BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BCA   SEMESTER : V
BRANCH: BCA   SESSION : MO/2024

SUBJECT: CA337 NATURAL LANGUAGE PROCESSING

TIME: 3 Hours   FULL MARKS: 50
INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. **Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Define the terms Phonology and Morphology related to NLP with example.	[5]	1	2
Q.1(b)	Describe the types of spelling errors commonly encountered in natural language text. Provide examples of each type.	[5]	3	4
Q.2(a)	Explain the concept of N-gram language models. How does an N-gram model estimate the probability of a sequence of words?	[5]	2	3
Q.2(b)	Here are a few other useful probabilities: P(Children |<s>) = 0.25, P(want | Children)=0.33, P(to|want) = 0.0011, P(play | to) = 0.6, P(footwal | play) = 0.5, P(</s>|footwal) = 0.68. Then compute the probability of sentences like "Children want to play footwall"	[5]	3	4
Q.3(a)	What is Perplexity in the context of language modeling? Provide an example of how it can be calculated for a simple sentence.	[5]	3	3
Q.3(b)	For the sentence "data science is fun", if the unigram probabilities are: P(data)=0.2, P(science)=0.25, P(is)=0.3, P(fun)=0.25, find the perplexity of the sentence.	[5]	5	5
Q.4(a)	Explain the importance of POS tagging in Natural Language Processing. Describe how POS tagging helps in understanding the structure of sentences in NLP applications.	[5]	3	3
Q.4(b)	Define Named Entity Recognition (NER) and explain its significance in Natural Language Processing. What are some common types of named entities that NER systems are designed to recognize?	[5]	4	4
Q.5(a)	Explain the concept of vector semantics in NLP.	[5]	2	3
Q.5(b)	For Given Context Free Grammar: S → NP VP NP → Pronoun | NOM | Det NOM NOM → Noun | Noun NOM VP → Verb NP -- Lexicon -- (parts of speech) Prounoun → I | they Noun → flight | morning | evening Verb → prefer Det → a | the | that Derive derivation for sentence "I Prefer a morning flight" and also draw parse tree.	[5]	5	5