PAPER ID-310305

Subject Code: KAI073

Roll No: | | | | | | | | | | | | | |

BTECH

(SEM VII) THEORY EXAMINATION 2023-24

TEXT ANALYTICS AND NATURAL LANGUGAE 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.	What are the key challenges in processing human language?	2
b.	How do these linguistic principles form the foundation of NLP and text analytics?	2
c.	How does MaxEnt address some of the limitations of traditional approaches?	2
d.	How does transformation-based tagging differ from other tagging approaches?	2
e.	Explore the concept of semantic attachments in natural language processing.	2
f.	How does the syntax of a language contribute to the semantic representation of knowledge?	2
g.	How does the vocal tract shape affect the acoustic characteristics of speech sounds?	2
h.	Provide examples of how different articulators contribute to speech.	2
i.	Discuss the significance of using a warped frequency scale and its impact on speech feature analysis.	2
j.	How does DTW address the challenges of time misalignment in speech recognition, and what are its limitations?	2

SECTION B

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

a.	Discuss the role of stop words in text analytics and NLP. How can the identification and removal of stop words impact the quality of language processing tasks?	10
b.	Explain the concepts of interpolation and backoff in the context of language modeling. Provide examples illustrating how these techniques enhance the performance of N-gram models.	10
c.	Investigate the various types of relations that can exist between different senses of words. How do these relations influence the construction of semantic networks? Provide examples to illustrate your answer.	10
d.	Elaborate on the Short-Time Fourier Transform method and its significance in analyzing speech signals. How does the STFT overcome challenges in representing time-varying characteristics of speech?	10
e.	Compare and contrast Cepstral Distances, Weighted Cepstral Distances, and Filtering techniques in the context of speech feature extraction. Provide examples of scenarios where each method may be more suitable.	10

SECTION C

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

a.	Examine the impact of language variations and nuances on NLP applications. How do regional dialects, slang, and cultural differences pose challenges in developing robust natural language processing systems?	10

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b.	Explore the significance of syntactic parsing in natural language processing. How does syntactic parsing contribute to the extraction of meaningful information from sentences, and what are the common approaches used in parsing?	10

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

a.	Elaborate on the role of Hidden Markov Models in part-of-speech tagging. How do HMMs model the sequence of POS tags, and what advantages do they offer over other approaches?	10
b.	Analyze the strengths and weaknesses of rule-based and stochastic tagging methods. Provide examples to demonstrate scenarios where one approach might outperform the other.	10

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

a.	Compare and contrast supervised methods for Word Sense Disambiguation. Discuss the challenges associated with supervised approaches and provide examples of how they can be effectively applied in real-world NLP tasks.	10
b.	Explore the concept of bootstrapping in the context of Word Sense Disambiguation. Discuss different bootstrapping methods and their applications in improving the accuracy of WSD systems.	10

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

a.	Provide an in-depth review of Linear Predictive Coding methods in speech processing. How are LPC coefficients calculated, and what role do they play in speech analysis and synthesis?	10
b.	Discuss the relationship between articulatory phonetics and acoustic phonetics in the context of speech sound production. How does the articulatory process influence the acoustic characteristics of speech?	10

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

a.	Investigate the role of Multiple Time-Alignment Paths in speech processing. How does considering multiple alignment paths contribute to the robustness and accuracy of speech recognition systems?	10
b.	Provide an in-depth comparison of LPC, PLP, and MFCC coefficients as feature extraction methods in speech processing. Discuss their respective strengths and weaknesses in capturing relevant information from speech signals.	10