End Semester Examination
Course Name: Natural Language Processing
Code: CS 563
Full Marks-80   **Time: 3 hours**
Answer ALL the questions

Make reasonable assumptions as and whenever necessary. You can answer the questions in any sequence. However, answers of all the parts to any particular question should appear together.

(Q1). Define (a) scope ambiguity, (b) preposition attachment ambiguity and (c) clause attachment ambiguity. Give examples in (i) English and (ii) your mother tongue, with explanation of why the instances are ambiguous.

(2 marks for each definition, 2 marks for examples- 1 for each language- and 2 for explanation)

$$3 \times (2+2+2+1) = 21$$

(Q2). Draw constituency and dependency parse trees for each of the above instances (English only). Give reasonable labels for the dependency trees. For constituency trees, design a reasonable grammar.
(2 for each tree- 6 trees; 4 for grammar design; 2 for reasonable dependency labels)

$$6 \times 2 + 4 + 2 = 18$$

(Q3). Show trace of Early parsing for each of the above examples (English only). Show how all the trees are embedded in each of the parse table.
(3 for each trace; 2 for each table analysis)

$$3 \times (3+2) = 15$$

(Q4). Show the parsing steps for transition based dependency parsing of each of the above examples (English only). Labels are not needed, only dependencies.
(3 for each trace)

$$3 \times 3 = 9$$

(Q5). Define *Anaphora* and *Cataphora* relations with examples. Determine the coreference chains from the following text. Show how training instances will be generated for building a machine-learning based coreference resolver (*assume a mention-pair model and markables to benoun phrases*)

"The Board for Cricket Control in India (BCCI) on Thursday recommended Indian skipper ViratKohli's name for country's highest sporting honour Rajiv Gandhi KhelRatna award. The development was confirmed by the BCCI. Former Indian cricketer Sunil Gavaskar's name has been recommended for Dhyan Chand Award, which is India's highest award for lifetime achievement in sports and games. This is the second time ViratKohli's name has been recommended for the KhelRatna award by the country's cricket board. In 2016, the BCCI had recommended Kohli's name for the coveted award but unfortunately he did not receive the same. If Kohli clinches the award this time, he would become the third cricketer to get the KhelRatna after legendary cricketer Sachin

Tendulkar and country's most successful captain Mahendra Singh Dhoni. Tendulkar received the award in 1997 while Dhoni bagged the same in 2007."

(2+6+5=13)

(Q6). For Aspect based Sentiment Analysis, with appropriate examples (review from products/restaurant) explain aspect terms and polarity classes (*positive, negative, neutral* and *conflict*).

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