


Name:			
Enrolment No:			
UPES End Semester Examination, May 2024			
Course: B.Tech. CSE-AIML (H & NH) Program: Computational Linguistics and NLP Course Code: CSEG 3024		Semester: VI Time : 03 hrs. Max. Marks: 100	
Instructions: All Questions are compulsory. Calculators are allowed in this examination. Any missing values can be assumed with proper explanation.			
SECTION A (5Qx4M=20Marks)			
S. No.		Marks	CO
Q 1	Differentiate between the following: b) Stemming and Lemmatization b) Transmission and Emission Probabilities in HMM	2+2	CO1
Q 2	What are the complications in word sense disambiguation?	4	CO2
Q 3	Explain the difference between phrase structured and dependency structured tree bank.	4	CO2
Q 4	If the value of Inverse Document Frequency of a word w is 20 times the word w', what does it signify? Explain.	4	CO1
Q 5	How is Layout and Meaning significant in Multimedia Presentation in NLP?	4	CO3
SECTION B (4Qx10M= 40 Marks)			
Q 6	Explain the concept of semantic role labelling and how it is used in natural language processing. Give an example of a sentence and its semantic roles.	10	CO4
Q 7	Suppose we have two documents A and B, represented as sets of words: Document A: {"apple", "orange", "banana", "grape", "cherry"} Document B: {"orange", "banana", "kiwi", "grape", "watermelon"} Calculate the cosine similarity and Jaccard similarity between these two documents.	10	CO3
Q 8	a) Consider the following sentence: "The quick brown fox jumps over the lazy dog". Generate all possible 2-grams (bigrams) and 3-grams (trigrams) for this sentence and calculate their frequency. b) Differentiate phrase structured and dependency structured tree bank.	10	CO3, CO4
Q9	Explain Sentiment Analysis and Word Sense Disambiguation in detail with example.	5+5	CO4
SECTION-C (2Qx20M=40 Marks)			

Q 10	<p>Consider the following context-free grammar and input string for a shift-reduce parser task:</p> <p>Grammar: $E \rightarrow E+E$ $E \rightarrow E * E$ $E \rightarrow E/E$ $E \rightarrow (E)$ $E \rightarrow b$</p> <p>Input string: $b1+(b2*b3)+(b4/b5)$</p> <p>Demonstrate the step-by-step parsing process using a Shift-Reduce parser for the given input string. Provide the sequence of shifts and reductions, including the state of the parsing stack at each step. Make clear how the parser proceeds from one step to the next and whether it shifts or reduces, following the grammar rules.</p>	20	CO5
Q 11	<p>(a) Consider the following context-free grammar:</p> <p>$S \rightarrow NP VP$ $NP \rightarrow Det N$ $VP \rightarrow V$ $VP \rightarrow V NP$ $N \rightarrow dog$ $N \rightarrow cat$ $N \rightarrow mouse$ $Det \rightarrow the$ $V \rightarrow sees$ $V \rightarrow hates$ $V \rightarrow sneezes$</p> <p>Which of the following sentences are recognized by this grammar. Explain why?</p> <ol style="list-style-type: none"> The dog sneezes the cat The mouse hates The cat the mouse hates The mouse hates the mouse The mouse sees the mouse <p>(b) Explain CYK algorithm in detail with suitable example.</p>	10+10	CO4, CO5