following	**(10)**
a)	Explain different types of data representations for Neural networks.	**05**
b)	What is Deep Learning?	**05**
c)	What is the Activation Function? Why does ANN need them?	**05**
d)	Explain the relationship between the network, layers, loss function, and optimizer.	**05**
Q.5	Attempt **any two** of the following	**(10)**
a)	Write a note on Naïve Bayes Classifier	**05**
b)	What is Lasso Regression?	**05**
c)	Explain how decision trees can be used for multiclass classification?	**05**
d)	What is TensorFlow? Why it is necessary?	**05**

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Time :2 Hours **Total Marks: 50**

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(4) Symbols have their usual meanings and tables have their usual standard design unless stated otherwise.

Q.1	Attempt <u>any two</u> of the following	(10)
a)	List and describe phases of NLP.	05
b)	Define smoothing. Give the different types of smoothing technique. Discuss any one of the techniques in detail.	05
c)	How does the noisy channel used for spelling correction?	05
d)	State different types of ambiguities with example.	05
Q.2	Attempt <u>any two</u> of the following	(10)
a)	Explain types of POS tagging.	05
b)	Discuss basic concept of tagset and lemmatization.	05
c)	Explain bottom-up parsing with parse tree construction.	05
d)	Explain the concept of Morphological parsing.	05
Q.3	Attempt <u>any two</u> of the following	(10)
a)	Explain SVD and LSA .	05
b)	Write a short note on: i. Word2vec ii. GloVe	05
c)	What are different approached to represent text to numbers? Explain them.	05
d)	Discuss the concept of word sense disambiguation.	05
Q.4	Attempt <u>any two</u> of the following	(10)
a)	Explain machine translation system.	05
b)	How is the speech recognition system used in NLP?	05
c)	Explain in brief applications of NLP in sentiment analysis.	05
d)	Explain how NLP is use in handling fraud and sms.	05
Q.5	Attempt <u>any two</u> of the following	(10)
a)	Explain in detail application of neural language model in NLP system development.	05
b)	Explain Hidden Markov Model to embed POS tags in inputted text.	05
c)	State the working of Tf-Idf.	05
d)	In short explain the BERT model in NLP.	05

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Time :1 Hour **Total Marks: 25**

N.B: **(1) <u>All questions are compulsory.</u>**
(2) Figures to the right indicate full marks.
(3) Assume additional data if necessary but state the same clearly.
(4) Symbols have their usual meanings and tables have their usual standard design unless stated otherwise.
(5) Use of scientific calculator is allowed.

Q.1	Attempt **<u>any two</u>** of the following	**(10)**
a)	Brief the application of simulation.	**05**
b)	What are the different types of system? Explain briefly.	**05**
c)	Explain the four phase of simulation model building.	**05**
d)	Explain the steady-state behavior of finite-population models and network of Queuing.	**05**

Q.2	Attempt **<u>any two</u>** of the following	**(10)**
a)	Let $m = 102 = 100$, $a = 19$, $c = 50$, and $X_0 = 63$, and generate a sequence 5 random integers using mixed congruential method.	**05**
b)	Explain the inverse transformation technique for generating random variate for exponential distribution with parameter λ.	**05**
c)	What are the tests to test randomness. Explain them.	**05**
d)	Write a note on Calibration and Validation of Models.	**05**

Q.3	Attempt **<u>any one</u>** of the following	**(05)**
a)	State the disadvantages of simulation.	**05**
b)	Brief the properties of random number.	**05**

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Time :1 Hours **Total Marks: 25**

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(2) Figures to the right indicate full marks.
(3) Assume additional data if necessary but state the same clearly.
(4) Symbols have their usual meanings and tables have their usual standarddesign unless stated otherwise.

Q.1	Attempt any two of the following	(10)
a)	Explain microcontroller and microprocessor in detail.	05
b)	What are the challenges in implementation of embedded system.	05
c)	Explain Wireless Sensor Network in detail?	05
d)	What is UART? How does it work?	05
Q.2	Attempt any two of the following	(10)
a)	Describe fundamental characteristics of IoT	05
b)	What are smart things? How do they communicate with gateway?	05
c)	Explain IoT gateway layered architecture.	05
d)	What are benefits of Edge computing?	05
Q.3	Attempt any one of the following	(05)
a)	Explain WSN protocol stack.	05
b)	Explain IoT protocol stack.	05

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