Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech. (CSE)/SEM-2/PGCS-205B/2011

2011

ADVANCED COMPILER DESIGN

Time Allotted : 3 Hours *Full Marks :* 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Very Short Answer Type Questions)

1. Answer any *five* of the following : 5 × 2 = 10

   i) What do you mean by syntax tree ?

   ii) What is the relation between lexemes and tokens ?

   iii) Differentiate between syntax error and semantic error.

   iv) What do you mean by ambiguous grammar ?

   v) What is look-ahead operator ? Give an example.

   vi) "Code optimization is an optimal phase of compilation process." Comment on the statement.

   vii) What do you mean by inherited attributes ?

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. a) Consider the following conditional statement :

   If ($x > 3$) then $y = 5$ else $y = 10$;

   From the above statement how many tokens are possible and what are that ? 3

   b) With the help of the look ahead concept show how identifiers can be distinguished from keywords. 2

3. a) What is the difference between parse tree and dag ? 2

   b) Compare complier and interpreter. 3

4. Design an FA for the RE $a^* + (ab + a)^*$.

5. What is LEX ? Write a short note on LEX. 2 + 3

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

6. a) Explain the different phases of a complier, showing the output of each phase, using the example of the following statement :

   Position : = initial + rate * 60. 10

   b) Eliminate left recursion from the following grammar :

   $E \rightarrow E + T \mid T$

   $T \rightarrow T*F \mid F$

   $F \rightarrow (E) \mid id$ 5

7. a) Construct SLR parsing table for the following grammar : 10

$S \rightarrow AS \mid b$

$A \rightarrow SA \mid a$

b) Construct the DAG for the following basic block : 5

D : = b*c

e : = a + b

b : = b*c

a : = e – d

8. a) Translate the following expression : 9

a = b* – C + b* – C into

i) Quadruples

ii) Triples

iii) Indirect triples.

b) What are the differences among Quadruples, Triples and Indirect Triples ? 3

c) Generate machine code for the following instruction :

ϑ = a + (b*c) – d 3

9. a)

	Production	Semantic Rules
I)	$L \rightarrow En$	L.val = E.val
II)	$E \rightarrow E_1 + T$	E.val = E_1.val + T.val
III)	$E \rightarrow T$	E.val = T.val
IV)	$T \rightarrow T_1 * F$	T.val = T_1.val × F.val
V)	$T \rightarrow F$	T.val = F.val
VI)	$F \rightarrow (E)$	F.val = E.val
VIII)	$F \rightarrow$ digit	F.val = digit.lexval

Figure 1 : Syntax-directed definition of a simple desk calculator.

For the SDD of figure 1, give annotated parse trees for the following expressions :

i) (3 + 4) * (5 + 6) *n*

ii) 3 * 5 + 4 *n* 5

b) Draw dependency graphs for the above two annotated parse trees. 5

c) What is handle ? Show an illustration of the shift-reduce parsing for a suitable grammar and for each reduction indicate the corresponding handle. 5

10. Write short notes on any *three* of the following : 3 × 5

a) *L*-attributed definitions

b) Peephole optimization

c) YACC

d) Symbol table

e) Input buffering.