5E1752

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B. Tech. V - Sem. (Main) Exam., February - 2023

Artificial Intelligence and Data Science

5AID4-02 Compiler Design

CS, IT, AID, CAI

Time: 3 Hours **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 Define context free grammar.

Q.2 What is Hashing? Explain it.

Q.3 Define Input Buffering.

Q.4 What do you understand by Lexical Analyzer?

Q.5 Define finite automation and regular expression.

Q.6 Define left recursion. Is the following grammar left recursive - $E \rightarrow E + E/E * E/a/b$

Q.7 List out different object code forms.

Q.8 Differentiate between compiler and interpreter.

Q.9 Explain different types of errors in compliers with error handling mechanism.

Q.10 What is Bootstrapping?

PART – B

(Analytical/Problem solving questions) **[5×4=20]**

Attempt any five questions

Q.1 Explain all the phases of compiler with the help of suitable example.

Q.2 What is the basic task of scanning? What are the difficulties found in delimiter oriented scanning? How can this be removed?

Q.3 Explain the syntax directed translation schemes in detail.

Q.4 What is the process and importance of intermediate code generation?

Q.5 Consider the expression (Left to right scanning) -

(a/b*c) + (a/b) – (b+(a*b)) (a*b)

Draw the DAG of the above expression.

Q.6 What do you mean by LR Parser? What is the model of an LR Parser? Explain.

Q.7 Construct NFA to accept a(a/b)*b.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[3×10=30]**

Attempt any three questions

Q.1 Generate the three address code for the following code fragment -

```
while(a>b)
{
    if(c>d)
    x = y+z;
    else
    x = y–z;
}
```

Q.2 Consider the following LL(1) grammar describing a certain sort of rented lists -

$S \rightarrow TS|\epsilon$

$T \rightarrow U.T|U$

$U \rightarrow x|y|[s]$

(i) Left factor this grammar

(ii) Give the first and follow sets for each non-terminal in the grammar obtain in part(i).

(iii) Using this information construct an LL parsing table for the grammar obtain in part(i).

Q.3 (a) Calculate canonical collection of sets of LR(0). Items of grammar given below –

$E' \rightarrow E$

$E \rightarrow E+T|T$

$T \rightarrow T* F|F$

$F \rightarrow (\epsilon)|id$

(b) Calculate canonical collection of sets of LR(1) items, for the grammar given below –

$s' \rightarrow s$

$s \rightarrow cc$

$c \rightarrow ec/d$

Q.4 For the assignment statement X = (a + b) * (c + d), construct the translation scheme and an annotated parse tree. Also, differentiate between 'call by value' and 'call by reference' with example.

Q.5 (a) Explain peephole optimization in detail.

(b) Explain the symbol table management system in detail.
