B5.2-R4: AUTOMATA THEORY AND COMPILER DESIGN

NOTE:

1. **Answer question 1 and any FOUR from questions 2 to 7.**
2. **Parts of the same question should be answered together and in the same sequence.**

Time: 3 Hours **Total Marks: 100**

1.

a) What are the different ways of representing three address statements? Explain them in brief.
b) Construct a CFG generating all integers (with sign).
c) What is a symbol table? Why is it necessary?
d) What do you mean by reduction in strength used in the optimization technique? Give an example.
e) What is Syntax directed translation? In this context define synthesized attributes with example.
f) What is a handle? Explain with an example.
g) Suppose G is the grammar with the following production rules.

list→list+list
list→list-list
list→digit
digit→0|1|2|…..|9

Show that G is ambiguous and convert it into unambiguous one.

(7×4)

2.

a) Prove the following theorem by induction: 1+2+3+……..+n = n(n+1)/2 .
b) Convert the following grammar G to Chomsky Normal Form.

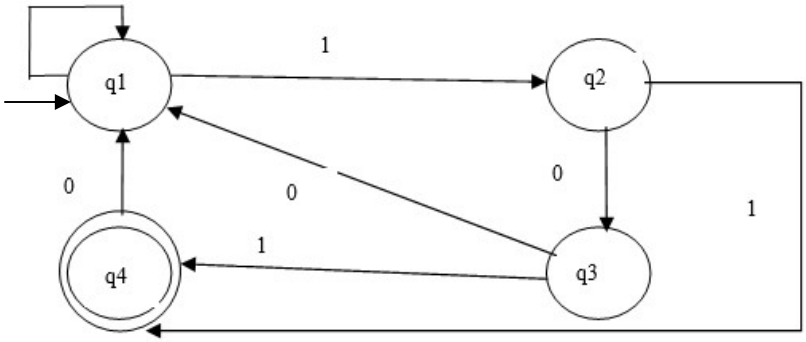
G->aAD
A->aB|bAB
B->b
D->d.

c) What are the error recovery techniques used in syntax analysis phase?

(6+7+5)

3.

a) Find the regular expression corresponding to the following FSM.



b) Define a left recursive grammar. Write an algorithm to eliminate left recursion.
c) Remove the left recursion from the following grammar.

E -> E+T|T
T-> T*F|F
F-> (E)|id

(8+6+4)

4.

a) Construct a PDA accepting the set of all strings over {a,b} with equal no. of a's & b's.

b) How can you define a Direct Acyclic Graph(DAG).Write down its applications.

c) Define Type 2 and Type 3 grammar. Find the highest type number which can be applied for the following grammars.

i. S→Aa, A→c|Ba B→abc

ii. S→ASB|d A→aA

(7+6+5)

5.

a) Suppose you want to parse the string id +id*id. Show the operator precedence relations of id, + and *.Give the procedure for finding handle using the above precedence relation.

b) Construct a Moore machine which is equivalent to the Mealy machine given by the state transition table:

	Next state			
Present state	input a=0		input a=1	
	state	output	state	output
→ q1	q3	0	q2	0
q2	q1	1	q4	1
q3	q2	1	q1	0
q4	q4	1	q3	0

(10+6)

6.

a) What is peephole optimization? Explain its usage with examples.

b) Construct a FA equivalent to regular expression (0+1)*(00+11)(0+1)* .Construct the transition graph and transition table of the corresponding NDFA. Convert the NDFA to DFA with reduced number of states.

c) Write a syntax directed definition for expression in infix to postfix translation. The expression will have the symbols numbers (0-9), + and -, e.g., 4+5-6.

(4+8+6)

7.

a) Draw the steps of parsing id1+ id2*id3 with the help of shift reduce parser. Define viable prefix in this parser.

b) Define LR parser. What are its merits? Also point out the drawbacks of LR parsing method.

(9+9)