CBCS SCHEME

USN | | | | | | | | | | BCS714B

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Natural Language Processing

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define Natural Language Processing. Explain different approaches that use NLP technique.	7	L1 L2	CO1
	b.	Explain Statistical Language Models. Explain n-gram model.	7	L2	CO1
	c.	Construct the TG representation, surface structure of the sentence "The boy was praised by the Teacher".	6	L3	CO1
		OR			
Q.2	a.	What is the role of transformational rules in transformational grammar? Explain with example.	7	L1 L2	CO1
	b.	Describe DFA and NFA. Mention the properties of finite automation.	7	L2	CO1
	c.	Consider the active sentence. "The teacher will announce the result". Construct the parse structure for the sentence. Also apply passive transformations.	6	L3	CO1
		Module – 2			
Q.3	a.	Explain CYK syntactic parsing algorithm.	7	L2	CO2
	b.	Write the algorithm for minimum edit distance. Apply the same to find distance between words TUTOR and TUMOUR.	5	L3	CO2
	c.	Find the sequence of states created by CYK algorithm while parsing the sentence. "The man read this book". Consider the following simplified grammar in CNF. S → NP VP S → VP VP → Verb NP NP → Det Noun Det → that/this/a/the Noun → book/flight/meal/man Verb → include/read NP Det Noun AUX → does	8	L3	CO2
		OR			
Q.4	a.	Write a note on different phase level construct with suitable example for each phrase.	7	L2	CO2
	b.	What is POS tagging? Explain rule based tagger and hybrid tagger.	5	L3	CO2

	c.	Draw the NFA for the languages consisting of all strings containing only a's and b's and ending with baa. Draw the state transition table. Find R.E. for the above language.	8	L3	CO2
		Module – 3			
Q.5	a.	Explain Binary Naïve Byes algorithm for Binarization.	8	L2	CO3
	b.	Explain Paired Bootstrap Test.	4	L2	CO3
	c.	Consider the training and test documents for the movie review. Use Naïve Bayes classifier to predict the category for test data :	8	L3	CO3

	Category	Documents
Training	-	Bad Script and Poor direction
	-	Waste of time and money
	+	Excellent direction and great performances
	+	Wonderful story and amazing music
Testing	?	Great music but poor story

		OR			
Q.6	a.	Explain : (i) Naïve Bayes classifier (ii) Naïve Bayes as language Model	8	L2	CO3
	b.	Define Classification. Explain binary classification task.	4	L1 L2	CO3
	c.	Assume the following likelihoods for each word being part of a positive or negative movie review and equal prior probabilities for each class.	8	L3	CO3

	POS	Neg
the	0.08	0.10
food	0.20	0.12
was	0.10	0.09
really	0.18	0.05
tasty	0.25	0.03
awful	0.03	0.22

What class will Naïve Bayes assign to the sentence "the food was really tasty"?

		Module – 4			
Q.7	a.	Describe the following approaches used in IR : (i) Indexing (ii) Stop word elimination (iii) Stemming	6	L2	CO4
	b.	Explain the limitations of traditional lexical resources like Word Net in modern NLP.	8	L2	CO4
	c.	Consider the document represented by the three terms and {tornado, swirl, wind} with the raw tf 4, 1 and 1 respectively. In a collection of 100 documents, 15 documents contain the term tornado, 20 contain swirl and 40 contains wind. Calculate idf of the term tornado.	6	L3	CO4

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		OR			
Q.8	**a.**	Explain different information retrieval models.	**6**	**L2**	**CO4**
	b.	Describe methods for updating or extending lexical resources using research Corpora.	**8**	**L2**	**CO4**
	c.	State and explain the importance of Zipf law related to words distribution in NLP.	**6**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	What are lexical divergences? Illustrate with example how they affect machine translation.	**7**	**L2**	**CO5**
	b.	Explain how human and automatic evaluations are used in machine translation evaluation.	**8**	**L2**	**CO5**
	c.	Explain the use of machine translation in NLP.	**5**	**L2**	**CO5**
		OR			
Q.10	**a.**	What are the major bias and ethical issues raised during machine translation?	**7**	**L2**	**CO5**
	b.	Explain how language and translation divergences help to build better machine translation model.	**8**	**L2**	**CO5**
	c.	Explain Encoder Decoder Model Architecture.	**5**	**L2**	**CO5**

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