Paper / Subject Code: 42175 / NATURAL LANGUAGE PROCESSING (DLOC - III)

BE/Sem VII/C-scheme/comp/June-26/09.05.2026

KONKAN GYANPEETH COLLEGE OF ENGINEERING KARJAT Dist. Raigad

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 Hypernomy Hyponomy Meronomy

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]

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5 a Short Note on i)Machine translation ii) Question Answering System [10]

b Explain steps of Porter Stemmer algorithm with example. [10]

6 [10]

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"**

Rules:

S → NP VP	Det → *that* | *this* | *a* | *the*
S → Aux NP VP	Noun → *book* | *flight* | *meal* | *man*
S → VP	Verb → *book* | *include* | *read*
NP → Det NOM	Aux → *does*
NOM → Noun	
NOM → Noun NOM	
VP → Verb	
VP → Verb NP	

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