CSIS Department;

1st Sem 2020-21; PPL (CSF301) Test-1

Date: 16-9-2020 Wt: 15% Total marks: 30marks (30 mins)

Mode: Using Google Forms through Google Classroom

1. Give a CFG for generating sentences representing signed integers (of any number of digits). Note that a non-zero integer will never start with a zero. If it is a positive zero or negative zero will have only one zero. Some valid sentences (integers) are: +0, -0, +1523, -326, +10087, -200100, etc. Some sample invalid sentences are: +000, -000, +000376, -0839 etc.
   Clearly specify sets of non-terminals, terminals and also specify the starting non-terminal.
   [6 marks]

2. Prove that the following Grammar is ambiguous.
   S→0Y | 01;Y→XY1 | 0;X→ 0XY | 0
   Set of Non-terminals={S, X, Y} Set of terminals={0,1} Starting Non-terminal=S. [6 Marks]

3. Look at the following statements.
   (i) CFGs are used to recognize sentences of their corresponding languages.
   (ii) BNF was first used to describe syntax of Smalltalk.
   (iii) Every ***sentence*** is also a ***sentential form***.
   (iv) Every ***Token*** belongs to a ***Lexeme***.
   Now pick the correct option. [3 marks]

   A. (i) and (ii) are false
   B. (i) and (iv) are true
   C. (ii) and (iii) are false
   D. Only (iii) is correct
   E. Only (i) is correct

4. Look at the following statements.
   (i) An Attribute grammar is an extension to CFG.
   (ii) Only one synthesized attribute and/or one inherited attribute can be associated with a grammar symbol represented as a node of the parse tree.
   (iii) The notation – square brackets "[ ] " are used to represent optional parts in EBNF.
   (iv) Two LMDs of sentence of a language can result in same parse tree.
   Now pick the correct option. [3 marks]

   A. (i) and (ii) are true
   B. (i) and (iii) are true
   C. (ii) and (iii) are false
   D. (i) and (iv) are false

5. Look at the following Grammar.

   S→ aScB

   S→ A | b

   A→ cA | c

   B→ d | A

[6 marks]

Set of Non-terminals={S, A, B} Set of terminals={a, b, c, d}

Starting Non-terminal=S.

Which of the following sentences can be generated by the above grammar?

(i) aacccccd

(ii) acccbccd

(iii) accccd

A. (i) and (ii) can be generated.
B. (ii) and (iii) can be generated.
C. (i) and (iii) can be generated.
D. None of them can be generated.

6. Convert the following EBNF to BNF as discussed in Textbook.

   S→ M{aM}

   M→ b[a]MN

   N→ c(+ | * | -)b

   Set of Non-terminals={S, M, N} Set of terminals={a, b, c, +, *,-}

   Starting Non-terminal=S.

[6 marks]

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