

2004 Paper 12 Question 11

Natural Language Processing

A context free grammar for a fragment of English is shown below:

```
S -> NP VP
NP -> Det N
N -> N N
VP -> rumbles, rusts
Det -> the, a, every
N -> bus, car, train, park, airport, station
```

- (a) Show the parse trees for the two parses that the grammar assigns for sentence S1.

S1: the train station bus rumbles

[3 marks]

- (b) Give an algorithm for a bottom-up passive chart parser without packing. Illustrate your answer by showing the edges constructed when parsing sentence S1. [11 marks]

- (c) Describe how this algorithm could be modified so that edges may be *packed*, illustrating your answer by considering sentences S1 and S2. What effect does packing have on parsing efficiency?

S2: the airport car park bus rumbles

[6 marks]