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

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2022

CS3CO27 Compiler Design

Programme: B.Tech. Branch/Specialisation: CSE

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.

Q.1 i. A language L from a grammar G = {V, N, Σ, P, S} is? **1**

(a) Set of symbols over VN (b) Set of symbols over Σ

(c) Set of symbols over P (d) Set of symbols over S

ii. A finite automaton recognizes _____. **1**

(a) Any Language (b) Context Sensitive Language

(c) Context Free Language (d) Regular Language

iii. A grammar for a programming language is a formal description of ___. **1**

(a) Syntax (b) Semantics (c) Structure (d) Library

iv. A grammar that produces more than one parse tree for some sentence is called _____. **1**

(a) Ambiguous (b) Unambiguous

(c) Regular (d) None of these

v. A bottom-up parser generates _____. **1**

(a) Right most derivation

(b) Right most derivation in reverse

(c) Left most derivation

(d) Left most derivation in reverse

vi. Consider LR(0) SLR, CLR, LALR parsing, which will have unequal number of states in LR items DFA? **1**

(a) SLR and LALR (b) CLR and LALR

(c) SLR and LR(0) (d) LALR and LR (0)

vii. In activation record, Which of the following stores the address of activation record of the caller procedure? **1**

(a) Access Link (b) Actual Parameters

(c) Control Link (d) Temporaries

P.T.O.

viii. An intermediate code form is _____. **1**
(a) Postfix notation (b) Syntax Trees
(c) Three Address code (d) All of these

ix. The best way to compare the different implementations of symbol table is to compare the time required to _____. **1**
(a) Add a new name
(b) Make an enquiry
(c) Add a new name and make an enquiry
(d) All of these

x. Peep hole optimization _____. **1**
(a) Loop Optimization (b) Local Optimization
(c) Constant folding (d) Data Flow analysis

Q.2 i. Define cross compiler and bootstrapping. **4**
ii. Explain the role of finite automata in lexical analysis. **6**
OR iii. Explain different phases of compiler with neat diagram. **6**

Q.3 i. Differentiate top down and bottom-up parsing technique. **3**
ii. Create LL (1) parsing for following grammar and parse the string acdb$ with the help of parsing table. **7**
S -> aABb
A -> c | ε
B -> d | ε
OR iii. Remove left recursion and calculate first and follow of given grammar, also state whether the given grammar is ambiguous or not: **7**
S → A
A → aB / Ad
B → b
C → g

Q.4 i. Elaborate Operator grammar. **3**
ii. Create SLR parsing table for the given grammar and also state whether the grammar is SLR grammar or not. **7**
S→E
E→E+T / T
T → T * F / F
F → id

OR iii. Construct LALR (1) parsing table for the given grammar. Also Find the canonical set of LR (1) items for the Grammar. **7**
C-> CC
C->cC
C->d

Q.5 i. Define L-attributed definition. **2**
ii. Differentiate synthesised and inherited attributes. **3**
iii. What is three address code? Convert the following expression into quadruple, triples, and indirect triples: **5**
a=b*c + d*c
OR iv. Generate the three-address code for the following program fragment- **5**
while (A< C and B> D) do
if A= =1 then
C: = C+1
else
C: = C-1

Q.6 Attempt any two:
i. Explain basic block and flow graph with example. **5**
ii. What is activation record? List out activation record fields with their purpose. **5**
iii. Explain different optimization techniques in detail. **5**

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Marking Scheme
CS3CO27 Compiler Design

Q.1	i)	b) Set of symbols over Σ	**1**
	ii)	d) Regular Language	**1**
	iii)	c) Structure	**1**
	iv)	a) Ambiguous	**1**
	v)	b) Right most derivation in reverse	**1**
	vi)	b) CLR and LALR	**1**
	vii)	c) Control link	**1**
	viii)	d) All of the mentioned	**1**
	ix)	c) Add a new name and make an enquiry	**1**
	x)	c) Constant folding	**1**
Q.2	i.	cross compiler- 2 Marks bootstrapping- 2 Marks	**4**
	ii.	Role of automata in lexical analyser with example- 6 Marks	**6**
OR	iii.	For the explanation of different Phases of Compiler 4 marks,1 marks for diagram	**6**
Q.3	i.	3 differences, 1 mark for each difference	**3**
	ii.	First & follow calculation-3 marks Parsing table creation-2 marks String acceptance calculation-2marks	**7**
OR	iii.	For left recursion removal: 2 Marks For First set calculation 2 Marks For Follow set calculation 2 Marks For ambiguity: 1Marks	**7**
Q.4	i.	Operator Grammar def/rules- 2 Marks Example-1 Mark	**3**
	ii.	canonical set of items- 3 Marks Parsing table- 2 Marks SLR grammar or not – 1 Mark	**7**
OR	iii.	canonical set of LR (1) items-4 marks LALR parsing table-3 Marks	**7**
Q.5	i.	L-attributed definition- 2 Marks	**2**
	ii.	3 differences between synthesised and inherited attributes – 1 mark each	**3**
	iii.	Three address code definition-2 Marks Quadruples, triples and indirect tuples-3 Marks	**5**
OR	iv.	Three address code conversion- 5marks	**5**
Q.6			
	i.	Basic block, flow graph – 2marks Creating basic block & flow graph of example – 3marks	**5**
	ii.	Activation record definition-2 Marks Activation record fields with its explaination-3 Marks	**5**
	iii.	optimization techniques with example- 5 Marks	**5**

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