Time: 3 hours   **Max. Marks: 80**

N.B. (1) Question No. 1 is compulsory

   (2) Assume suitable data if necessary

   (3) Attempt any three questions from the remaining questions

Q.1   Solve any Four out of Five   5 marks each

a   Explain the challenges of Natural Language processing.

b   Explain how N-gram model is used in spelling correction

c   Explain three types of referents that complicate the reference resolution problem.

d   Explain Machine Translation Approaches used in NLP.

e   Explain the various stages of Natural Language processing.

Q.2   10 marks each

a   What is Word Sense Disambiguation (WSD)? Explain the dictionary based approach to Word Sense Disambiguation.

b   Represent output of morphological analysis for Regular verb, Irregular verb, singular noun, plural noun Also Explain Role of FST in Morphological Parsing with an example

Q.3   10 marks each

a   Explain the ambiguities associated at each level with example for Natural Language processing.

b   Explain Discourse reference resolution in detail.

Q.4   10 marks each

a

\<S\>	Martin	Justin	can	watch	Will	\<E\>
\<S\>	Spot	will	watch	Martin	\<E\>	
\<S\>	Will	Justin	spot	Martin	\<E\>	
\<S\>	Martin	will	pat	Spot	\<E\>	

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For given above corpus,

N: Noun [Martin, Justin, Will, Spot, Pat]

M: Modal verb [can , will]

V:Verb [watch, spot, pat]

Create Transition Matrix & Emission Probability Matrix

Statement is "Justin will spot Will"

Apply Hidden Markov Model and do POS tagging for given statements

b   Describe in detail Centering Algorithm for reference resolution.

Q.5   **10 marks each**

a   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
```

b   Explain Porter Stemmer algorithm with rules

Q.6   **10 marks each**
a   Explain information retrieval versus Information extraction systems
b   Explain Maximum Entropy Model for POS Tagging