Total number of printed pages–4

53 (IT 603) CPDG

2021

COMPILER DESIGN

Paper : IT 603

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. (a) What is common sub-expression ? How to eliminate it ? Explain with example.

    10

   (b) Write quadruples, triples, indirect triples for the expression —

    $$-(a*b)+(c+d)-(a+b+c+d).$$

    10

Contd.

2. *(a)* With an example for each, explain the following loop optimization techniques : 12

    (i) Code motion

    (ii) Induction variable elimination

    (iii) Strength reduction.

  (b) Draw the syntax tree and DAG for the following expression : 8

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

3. *(a)* Construct the non-recursive predictive parse table for the given grammar and check the acceptance of the input string $abcfg$

$$S \rightarrow A \qquad\qquad A \rightarrow aB \mid Ad$$
$$B \rightarrow bBC \mid f \qquad\qquad C \rightarrow cg$$

                    15

  (b) Define *S*-attributed and *L*-attributed definitions. Give an example for each. 5

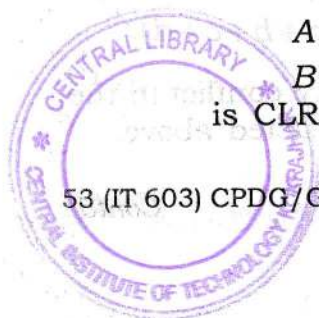4. *(a)* Show the following grammar 10

$$S \rightarrow Aa \mid bAc \mid Bc \mid bBa$$
$$A \rightarrow d$$
$$B \rightarrow d$$

is CLR (1) but not LALR (1).

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(b) Define Symbol Table. Explain about the data structures used for the symbol table. 10

5. *(a)* Compute First and Follow of the following grammar : 5

$$S \rightarrow Bb/Cd$$
$$B \rightarrow aB/\varepsilon$$
$$C \rightarrow cC/\varepsilon$$

(b) Define Ambiguous grammar. Check whether the grammar — 5

$$S \rightarrow aAB,$$
$$A \rightarrow bC/cd,$$
$$C \rightarrow cd,$$
$$B \rightarrow c/d$$

is Ambiguous *or* not.

(c) Construct a LR (0) collection of items for the grammar below. 10
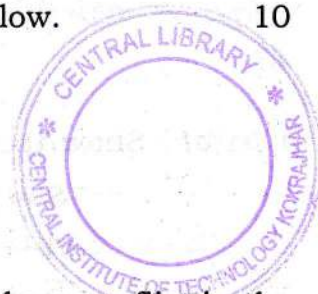
$$S \rightarrow L = R$$
$$S \rightarrow R$$
$$L \rightarrow *R$$
$$L \rightarrow id$$
$$R \rightarrow L$$

Also identify shift reduce conflict in the LR (0) collection constructed above.

6. (a) Write all the phases of a compiler with a diagram. 10

(b) Construct the predictive parsing table for the grammar 10

$$E \rightarrow E + T \,|\, T$$
$$T \rightarrow T * F \,|\, F$$
$$F \rightarrow (E) \,|\, id$$