

Total No. of Questions : 8]

SEAT No. :

PE-2528

[Total No. of Pages : 3

[6583]-54

**T.E. (Artificial Intelligence & Data Science)
NATURAL LANGUAGE PROCESSING
(2019 Pattern) (Semester - VI) (317532 B) (Elective - II)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 and Q. 7 or Q.8.
- 2) Figures to the right side indicates full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Use of calculator is allowed.
- 5) Assume suitable data if necessary.

Q1) a) Explain the concept of partial parsing in the context of constituency parsing. How does partial parsing differ from full parsing, and what applications benefit from partial parsing techniques? [9]

b) Explain Combinatory Categorical Grammar. List and explain grammar rules for English. [9]

OR

Q2) a) Describe dependency parsing and the notion of dependency relations between words in a sentence. Compare and contrast dependency parsing with constituency parsing, highlighting their respective strengths and weaknesses. [9]

b) Write short note on : [9]
i) Context Free Grammar
ii) Partial Parsing
iii) Describe Chomsky's Normal Form (CNF)

Q3) a) Examine the challenges associated with thematic roles in semantic role labeling. Discuss how issues such as selection restrictions and decomposing predicates influence the accuracy of semantic role labeling systems. [8]

b) Define connotation frames and explain their significance in understanding the nuanced meaning of words and phrases. Discuss how connotation frames can be utilized in various natural language processing tasks, such as affect recognition and sentiment analysis. [9]

OR

P.T.O.

- Q4) a)** Define word senses and explain the importance of disambiguating word senses in natural language processing tasks. Discuss the challenges associated with word sense disambiguation (WSD) and how it relates to the ambiguity of language. [8]
- b)** Explore the use of lexicons for sentiment recognition in natural language processing. Discuss how sentiment lexicons are utilized to classify the sentiment of words and phrases in text data, highlighting their effectiveness and limitations. [9]

- Q5) a)** Describe the components and functionalities of a Question Answering (QA) system. How do QA systems process natural language questions, retrieve relevant information from textual sources, and generate concise answers? Discuss the challenges associated with QA systems. [9]
- b)** Explain the concept of Direct Machine Translation and its underlying principles. Discuss the advantages and disadvantages of this approach in comparison to other MT methods. [9]

OR

- Q6) a)** Explore Knowledge-Based Machine Translation systems and their reliance on domain-specific knowledge bases. How does knowledge-based MT differ from rule-based and statistical approaches? Discuss the role of semantic knowledge in improving translation. [9]
- b)** Describe the architecture and operation of Rule-Based Machine Translation systems. How do RBMT systems utilize linguistic rules and dictionaries to generate translations? Discuss the challenges associated with rule-based approaches. [9]
- Q7) a)** Explain the Vector Space Model (VSM) in Information Retrieval. How does VSM represent documents and queries as vectors in a high-dimensional space? Discuss the cosine similarity measure and its role in ranking documents for a given query. [8]
- b)** Discuss the ethical considerations and challenges associated with deploying NLP-based systems, such as bias in training data, privacy concerns, and the potential for misuse. How can developers mitigate these issues and ensure responsible use of NLP technologies in real-world applications? [9]

OR

- Q8)** a) Discuss the use of sequence labeling in Information Extraction tasks. What are the key sequence labeling techniques used for tasks such as Named Entity Recognition (NER) and Part-Of-Speech (POS) tagging? Provide examples to illustrate their applications. **[8]**
- b) Explain how NLTK (Natural Language Toolkit) facilitates text analysis and processing tasks in Python. Discuss the key features and functionalities provided by NLTK for tasks such as tokenization, stemming, lemmatization, and syntactic parsing. **[9]**

