

SW-312 COMPILER DESIGN

Time: 3:00 Hours

Max. Marks : 70

Note : Answer any **FIVE** questions.
Assume suitable missing data, if any.

- 1 Construct predictive parsing table for the following grammar and check if it is LL(1) grammar?

 $S \rightarrow AB \mid PQx$ $A \rightarrow xy \mid m$ $B \rightarrow bC$ $C \rightarrow bC \mid e$ $P \rightarrow pP \mid \epsilon$ $Q \rightarrow qQ \mid \epsilon$

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- 2[a] Describe the structure of LR parser. 5
- [b] How is input buffering implemented in lexical analysis? 5
- [c] What is the role of lexical analyser and syntax analyser? What kind of association exists between lexical and syntax analysis phases of a compiler? 4

- 3[a] Generate Intermediate code for the following statement

 $i = 1$ $j = 1$ while ($i < 5$) AND ($j > 6$) do $a = b + c + d$ $i = i + 1$

end while

Optimize the generated 3AC as far as possible.

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- [b] Describe the necessary and sufficient conditions for performing constant propagation and dead code elimination. 4

4[a] Write a syntax directed definition for Boolean expression involving AND, OR and NOT. 7

[b] With the help of an example, show how L-attributed definition is implemented with predictive parser. 7

5[a] Define handle of a sentential form and explain its role in bottom up parsing. 4

[b] Write syntax directed definition to construct three address code for array references. 10

6[a] Write Ullmaan Sethi algorithm to generate code for a given expression tree assuming that the target machine has a finite set of general purpose registers and a finite set of memory locations. The instructions available are

$r \leftarrow m, m \leftarrow r, r \leftarrow op\ m\ r, r_2 = \leftarrow op\ r_1\ r_2$ 7

[b] Generate code for the expression given below using Sethi Ullmaan algorithm

$(a+b) - (c * d) + x$ 7

7 Construct a non deterministic finite automaton using Thompson construction for the regular expression $ab((a^*/b^*)^*)$. Convert the NFA to DFA using subset construction and minimize the states in the DFA. Describe each step. 14