Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem Examination May-2024

CS3CO27 Compiler Design

Programme: B.Tech. Branch/Specialisation: CSE All

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1 i. Which of the following concept of FSA is used in the compiler? **1**

(a) Code optimization (b) Code generation

(c) Lexical analysis (d) Parser

ii. Which of the following component is important for semantic analysis? **1**

(a) Yacc (b) Lex (c) Symbol Table (d) Type Checking

iii. Syntax Analyser is also known as _____. **1**

(a) Hierarchical Analysis

(b) Hierarchical Parsing

(c) Hierarchical Analysis & Parsing

(d) None of these

iv. Predictive Parser can be- **1**

(a) Recursive (b) Constructive

(c) Non recursive (d) Both (a) and (b)

v. Which of the following function is called the canonical collection of LR(0) item. **1**

(a) FIRST (b) GOTO (c) COMPUTE (d) FOLLOW

vi. Which of the following option is not a function of the shift-reduce parser? **1**

(a) Reduce (b) Accept (c) Go (d) Shift

vii. In the compiler, the function of using intermediate code is: **1**

(a) To improve the register allocation

(b) To increase the error reporting & recovery

(c) To make semantic analysis easier

(d) To increase the chances of re-using the machine-independent code optimizer in other compilers

viii. Which mapping is described by the implementation of the syntax-directed translator? **1**
(a) Parse table (b) Input (c) Output (d) Input-Output

ix. Which of the following is correct regarding an optimizer compiler? **1**
(a) Optimize the code
(b) Is optimized to occupy less space
(c) Both (a) and (b)
(d) None of these

x. A variable is called _____ variable if its value is altered within the loop by a loop-invariant value. **1**
(a) Invariant (b) Induction (c) Strength (d) Loop

Q.2 i. What is the role of error handler and symbol table in compiler design? **2**

ii. What do you mean by translator? Write the differences between compiler and interpreter. **3**

iii. List out the phases of compiler design with block diagram. **5**

OR iv. Explain the concept of input buffering. Explain it's methods. **5**

Q.3 i. What is recursive descent parser. **2**

ii. What do you mean by left recursion? **8**
Consider the following grammar and calculate the first and follow function for given grammar.
S → A
A → aB / Ad
B → b
C → g

OR iii. What do you mean by ambigious grammar? Consider following given grammar and Check whether the grammar is LL(1) or not. **8**
S → (L) / a
L → SM
M → ,SM / €

Q.4 i. List out the differences between bottom-up parsing and top down parsing with example. **3**

ii. Consider the given grammar and construct SLR parser. **7**
S → cAd
A → ab |e
And parse the following string: - " ced "

OR iii. Consider the grammar and construct the operator precedence parser. **7**
E → E+ T / T
T → T* F / F
F → id
And parse the following string: - id+id*id

Q.5 i. What is SDT? Write it's applications and distinguish between inherited and synthesized attributes. **4**

ii. Convert the binary number 11011 into decimal number with the help of given SDT. **6**
S → L {S.dv = L.dv}
L → LB { L.dv = 2 * L.dv + B.dv }
L → B { L.dv = B.dv }
B → 0 { B.dv = 0}
B → 1 {B.dv =1}
Where dv is decimal value.

OR iii. Generate the TAC for given expression and also write the Quadruple, triple, indirect triple for expression: **6**
(a*b)+(c-d)*(a*b)+b

Q.6 Attempt any two:

i. Explain global data flow analysis and loop invariant computations. **5**

ii. Name the storage allocation strategies. Explain them. **5**

iii. With the help of block diagram explain the activation records. **5**

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Marking Scheme

CS3CO27 (T) Compiler Design

Q.1 i) C **1**
ii) D **1**
iii) D **1**
iv) A **1**
v) B **1**
vi) C **1**
vii) D **1**
viii) D **1**
ix) C **1**
x) B **1**

Q.2 i. What is the role of error handler and symbol table in compiler design. **2**
Role of Error Handler 1 mark
Role of Symbol Table 1 mark

ii. What do you mean by translator? Write the differences between compiler and interpreter. **3**
Translator Definition 1 mark
Atleast two differences 2 marks

iii. List out the phases of Compiler Design with block diagram **5**
Block Diagram 2 mark
Phases explanation 3 marks

OR iv. What is input buffering.Explain it's methods. **5**
Input buffering with diagram 2 marks
Two methods:
1.One buffer Scheme 1.5 marks
2.Two buffer Scheme 1.5 marks

Q.3 i. What is Recursive Descent Parser. **2**
Definition 2 marks

ii. What do you mean by Left Recursion? **8**
Consider the following grammar and calculate the first and follow function for given grammar.

S → A
A → aB / Ad
B → b
C → g

Left Recursion definition 1 mark
Solution
Removal of Left Recursion from given grammar 1 mark
First Function 3 marks
Follow Function 3 marks

OR iii. What do you mean by ambigious grammar? Consider following given grammar and Check whether the grammar is LL(1) or not. **8**

S → (L) / a
L → SM
M → ,SM / €

Ambigious grammar definition with Example 1 mark
LL (1) Checking with condition 1 mark
Solution
First and Follow function 3 marks
Parsing Table 2 marks
Checking yes/no 1 mark

Q.4 i. List out the differences between bottom up parsing and top down parsing with example. **3**
Differences 2 marks
Example 1 mark

ii. Consider the given grammar and construct SLR parser. **7**
S → cAd
A → ab le
And parse the following string:- " ced "
Solution:
Data Flow Diagram or conical Items compute 3 marks
Parsing table 3 marks
Parsing String 1 marks

OR iii. Consider the grammar and construct the operator precedence parser. **7**
E → E+ T / T
T → T* F / F
F → id
And parse the following string:- id+id*id
Solution:
Parsing Table 3 marks
Parsing String 4 marks

Q.5 i. What is SDT? Write it's applications and Distinguish between inherited and synthesized attributes. **4**
SDT definition 1 mark

Application 1 mark
Differences 2 marks

ii. Convert the binary number 11011 into decimal number with the help of given SDT. **6**

S → L {S.dv = L.dv}
L → LB { L.dv = 2 * L.dv + B.dv }
L → B { L.dv = B.dv }
B → 0 { B.dv = 0}
B → 1 {B.dv =1}

Solution:
Parse tree 5 marks
Output 1 mark

OR iii. Generate the TAC for given expression. And also write the Quadruple, triple ,indirect triple for expression : **6**
(a*b)+(c-d)*(a*b)+b.

Solution:
TAC 1.5 marks
Quadruple 1.5 marks
Triple 1.5 marks
Indirect triple 1.5 marks

Q.6

i. Explain Global data flow analysis and Loop invariant computations. **5**
Global data flow analysis 2.5 marks
Loop invariant computations 2.5 marks

ii. Name the storage allocation strategies. explain them. **5**
Name: 0.5marks
Explanation of 3 strategies 4.5(1.5each)marks

iii. With the help of block diagram explain the activation records. **5**
Block diagram 1.5 marks
Explanation 3.5 marks

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