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Question Paper Code: U5304

M.E. DEGREE EXAMINATION, APRIL / MAY 2025

Second Semester

Computer Science and Engineering

21PCS504- NATURAL LANGUAGE PROCESSING

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART – A (5 x 20 = 100 Marks)

1. (a) Explain the concepts of morphological parsing and part-of-speech tagging. Describe the challenges and techniques associated with each of these word-level analysis tasks. CO1- U (20)
Or
(b) Differentiate between grammar-based and statistical language models in NLP. Provide examples of where each type of model might be used in real-world applications. CO1- U (20)
2. (a) Construct a Context-Free Grammar (CFG) for this sentence "The dog chased the cat that ran up the tree." CO2- App (20)
ii) Perform constituency parsing using a parse tree.
iii) Explain how probabilistic parsing improves accuracy when dealing with ambiguous sentences.
Or
(b) Given the following dialogue between a customer and an automated chatbot, describe how discourse processing techniques could improve the chatbot's ability to handle follow-up questions and maintain context: CO2- App (20)
Customer: "What is the weather like today?"
Chatbot: "The weather is sunny with a high of 25°C."
Customer: "What about tomorrow?"

3. (a) Explain how unification-based parsing can be used to improve natural language understanding. CO1- U (20)
Or
(b) Discuss how computational semantics helps in natural language understanding. Provide examples of its applications. CO1- U (20)
4. (a) Explain the importance of alignment in Machine Translation and how IBM Models contribute to it. CO1- U (20)
Or
(b) Describe different approaches used in Named Entity Recognition (NER). Compare Rule-Based, Machine Learning, and Deep Learning methods. CO1- U (20)
5. (a) Develop a ranking algorithm for an information retrieval system used to search academic papers. How would you rank the documents based on the query, and what techniques would you use to ensure that the most relevant papers are ranked higher? CO2- App (20)
Or
(b) Implement a Markov Decision Process (MDP) for a customer support chatbot. How would you model the states, actions, and rewards in this system, and how would the chatbot adapt over time. CO2- App (20)