

Sr. No.....016703

December 2023

B.Tech (CE(DS)/CSE) - VII SEMESTER

Speech and Natural Language Processing (PEC-CS-D-701)

Time: 3 Hours

Max. Marks:75

- Instructions:**
1. It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.
 2. Answer any four questions from Part -B in detail.
 3. Different sub-parts of a question are to be attempted adjacent to each other.

PART -A

- Q1 (a) What are some common applications of combining speech processing and NLP technologies? (1.5)
- (b) What is Tokenization? (1.5)
- (c) What makes natural language processing difficult? (1.5)
- (d) What is Morphology, Why do we need to do Morphological Analysis? (1.5)
- (e) Explain the concept of word error rate (WER) and its significance in assessing system accuracy. (1.5)
- (f) Differentiate between Natural language and formal language with suitable example. (1.5)
- (g) What are some common challenges faced by speech recognition systems in noisy environments? (1.5)
- (h) Discuss the impact of speaker variability on the performance of speech recognition systems. (1.5)
- (i) Show the given statement in transformation grammar. "Umesh was killed". (1.5)
- (j) Identify the morphological type (Noun phrase, Verb Phrase, Adjective Phrase) of following sentence segments 1. Looked up the tree (1.5)

PART -B

- Q2 (a) List and explain different phases of analysis in Natural Language Processing with an example for each. (8)
- (b) What are the various Sources of Ambiguity in Natural Languages. (7)
- Q3 (a) What distinguishes context-free grammars from regular grammars? Create a context-free grammar for a simple language, and generate some strings. (5)
- (b) Perform parsing using simple top down parsing for the sentence "The dogs cried" using the grammar given below: (10)
- S->NP VP
NP->ART N
NP->ART ADJ N
VP->V
VP->V NP

- Q4 How does automatic speech recognition (ASR) work? Describe the major steps (15) involved. Explain the importance of prosody in speech processing and its impact on naturalness.
- Q5 (a) Explain the concept of part-of-speech tagging in NLP. How is POS tagging (5) useful in syntactic analysis?
(b) How does Hidden Markov Model (HMM) contribute to the functioning of a (10) speech recognition system? Explain the concept of the "hidden" states in HMMs compared to observable states by taking a suitable example.
- Q6 (a) What are graph models and optimization, and how do they contribute to (10) semantic knowledge representation?
(b) Explain the basic components and structure of a Recursive Transition (5) Network? In what applications or domains are Recursive Transition Networks commonly employed?
- Q7 Write short note on the following. (15)
(a) Commercial Uses of NLP
(b) Major challenges in ASR systems
(c) Earley's Algorithm
