

Duration: 3hrs

[Max Marks:80]

N.B. : (1) Question No 1 is Compulsory.

(2) Attempt any three questions out of the remaining five.

(3) All questions carry equal marks.

(4) Assume suitable data, if required and state it clearly.

1 Attempt any FOUR**[20]**

- a Explain the various preprocessing operations used in Natural Language Processing (NLP).
- b Compare rule-based, stochastic and transformation-based POS tagging.
- c Explain Shift Reduce Parser in NLP with example
- d What is Reference Resolution in Natural Language Processing?
- e Explain Limitations of Hidden Markov Model (HMM) and MaxEnt Model for POS Tagging.

- 2 a Explain Laplace smoothing and Good-Turing discounting. Compare their effectiveness. **[10]**

- b Explain with suitable example following relationships between word meanings: **[10]**
Homonymy Polysemy Synonymy Antonymy Hypernymy Hyponymy Meronymy

- 3 a What is knowledge/dictionary based approach for Word sense disambiguation (WSD). Explain Lest Algorithm for WSD with suitable example. **[10]**

- b Consider the following corpus **[10]**
 <s> the/DT teacher/NN explains/V the/DT lesson/NN </s>
 <s> the/DT student/NN reads/V a/DT book/NN </s>
 <s> teacher/NN guides/V student/NN </s>
 Compute the emission and transition probabilities for a bigram HMM. Also decode the following sentence using Viterbi algorithm.

"The student reads the book"

- 4 a Explain how Anaphora Resolution is performed using the Hobbs Algorithm and the Centering Algorithm. **[10]**

- b What is the output of Morphological Analysis for a Regular Verb, Irregular Verb, Singular Noun, and Plural Noun? **[10]**

- 5
- a

Short Note on i)Machine translation ii) Question Answering System

[10]
- b

Explain steps of Porter Stemmer algorithm with example.

[10]

- 6
- a

What are the different levels of ambiguities in natural language, and how can they be resolved in NLP?

[10]
- b

For a given grammar using CYK or CKY algorithm parse the statement
"The man read this book"

[10]

Rules:

$S \rightarrow NP VP$	$Det \rightarrow that \mid this \mid a \mid the$
$S \rightarrow Aux NP VP$	$Noun \rightarrow book \mid flight \mid meal \mid man$
$S \rightarrow VP$	$Verb \rightarrow book \mid include \mid read$
$NP \rightarrow Det NOM$	$Aux \rightarrow does$
$NOM \rightarrow Noun$	
$NOM \rightarrow Noun NOM$	
$VP \rightarrow Verb$	
$VP \rightarrow Verb NP$	