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

Enrollment No.....

Faculty of Engineering

End Sem Examination May-2023

IT3CO24 Compiler Design

Programme: B. Tech. Branch/Specialisation: IT

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. Choose the incorrect statement- **1**

(a) Moore and Mealy machines are FSM with output capabilities
(b) Any given Moore machine has an equivalent Mealy machine
(c) Any given Mealy machine has an equivalent Moore machine
(d) Moore machine is not an FSM

ii. FSM can recognize- **1**

(a) A grammar depending on the characteristics of FSM
(b) An CFG
(c) Any unambiguous grammar
(d) Only regular grammar

iii. Which tool is used for grouping of characters in tokens in the compiler? **1**

(a) Parser (b) Code optimizer
(c) Code generator (d) Scanner

iv. In which parsing, the parser constructs the parse tree from the start symbol and transforms it into the input symbol. **1**

(a) Bottom-up parsing (b) Top-down parsing
(c) Both (a) and (b) (d) None of these

v. Which is considered as the sequence of characters in a token? **1**

(a) Mexeme (b) Lexeme
(c) Texeme (d) Pattern

vi. Which phase of the compiler checks the grammar of the programming? **1**

(a) Code Optimization (b) Semantic Analysis
(c) Code Generation (d) Syntax Analysis

P.T.O.

vii. Syntax directed translation can be based on _____. **1**
(a) Syntax tree (b) Parse tree
(c) Both (a) and (b) (d) None of these

viii. Which of the following comment about peep-hole optimization is true? **1**
(a) It is applied to small part of the code and applied repeatedly
(b) It can be used to optimize intermediate code
(c) It can be applied to a portion of the code that is not contiguous
(d) It is applied in symbol table to optimize the memory requirements

ix. Which of the following is not available in the activation record of procedure? **1**
(a) Actual Parameters (b) Direct Link
(c) Control Link (d) Temporaries

x. Which of the following activation record unit points to non-local data stored in other activation records? **1**
(a) Machine Status (b) Access Link
(c) Control Link (d) Temporary Variables

Q.2 i. What is Regular Expression? **2**

ii. Differentiate tokens, patterns, and lexeme. **3**

iii. Write the regular expression for- **5**
(a) R=R1+R2 (Union operation)
(b) R=R1.R2 (concatenation Operation)
(c) R=R1* (Kleen Clouser)
(d) R=R+ (Positive Clouser)
(e) Write a regular expression for a language containing strings which end with "abb" over $\Sigma = \{a,b\}$.

OR iv. Let $M=(\{q_0,q_1\}, \{0,1\}, \delta, q_0, \{q_1\})$. Be NFA where $\delta(q_0,0) = \{q_0,q_1\}$, $\delta(q_1,1) = \{q_1\}$ $\delta(q_1,0) = \Phi$, $\delta(q_1,1) = \{q_0, q_1\}$ Construct its equivalent DFA. **5**

Q.3 Attempt any two:

i. Explain Input Buffering with simple examples. **5**

ii. Describe the role of lexical analysis in compiler design. **5**

iii. What is the need for separating lexical analysis and syntax analysis? **5**

Q.4 Attempt any two:

i. Construct the recursive decent parser for the following grammar? **5**
E-> E+T/T

T-> T*F/F
F-> (E)/id

ii. Construct Predictive Parse Table for the grammar **5**
E->E+T/T,T->T*F/F,F->(E)|id and parse the string id+id*id.

iii. Perform Shift Reduce Parsing for the following: **5**
(a) S->(L)|a
L->L,S|S input string: (a,(a,a)) .
(b) E-> E+E / E*E / (E) / id input string (id*id+id)

Q.5 i. Differentiate between L attribute and S attribute. **3**

ii. Describe the evaluation order of SDT with an example. **7**

OR iii. What are three address codes? Explain each of them with example. **7**

Q.6 i. Define scope and life time of variable. **2**

ii. Draw the format of Activation Record in stack allocation and explain each field in it. **8**

OR iii. Explain the Storage Organization with simple examples. **8**

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Objective

IT3CO24 Compiler Design

Q.1 (i) d Moore machine is not an FSM
(ii) d Only regular grammar.
(iii) d Scanner
(iv) b Top down parsing.
(v) b lexeme.
(vi) d Syntax analysis
(vii) c Both (a) & (b)
(viii) d It is applied in symble table to optimize memory req.
(ix) b Direct link.
(x) b Accers link.

Q.2 (i) 2 marks for definition
(ii) 1 mark for each
(iii) 1 mark for each
(iv) 2 mark for table 3 marks for conversion.

Q.3 (i) 3 marks for definition 2 marks for example
(ii) 5 marks for role.
(iv) 5 marks for explaination.

Q.4 (i) 5 marks for step by step function.
(ii) 3 marks for parsing table & 2 marks for parsing string
(iii) 2.5 marks for each.

Q.5 (i) 3 marks for differences (at least 3)
(ii) 5 marks for d-escription & 2 marks for ex.
(iii) 1 mark for definition & 3 marks for explanation & 3 marks for example

Q.6 (i) 1 mark for each definition
(ii) 3 marks for format & 5 marks for explanation
(iii) 5 marks for explanation & 3 marks for example.