- A. Questions referred from different university
- 1. Identify the head and morphological type (Noun Phrase, Verb Phrase, Adjective Phrase, Adverbial Phrase) of the following sentence segments.
  - I. The president of the company
  - II. Looked up the chimney
- III. Angry as a hippo
- IV. Rapidly like a bat
- V. important to Bill
- VI. looked up the tree
- 2. Given the following CFG grammar from ATIS System, USA. Perform syntactic analysis of the following sentence using any of the parsing method.

"Book the flight through Houston."

$S \rightarrow NP VP$	$Det \rightarrow that \mid this \mid a \mid the$
$S \rightarrow Aux NP VP$	Noun → book   man   flight
$S \rightarrow VP$	Verb → book   include
$NP \rightarrow Pronoun$	prefer   man
NP → Proper-Noun	Pronoun $\rightarrow$ I   she   me
NP → Det Nominal	Proper-Noun → Houston   TWA
Nominal → Noun	Aux → does
Nominal → Nominal Noun	Preposition → from   to   through

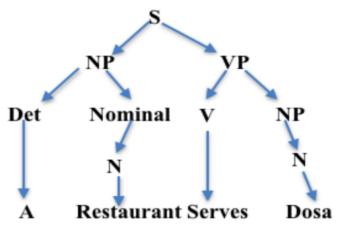
Nominal → Nominal PP
$VP \rightarrow Verb$
$VP \rightarrow Verb NP$
$VP \rightarrow Verb NP PP$
$VP \rightarrow Verb PP$
$VP \rightarrow VP PP$
PP → Preposition NP

- 3. Explain the different levels of language analysis.
- 4. Identify and describe the ambiguities in the following sentences.
  - I. The man kept the dog in the house.
  - II. Book that flight.
  - III. Time flies like an arrow
  - IV. He crushed the key to my heart
- 5. Analyze the significance of Word Sense Disambiguation in NLP. Explain any one WSD method
- 6. Analyse how statistical methods can be used in machine translation
- 7. Design a finite state transducer with E-insertion orthographic rule that parses from surface level "foxes" to lexical level "fox+N+PL" using FST.
- 8. Differentiate between top-down and bottom-up parsing.

- 9. What is Natural Language Processing? Discuss with some applications.
- 10. What is meant by the semantics of a natural language, and how this differs from the pragmatics?
- 11. Describe augmented grammar in syntactic analysis
- 12. Explain POS tagging with example
- 13. Distinguish between bounded movement and unbounded movement and give examples.
- 14. Perform parsing using simple top down parsing for the sentence "The dogs cried" using the grammar given below:

S->NP VP NP->ART N NP->ART ADJ N VP->V VP->V NP

15. The parse tree for the sentence "A restaurant serves dosa" is given below. Perform semantic analysis and show the semantic interpretations of the constituents. Explain the process



- 16. Explain vector space model of information retrieval
- 17. Explain surface anaphora and the different methods for dealing with surface anaphora
- 18. Explain the difference of discourse structure from other reference mechanisms
- 19. Explain direct machine translation

- 20. Explain text summarization and multiple document text summarization with neat diagram
- 21. Describe transfer model of Machine Translation. List out its three phases
- 22. State the difference between hypernymy and hyponymy and give an example of each.
- 23. Derive a top-down, depth-first, left-to-right parse tree for the given sentence:

The angry bear chased the frightened little squirrel

Use the following grammar rules to create the parse tree:

$S \rightarrow NP VP$	Det $\rightarrow$ the
$NP \rightarrow Det Nom$	Adj→ little   angry   frightened  N → squirrel   bear
$VP \rightarrow V NP$	$N \rightarrow \text{squirrel} \mid \text{bear}$
Nom →Adj Nom   N	V → chased

- 24. Explain the Bayes' rule on conditional probability of an event A given an event B.
- **25.** Draw the shift-reduce parser in processing the sentence *The woman saw a puppy*
- 26. Analyze the naive Bayes classifier approach to Word Sense Disambiguation in NLP.
- 27. Define the following with respect to Information Retrieval:
  - I. Vector Space Model
  - II. Term Frequency
- III. Inverse Document Frequency
- 28. What is meant by knowledge representation?
- 29. Describe discourse segments.
- 30. Briefly describe what is meant by reference resolution.
- 31. Give any 3 different evaluation metrics available for text classification?

- B. Questions Asked in 2021 MU
- 32. Challenges in NLP
- 33. Define WordNet with applications and types of representation
- 34. Stemming (Porter Stemmer) with steps and algorithm
- 35. Context Free Grammar
- 36. IR vs Information Extraction/Data Mining
- 37. Word Sense Disambiguation with approaches, limitations and applications

## In Syllabus but never asked:

- 38. Reference Resolution, Reference Phenomena
- 39. QnA Systems
- 40. BabelNet
- 41. Syntactic & Semantic constraint on coherence;
- 42. Anaphora Resolution using Hobbs and Cantering Algorithm
- 43. Homonymy, Polysemy, Synonymy, Hyponymy; Semantic Ambiguity;
- 44. Hidden Markov Model (HMM Viterbi) for POS tagging; Issues in HMM POS tagging; Discriminative Model:
- 45. Maximum Entropy model, Conditional random Field (CRF)
- 46. Evaluating N-grams: Perplexity; Smoothing: Laplace Smoothing, Good-Turing Discounting;