

Reg. No. :

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Question Paper Code: U7E02S

B.E./B.Tech. DEGREE EXAMINATION, NOV 2025

Seventh Semester

21UAD702 - NATURAL LANGUAGE PROCESSING

Artificial Intelligence & Data Science

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. What is Constituency Grammar in the context of NLP? CO1-U
2. Identify the lemmatization technique for the Given word "better", and mention the part of speech considered. CO2-App
3. Differentiate between the Penn Treebank and Universal POS tagsets. CO2-App
4. Define Viterbi decoding in the context of HMM-based POS tagging. CO2-App
5. Differentiate between Top-Down and Bottom-Up parsing. CO1-U
6. Apply transition-based dependency parser using shift-reduce transitions to parse: "John saw Mary." CO2-App
7. Differentiate between supervised and unsupervised methods for WSD. CO1-U
8. Apply WordNet to list different senses of the word "light." CO2-App
9. Explain the concept of equivalence classes in handling sparse data. CO1-U
10. Use Add-k smoothing to calculate the probability of the trigram "in the room" given $k = 0.5$ and appropriate counts. CO2-App

PART – B (5 x 16= 80 Marks)

11. (a) Describe the role of statistics in natural language processing. How are statistical methods useful in handling language data? CO1-U (16)
- Or
- (b) Describe in detail about Constituency and Dependency Grammar with illustrative parse trees. CO1-U (16)

12. (a) Apply Unigram, Bigram, and Trigram POS taggers in the same sentence. Illustrate their differences in tagging accuracy and assumptions. CO2-App (16)
- Or
- (b) Identify the rule-based POS tagging system by using regular expressions to the paragraph and explain its performance. CO2-App (16)
13. (a) Compare the parsing capabilities of NLTK, SpaCy, and Stanford CoreNLP and highlight their parsing strategies, tool-specific features. CO1-U (16)
- Or
- (b) Explain dependency parsing also compare transition-based and graph-based dependency parsing with examples. CO1-U (16)
14. (a) Apply Conceptual Density-based WSD to an example sentence containing the word “bat.” Walk through the semantic hierarchy to select the most appropriate sense. CO2-App (16)
- Or
- (b) Apply the Naive Bayes approach to supervised WSD with an example sentence and feature set. CO2-App (16)
15. (a) Briefly explain the role of smoothing techniques in N-gram models and compare Laplace, Add-k, backoff, and interpolation methods. CO1-U (16)
- Or
- (b) Explain in detail various statistical tests for word association such as t-test, chi-square test and likelihood ratio with examples. CO1-U (16)