

**BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)**  
**B. Tech. Sem - VI COMPUTER SCIENCE & ENGINEERING : SUMMER : 2024**  
**SUBJECT: NATURAL LANGUAGE PROCESSING**

Day : Friday  
 Date : 24/05/2024

S-25597-2024

Time : 02:30 PM-05:30 PM  
 Max. Marks : 60

**N.B.:**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable **CALCULATOR** is allowed.

**Q.1** Discuss various stages of NLP ambiguity with suitable example. (10)

**OR**

Write formula for unigram and bigram model. Solve below example using (10)  
 bigram and trigram model  
 Sentence: "about five minutes form....."

**Q.2** Define concept of vector space model. Also solve below example to find (10)  
 cosine similarity of document.

$D_1 = (0.5, 0.8, 0.3)$   
 $D_2 = (0.9, 0.4, 0.2)$   
 $Q = (1.5, 1.0, 0)$

**OR**

Describe the various common techniques used for extracting information (10)  
 from the text.

**Q.3** Describe the classification of POS- tagger in detail. (10)

**OR**

How ambiguity in POS tag is resolved using HMM veterbi algorithm. Solve (10)  
 below example.

Training corpus with POS Tags:

<S>	Martin	Justin	can	watch	Will	<E>
	N	N	M	V	N	
<S>	Spot	will	watch	Martin	<E>	
	N	M	V	N		
<S>	will	Justin	spot	Martin	<E>	
	M	N	V	N		
<S>	Martin	will	pat	spot	<E>	
	N	M	V	M		

Test Data

<S>	Justin	will	stop	Will </S>
POS	N	N	V	N
Tag		M	N	M

**Q.4** Use Cky algorithm for PCFG to find most probable parse tree. (10)

Sentence – "The flight includes a meal"

CFG Rules with Probabilities are:-

- $S \rightarrow NP VP$  [0.8]  
 $NP \rightarrow Det N$  [0.3]  
 $VP \rightarrow V NP$  [0.20]  
 $V \rightarrow include$  [0.05]  
 $Det \rightarrow the$  [0.4]  
 $Det \rightarrow a$  [0.4]  
 $N \rightarrow Meal$  [0.001]  
 $N \rightarrow flight$  [0.02]

OR

Define the concept of parsing. Also explain concept of shift reduce parse. (10)

Solve below example using shift reduce parser-

Grammar

Input string

$S \rightarrow S + S$

$a_1 - (a_2 + a_3)$

$S \rightarrow S - S$

$S \rightarrow (S)$

$S \rightarrow a$

Q.5 Discuss the concept of Non-Negative Matrix Factorization with suitable example. (10)

OR

Apply concept of singular value decomposition on below matrix. (10)

$$A = \begin{bmatrix} 3 & 1 & 1 \\ -1 & 3 & 1 \end{bmatrix}$$

Q.6 Write a note on Web technologies and ontologies. (10)

OR

Write various library functions of NLTK with suitable example. (10)

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