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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:
- $5 \times 2 = 10$
- 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?

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#### **GROUP - B**

# (Short Answer Type Questions)

Answer any three of the following.



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?

- 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.
- 4. Design an FA for the RE  $a^*$  + ( ab + a )\*.
- 5. What is LEX? Write a short note on LEX.

### GROUP - C

# (Long Answer Type Questions)

Answer any three of the following.

 $3 \times 15 = 45$ 

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

3

2 + 3

b) Eliminate left recursion from the following grammar:

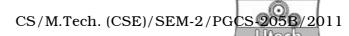
$$E \rightarrow E + T \mid T$$

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

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

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

$$S \rightarrow AS \mid b$$

$$A \rightarrow SA \mid a$$

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 :

$$a = b^* - C + b^* - C$$
 into

- i) Quadruples
- ii) Triples
- iii) Indirect triples.
- b) What are the differences among Quadruples, Triples and Indirect Triples?
- c) Generate machine code for the following instruction :

$$\vartheta = a + (b*c) - d$$

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3

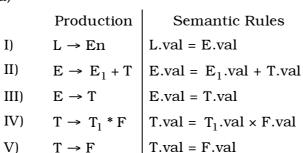
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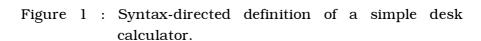
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9. a)

VI)

VIII)





F.val = digit.lexval

F.val = E.val

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

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

ii) 
$$3*5+4n$$

 $F \rightarrow (E)$ 

 $F \rightarrow digit$ 

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.
- 10. Write short notes on any *three* of the following :  $3 \times 5$ 
  - a) *L*-attributed definitions
  - b) Peephole optimization
  - c) YACC
  - d) Symbol table
  - e) Input buffering.

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