Roll No:

BTECH
(SEM V) THEORY EXAMINATION 2025-26
NATURAL LANGUAGE PROCESSING

TIME: 3 HRS

M.MARKS: 70

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 07 = 14

Q no.	Question	CO
a.	Discuss early grammar based language models.	1
b.	What is tokenization?	1
c.	Compare different smoothing methods.	2
d.	How does math help extract meaning from word counts?	2
e.	Define Context Free Grammars.	3
f.	What are word senses?	4
g.	Discuss real world NLP challenges.	5

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

a.	Describe Regular Expressions and Finite State Automata. Explain how they are used in real NLP tasks such as pattern matching, tokenization, and lexical analysis.	1
b.	What is Zipf's Law? Explain its significance in natural language. Discuss how it influences vocabulary distribution and language modeling.	2
c.	Explain Chart Parsing and Transition Network Grammars. Describe how Top Down Chart Parsing improves parsing efficiency.	3
d.	Explain selectional restrictions. How do they help reduce semantic ambiguity in sentence interpretation?	4
e.	Describe speech distortion measures. Compare mathematical and perceptual distortion techniques used in speech analysis.	5

SECTION C

3. Attempt any *one* part of the following: 07 x 1 = 07

a.	Explain English morphology in detail. Discuss how finite state transducers are used to model lexicons and morphological rules in NLP systems.	1
b.	Explain the concept of Minimum Edit Distance. Describe its algorithm, cost operations, and role in spelling correction and speech recognition.	1

4. Attempt any *one* part of the following: 07 x 1 = 07

a.	Explain N gram language models. Describe unsmoothed N grams and discuss why smoothing techniques are necessary in real world NLP applications.	2
b.	Provide an overview of English syntax and semantics. Explain how linguistic background helps bridge word level statistics with semantic interpretation.	2

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5. Attempt any *one* part of the following: **07 x 1 = 07**

a.	What are feature systems in NLP? Explain morphological features and their role in parsing with examples from English grammar.	3
b.	Discuss ambiguity in natural language. Explain statistical methods and probabilistic parsing techniques used for ambiguity resolution.	3

6. Attempt any *one* part of the following: **07 x 1 = 07**

a.	Discuss different approaches to Word Sense Disambiguation. Compare supervised, dictionary based, and bootstrapping methods.	4
b.	Describe syntax driven semantic analysis. Explain semantic attachments and their role in mapping syntax to meaning.	4

7. Attempt any *one* part of the following: **07 x 1 = 07**

a.	Explain Short Time Fourier Transform, Filter Bank, and LPC methods. Compare their role in speech feature extraction.	5
b.	Discuss acoustic phonetics. Explain the acoustics of speech production and its relevance in speech recognition systems.	5