Subject Code: KCS072

PAPER ID-310319

Roll No:

BTECH
(SEM VII) THEORY EXAMINATION 2023-24
NATURAL LANGUAGE PROCESSING

TIME: 3 HRS **M.MARKS: 100**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

Q no.	Question	Marks
a.	How has NLP evolved over time?	2
b.	Can you explain the challenges associated with language modeling in NLP?	2
c.	Discuss strategies for handling ambiguity in parsing.	2
d.	How Dynamic Programming is employed in parsing algorithms?	2
e.	Discuss the limitations of supervised approaches in handling WSD challenges.	2
f.	How do semantic attachments contribute to disambiguating word senses?	2
g.	Discuss the applications of filter bank methods in speech signal processing.	2
h.	How do filter banks contribute to speech analysis?	2
i.	Describe the role of Perceptual Linear Prediction.	2
j.	How does the process of feature extraction contribute to understanding speech patterns?	2

SECTION B

2. Attempt any *three* of the following: 10 x 3= 30

a.	Provide an overview of Hidden Markov Models and Maximum Entropy models in word-level analysis. How do these models contribute to language processing tasks, and what are their strengths and weaknesses?	10
b.	Discuss Probabilistic CYK parsing and Probabilistic Lexicalized CFGs. How do these probabilistic parsing techniques improve upon traditional parsing algorithms, and what are their applications in natural language processing?	10
c.	Compare and contrast first-order logic with propositional logic. Discuss the expressive power of first-order logic and its significance in representing complex relationships.	10
d.	Analyze the challenges associated with accurately representing and classifying speech sounds. How do these challenges impact the development of speech recognition systems?	10
e.	Explain the significance of Likelihood Distortions in speech analysis and how they contribute to the assessment of speech models. How does the process of feature extraction contribute to understanding speech patterns?	10

SECTION C

3. Attempt any *one* part of the following: 10 x 1= 10

a.	Explain the concept of Minimum Edit Distance and its significance in the context of word-level analysis. Provide examples to illustrate its application.	10

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b.	What are N-grams, and how are unsmoothed N-grams used in language modeling? Discuss the challenges associated with evaluating N-grams and the role of smoothing techniques.	10

4. Attempt any *one* part of the following: 10 x 1= 10

a.	Compare and contrast Dependency Grammar with Phrase Structure Grammar. Highlight the key differences in representing syntactic relationships between words in these two grammatical frameworks.	10
b.	Delve into the concept of Shallow Parsing and its applications. How does Shallow Parsing differ from deep parsing, and what are the advantages and limitations of each approach?	10

5. Attempt any *one* part of the following: 10 x 1= 10

a.	Examine how thesaurus-based and distributional methods contribute to measuring word similarity. Discuss the strengths and weaknesses of each approach and their applicability in different contexts.	10
b.	Compare and contrast WSD techniques using dictionaries and thesauri. How do these lexical resources contribute to disambiguating word senses, and what are the considerations when choosing between them?	10

6. Attempt any *one* part of the following: 10 x 1= 10

a.	Explore the acoustic phonetics aspect of speech production. How do the acoustics of speech production contribute to the perceptual differences between various speech sounds?	10
b.	Explore the Linear Predictive Coding method in speech processing. How does LPC model speech signals, and what are its advantages in speech analysis and synthesis?	10

7. Attempt any *one* part of the following: 10 x 1= 10

a.	Elaborate on the concept of time alignment in speech analysis, focusing on the techniques of Dynamic Time Warping and the representation of multiple time-alignment paths.	10
b.	Explain the process of evaluating Hidden Markov Models, including the concept of the Optimal State Sequence and the role of Viterbi Search in determining the most likely sequence of states.	10