- Write short notes on any four of the following:
 - i. Directed acyclic graph(DAG)
 - ii. Syntax tree
 - Triple iii.
 - Quadruple iv.
 - Indirect triple.
- 4. Attempt any two of the following:

 $(10 \times 2 = 20)$

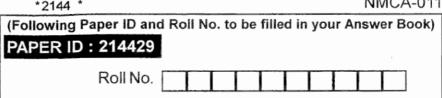
- Describe symbol table and its entries. Also discuss various data structure used for symbol table.
- What is activation record? Explain its organization. Also discuss various storage allocation strategies.
- Discuss how access links and displays are used to access non local names.
- 5. Attempt any two of the following: $(10 \times 2 = 20)$
 - Explain following code improving transformations with examples
 - Local and global elimination of common subexpressions.
 - Copy propagation and dead code elimination.
 - What is basic block write the algorithm for the construction of basic block? Find the basic block from the following code and also draw the CFG.

Printed Pages:5



417

NMCA-011



SPL. THEORY EXAMINATION, 2014-15

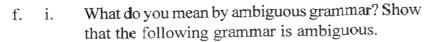
COMPILER DESIGN

Time: 3 Hours]

[Total Marks: 100]

- Attempt any four of the following:
- $(5 \times 4 = 20)$
- Explain the compilation with suitable block diagram. Also discuss the role of various phases of compiler.
- Discuss the bootstrapping of a cross compiler.
- Describe the task performed by following programs:
 - Pre-processor
 - ii. Assemblers
 - Loaders and link-editors.
- Discuss the algorithms for subset construction and computation of \in -Closure.
- Show the construction of NFA for following regular expression
 - (a|b) * a (a|b) (a|b).
 - ii. (a|b)*abb(a|b)*

2144291



$$S \rightarrow aSBS | bSaB | \in$$

- ii. What language is generated by following grammar? In each case justify your answer:
 - 1) $s \rightarrow 0s1 \mid 01$
 - 2) $s \rightarrow +ss|-ss|a$
 - 3) $s \rightarrow s(s)s \mid \epsilon$
- 2. Attempt any two of the following: $(10 \times 2 = 20)$
 - a. What do you mean by left factoring & left recursion? Eliminate left recursion from the following grammar:

$$E \rightarrow E+T|T$$

$$T\to T^*F|F$$

$$F \rightarrow (E)|id$$

b. Consider the following grammar:

$$S' \rightarrow S\#$$

$$S \rightarrow ABC$$

$$A \rightarrow a \mid bbD$$

$$B \rightarrow a \mid \in$$

$$C \rightarrow b \mid \in$$

$$D \rightarrow c \mid \in$$

Construct the first and follow sets for the grammar, also design a LL(1) parsing table for the grammar.

c. Give the algorithm to construct LALR parsing table. Construct the LALR parsing table for following grammar:

$$S \rightarrow AA$$

$$A \rightarrow aA|b$$

- 3. Attempt any two of the following: (10x2=20)
 - a. Consider the following grammar and give the syntax directed definitions to construct parse tree. For the input expression 4*7+1*2 construct an annotated parse tree according to your syntax directed definition:

$$E \rightarrow E+T \mid T$$

$$T \rightarrow T^*F \mid F$$

$$F \rightarrow digit$$

- b. Translate the following segment into three code:
 - i. While(a>b)

else

$$c=c+d*e$$

ii. inti,

$$i=1$$

while a<10 do

$$a=x+y$$

else

214429] (3) [Contd...

$$I := 1$$

$$T_1 := 4 * I$$

$$T_2$$
:=addr(A)-4

$$T_3 := T_2[T_1]$$

$$T_4$$
:=addr(B)-4

$$T_5 := T_4[T_1]$$

$$T_6:=T_3*T_5$$

$$I:=I+1$$

- c. Write short notes on any three of the following:
 - i. Error and its recovery
 - ii. Local and loop optimization
 - iii. Loop unrolling, Loop jamming & code motion.
 - iv. DAG representation of Basic block.

