

c. Write short notes on any four of the following :-

- i. Directed acyclic graph(DAG)
- ii. Syntax tree
- iii. Triple
- iv. Quadruple
- v. Indirect triple.

4. Attempt any two of the following: (10×2=20)

- a. Describe symbol table and its entries. Also discuss various data structure used for symbol table.
- b. What is activation record? Explain its organization. Also discuss various storage allocation strategies.
- c. Discuss how access links and displays are used to access non local names.

5. Attempt any two of the following: (10×2=20)

- a. Explain following code improving transformations with examples
 - i. Local and global elimination of common sub-expressions.
 - ii. Copy propagation and dead code elimination.
- b. 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



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NMCA-011

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 214429

Roll No.

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SPL. THEORY EXAMINATION, 2014-15

COMPILER DESIGN

Time : 3 Hours]

[Total Marks : 100

1. Attempt any four of the following: (5×4=20)

- a. Explain the compilation with suitable block diagram. Also discuss the role of various phases of compiler.
- b. Discuss the bootstrapping of a cross compiler.
- c. Describe the task performed by following programs:
 - i. Pre-processor
 - ii. Assemblers
 - iii. Loaders and link-editors.
- d. Discuss the algorithms for subset construction and computation of ϵ -Closure.
- e. Show the construction of NFA for following regular expression
 - i. $(a|b)^* a (a|b) (a|b)$.
 - ii. $(a|b)^* abb(a|b)^*$

f. i. What do you mean by ambiguous grammar? Show that the following grammar is ambiguous.

$$S \rightarrow aSBS \mid bSaB \mid \epsilon$$

ii. What language is generated by following grammar? In each case justify your answer:

1) $s \rightarrow 0s1 \mid 01$

2) $s \rightarrow +ss \mid -ss \mid a$

3) $s \rightarrow s(s)s \mid \epsilon$

2. Attempt any two of the following: (10x2=20)

a. What do you mean by left factoring & left recursion? Eliminate left recursion from the following grammar:

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

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

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

b. Consider the following grammar:

$$S' \rightarrow S \#$$

$$S \rightarrow ABC$$

$$A \rightarrow a \mid bbD$$

$$B \rightarrow a \mid \epsilon$$

$$C \rightarrow b \mid \epsilon$$

$$D \rightarrow c \mid \epsilon$$

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:

$$S \rightarrow AA$$

$$A \rightarrow aA \mid b$$

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:

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

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

$$F \rightarrow \text{digit}$$

b. Translate the following segment into three code:-

```
i. While(a>b)
    If(c>d)
        c=c-d*e
    else
        c=c+d*e
```

```
ii. inti,
    i=1
    while a<10 do
        if x>y then
            a=x+y
        else
            a=x-y
```

```
PROD:=0
I:=1
T1:=4*I
T2:=addr(A)-4
T3:=T2[T1]
T4:=addr(B)-4
T5:=T4[T1]
T6:=T3*T5
PROD:=PROD+T6
I:=I+1
if I<=20 goto (3)
```

- 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.

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