Tutorial No 9

Q 1: Identify the nonterminals and terminals in the following grammars.

(1) S -> Aba | b   A -> BB | aa   B -> bB | c   C -> cC | d
(2) S -> XY1 | 0   X -> 00X | 1   Y -> 1X1
(3) S -> XY   X -> YSY   X -> YY | a   Y -> aXb | b
(4) S -> XY   X -> YSY   X -> YY | 1   Y -> 0X1 | 1

Q 2: Convert the following CFG to CNF:

(1) S -> aAC   A -> aB | bAB   B -> b   C -> c
(2) S -> 0X1Y   X -> 0X | 0   Y -> 1Y | 1
(3) S -> abSab | a |aAAb   A -> bS | aAAb | c

Q 3: Identify and remove the nonreachable nonterminals from the following grammars:

(1) S - > XY1 | 0   X -> 00X | 1   Y -> 1X1   Z -> 00
(2) S -> XZ | 0   X -> YA | 1   Y -> Z1 | A2   A -> 01   B-> X | 2

Q 4: Identify Language

(1) L={ $a^i b^i c^i$ | i>=1 }
   a. Regular Language
   b. CFL
   c. Both CFL & Regular
   d. Neither CFL nor Regular

(2) L={ $a^i b^j c^j$ | I,j>=1 }
   a. Regular Language
   b. CFL
   c. Both CFL & Regular
   d. Neither CFL nor Regular

(3) L={ $a^n b^n c^m d^m$ | n,m>=1 }
   a. Regular Language
   b. CFL
   c. Both CFL & Regular

d. Neither CFL nor Regular

(4) L={ $0^n1^m2^{m+n}$ | n,m>=1 }
   a. Regular Language
   b. CFL
   c. Both CFL & Regular
   d. Neither CFL nor Regular

Q 5: Define Property

(1) CFLs are closed under
   a. Union
   b. Complementation
   c. Intersection
   d. All the above
(2) The CFLs and regular languages are both closed over
   a. Union
   b. Complementation
   c. Intersection
   d. None of the above
(3) The CFLs and regular languages are both closed over
   a. Difference
   b. Intersection
   c. Complement
   d. Concatenation
(4) CFLs are not closed under
   a. Union
   b. Concatenation
   c. Intersection
   d. Homomorphism

Q 6:

The regular expression corresponding to the CFG S -> aS | bS | a | b is

   a. a+b
   b. (a+b)*
   c. (a+b)*(a+b)
   d. None of the above
(1) The CFG corresponding to the language L={0^k1^k | k>=1} is
   a. S -> 0S1 | 01
   b. S -> 0S1 | 01 | ε
   c. S -> 0A1, A -> 01
   d. All the above

(2) The CFL $L=\{a^n b^n \mid n>0\}$ can be generated by the following CFG:

a. $S \rightarrow \epsilon \mid ab \mid aSb$

b. $S \rightarrow ab \mid aSb$

c. $S \rightarrow \epsilon \mid aSb$

d. All of the above