

Enrollment No./Seat No.:

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**Bachelor of Engineering - SEMESTER - VII EXAMINATION - WINTER 2025**

**Subject Code: 3174602**

**Date: 26-11-2025**

**Subject Name: Natural Language Processing**

**Time: 10:30 AM TO 01:00 PM**

**Total Marks: 70**

**Instructions**

- 1. Attempt all questions.**
- 2. Make suitable assumptions wherever necessary.**
- 3. Figures to the right indicate full marks.**
- 4. Simple and non-programmable scientific calculators are allowed.**

	<b>Marks</b>
<b>Q.1 (a)</b> List any three advantages and disadvantages of NLP.	<b>03</b>
<b>(b)</b> Define Zipf's Law and Heap's Law in the context of NLP with the suitable example.	<b>04</b>
<b>(c)</b> Explain the various phases of NLP processing from text input to meaningful output.	<b>07</b>
<b>Q.2 (a)</b> Explain text pre-processing steps with examples.	<b>03</b>
<b>(b)</b> Compare bigram and trigram models with a suitable example.	<b>04</b>
<b>(c)</b> Illustrate how smoothing affects the performance of a language model with an example.	<b>07</b>
<b>OR</b>	
<b>(c)</b> Elaborate on the concept of named entity recognition and its importance in information extraction.	<b>07</b>
<b>Q.3 (a)</b> Define Word Sense Disambiguation (WSD). Name two approaches for WSD.	<b>03</b>
<b>(b)</b> Define the Bag of Words (BoW) model in NLP. Also discuss the limitations of BoW model.	<b>04</b>
<b>(c)</b> Evaluate WordNet-based WSD vs. supervised WSD for a low-resource language/domain.	<b>07</b>
<b>OR</b>	
<b>(a)</b> Illustrate with an example how Word2Vec captures the context of words.	<b>03</b>
<b>(b)</b> Differentiate between CBOW and Skip-Gram models with examples.	<b>04</b>
<b>(c)</b> Discuss the various approaches to Word Sense Disambiguation such as rule-based, statistical, and machine learning approaches with examples.	<b>07</b>
<b>Q.4 (a)</b> Explain the concept of sentiment analysis in Natural Language Processing (NLP).	<b>03</b>
<b>(b)</b> Compare extractive and abstractive summarization with examples.	<b>04</b>
<b>(c)</b> Describe cross-lingual information retrieval (CLIR) with examples and explain how translation and mapping approaches handle multilingual data.	<b>07</b>

**OR**

- (a) Explain the concept of text classification in Natural Language Processing (NLP). 03
- (b) Describe the evaluation metrics used for text summarization. 04
- (c) Analyze bottlenecks in a Question Answering pipeline for multilingual corpora. Explain it with an example. 07
- Q.5** (a) Define Machine Translation (MT). What is the main objective of machine translation systems? 03
- (b) Compare RBMT and SMT approaches to translation. 04
- (c) Explain Latent Semantic Analysis (LSA) in detail. Include a mathematical formulation using Singular Value Decomposition (SVD). 07

**OR**

- (a) Define topic modeling. What is the objective of topic models in NLP? 03
- (b) Write short notes on: Latent Variables, and Probabilistic Topic Models 04
- (c) Discuss the importance of EM in SMT parameter learning. Illustrate with an example. 07

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