Total No. of Questions : 8]

SEAT No. :

PD4264

[Total No. of Pages : 3

[6403]-60

T.E. (Artificial Intelligence & Data Science)

NATURAL LANGUAGE PROCESSING

(2019 Pattern) (Semester - VI) (317532 (B)) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Make suitable assumptions whenever necessary.***

Q1) a) Consider the following CNF rules. Create a Parse tree for the sentence "The flight includes a meal" using CKY parsing algorithm. **[9]**

S → NP VP

NP → Det N

VP → V NP

V → includes

Det → the

Det → a

N → meal

N → flight

b) Explain why CFG is used to represent natural language in parsing. Differentiate between top-down and bottom-up parsing. **[9]**

OR

P.T.O.

Q2) a) Consider following grammar rules. **[9]**

$S \rightarrow NP\ VP$

$S \rightarrow VP$

$NP \rightarrow DET\ N$

$NP \rightarrow N$

$VP \rightarrow V$

$VP \rightarrow V\ NP$

$Det \rightarrow this \mid that \mid a \mid the$

$Noun \rightarrow book \mid flight \mid John \mid ball \mid meal$

$Verb \rightarrow book \mid include \mid read$

Generate the Top-Down and Bottom-up Parse Trees for the sentence. "Book that flight". Is the Top-Down parsing approach better than Bottom up approach? Justify your answer.

b) What is Constituency Parsing? Explain CCG parsing with an example. **[9]**

Q3) a) What do you mean by Semantic and Thematic Roles? List out any 4 thematic roles with definitions and examples. **[9]**

b) Write short note on : **[8]**

i) WordNet

ii) FrameNet

OR

Q4) a) What is the significance of Word Sense Disambiguation in NLP? Explain any one Word Sense Disambiguation method. **[8]**

b) Explain the Scherer typology of affective states. What are the two families of theories of emotion? **[9]**

Q5) a) Why is Machine Translation needed? Explain various problems of machine translation. **[9]**

b) Explain in detail Rule based Machine Translation, Knowledge based Machine Translation and Statistical Machine Translation. **[9]**

OR

Q6) a) Draw a neat diagram of Encoder-decoder architecture. Explain the working of Neural Machine Translation. **[9]**

b) Explain the stages of a Direct Machine Translation System with example. **[9]**

Q7) a) Write short notes on : **[9]**

i) Named Entity Recognition

ii) Question Answer System

iii) Chatbot using Dialogflow

b) Draw the architecture of an ad hoc Information Retrieval system. Explain the working of vector space model of information retrieval. **[8]**

OR

Q8) a) Describe the following approaches used in information retrieval. **[9]**

i) Term weighting and document scoring

ii) Stop word Elimination

iii) Inverted Index

b) Explain the stages and working of Question Answering System. **[8]**