Seat No.: _____ Enrolment No._____

NATIONAL FORENSIC SCIENCES UNIVERSITY

Semester End Examination (April-May 2025)
M.Tech AIDS
Semester – II

Subject Code: CTMTAIDS SII P3 **Date: 28/04/2025**
Subject Name: Natural Language Processing
Time: 10:30 AM – 1:30 PM **Total Marks: 100**

Instructions:

1. **Write down each question on a separate page.**
2. **Attempt all questions.**
3. **Make suitable assumptions wherever necessary.**
4. **Figures to the right indicate full marks.**

			Marks
Q.1		**Attempt any three.**	
	(a)	What is regular expression? Explain various metacharacters. Explain any two functions of remodule.	**08**
	(b)	Describe the different types of Part-of-Speech (PoS) tags. Explain the challenges and ambiguities involved in PoS tagging.	**08**
	(c)	Explain various parsing techniques for context free grammar in detail.	**08**
	(d)	Define Language Modelling. Differentiate between Grammar-based Language Models and Statistical Language Models, highlighting their strengths and weaknesses.	**08**
Q.2		**Attempt any three**	
	(a)	List various techniques for detecting and correcting spelling errors and explain minimum edit distance technique in detail with example	**08**
	(b)	Describe the process of Tokenization in detail. Provide examples of different tokenization approaches.	**08**
	(c)	What is Chomsky Normal Form? What are the rules for CFG to CNF conversion? Explain CKY algorithm.	**08**
	(d)	Explain the Bag-of-Words (BoW) model and N-gram language models with examples illustrating their representation of text.	**08**
Q.3		**Attempt any three**	
	(a)	What are Hidden Markov Models (HMMs)? Explain how HMMs can be applied to Part-of-Speech tagging. Describe the Viterbi algorithm and its role in finding the most likely tag sequence.	**08**
	(b)	What is Dependency Grammar? Illustrate the dependency relations in a sentence using a dependency tree. Discuss the advantages of dependency parsing over constituency parsing.	**08**
	(c)	What is Shallow Parsing (Chunking)? Explain its purpose and how it differs from full parsing. Provide an example of chunking a sentence.	**08**

(d) What is Discourse Segmentation? Explain the challenges involved in segmenting a text into coherent discourse units. 08

Q.4 **Attempt any two**

(a) What is Anaphora Resolution? Explain the Hobbs algorithm for anaphora resolution with an example. 07

(b) Explain the concept of Syntactic Ambiguity. Discuss different types of syntactic ambiguity with examples and how parsing techniques attempt to resolve them. 07

(c) Explain the requirements for knowledge representation in NLP. Discuss the use of First-Order Logic to represent semantic meaning. 07

Q.5 **Attempt any two**

(a) Explain the concept of Thematic Roles (e.g., Agent, Patient, Instrument). How are they useful in semantic analysis? Provide examples. 07

(b) What are Word Senses? Discuss the problem of Word Sense Disambiguation (WSD) and its importance in NLP. 07

(c) Briefly discuss any three of the following NLP resources: Porter Stemmer, Lemmatizer, WordNet, or Brown Corpus. Explain their purpose and utility. 07

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