Printed Pages: 02 **Sub Code: KCA 015**

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MCA
(SEM III) THEORY EXAMINATION 2022-23
COMPILER DESIGN

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

Note: Attempt all Sections. If you require any missing data, then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2x10 = 20

(a) Discuss the need of cross compiler and how it can be achieved?
(b) Describe the Arden's theorem
(c) Investigate the use of pass of a compiler.
(d) Discuss the requirement of a "lookahead" feature in order to specify their lexical Analyzers.
(e) Demonstrate an example of parse tree and syntax tree.
(f) Show the actions available with shift reduce parsers
(g) Define a postfix notation.
(h) Explain peephole optimization.
(i) Define DAG.
(j) What do you mean by machine dependent and machine independent optimization?

SECTION B

2. Attempt any *three* of the following: 10x3 = 30

(a) Describe the symbol table manager and error handler routines?

(b) Examine the output of lexical analyzer for the following program.

```
int max (x, y)
int x, y;

/* this program find out the maximum of two numbers*/
{
      return (x > y? x: y);
}
```

(c) What are the difficulties with top-down parsing? Explain with examples.

(d) What are the various ways of calling the procedure? Explain in detail

(e) Discuss about the following:
(i) Copy Propagation
(ii) Dead-code Elimination

SECTION C

3. Attempt any *one* part of the following: 10x1 = 10

(a) Consider the following grammar

E → E + E
E →E * E
E → (E)
E → id

Discover whether the above grammar is unambiguous or not. If not convert it and also remove the left recursion from the grammar.

(b) For the Regular expression (a/b)*a(a/b). Draw the NFA. Obtain DFA form NFA

4. Attempt any *one* part of the following: 10x1 = 10

(a) Point out the various phases of compiler and write down the output of each phase of the compilation for the expression a: = (b +d) + (c* 5).

(b) Illustrate how a lexical analyzer can be implemented and Write a LEX program to identify octal and hexadecimal numbers and implement specific action after identifying these tokens.

5. Attempt any *one* part of the following: 10x1 = 10

(a) Compute FIRST and FOLLOW for given Grammar
S ->aBDh
B ->cC
C ->bC | ε
D ->EF
E ->g | ε
F ->f | ε

(b) Make use of the recursive descent parser to write the code in C-Language for the following grammar

E→ TE′
E′→+ TE′|ε
T → FT′
T′→ * F T′|ε
F→ (E) | id

6. Attempt any *one* part of the following: 10x1 = 10

(a) Break down the 3-address code for the statements a =c*-d + b*-c?
(b) classify three types of implementations of three-address statements

7. Attempt any *one* part of the following: 10x1 = 10

(a) What are the issues in the design of code generator? Explain in detail
(b) What is an activation record? Draw diagram of General Activation record and explain the purpose of different fields of an activation record.