

Enrollment No.....



Faculty of Engineering
End Sem (Odd) Examination Dec-2019
CS3CO27 / IT3CO17 Compiler Design

Programme: B.Tech.

Branch/Specialisation: CS/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.

- Q.1 i. 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
- ii. A finite automata recognizes **1**
 (a) Any Language (b) Context Sensitive Language
 (c) Context free Language (d) Regular Language
- iii. The symbol table implementation is based on the property of locality of reference is **1**
 (a) Linear list (b) Search tree
 (c) Hash Table (d) Self Organisation
- iv. A system program that combines separately compiled modules of a program into a form suitable for execution is **1**
 (a) Assembler (b) Linking loader
 (c) Cross compiler (d) None of these
- v. Which of the following describes a handle (as applicable to LR-parsing) appropriately? **1**
 (a) It is the position in a sentential form where the next shift or reduce operation will occur
 (b) It is non-terminal whose production will be used for reduction in the next step
 (c) It is a production that may be used for reduction in a future step along with a position in the sentential form where the next shift or reduce operation will occur
 (d) It is the production p that will be used for reduction in the next step along with a position in the sentential form where the right-hand side of the production may be found

P.T.O.

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- vi. Which of the following production rule does not satisfy the property of operator grammar? **1**
 (a) $A \rightarrow BC$ (b) $A \rightarrow \epsilon$
 (c) Both (a) and (b) (d) None of these
- vii. Which of the following is not an intermediate code form? **1**
 (a) Three address code (b) Postfix
 (c) Prefix (d) None of these
- viii. Consider the following Syntax Directed Translation Scheme (SDTS), **1**
 with non-terminals $\{S, A\}$ and terminals $\{a, b\}$
 $S \rightarrow aAb \{ \text{print} "1" \}$
 $A \rightarrow aAb \{ \text{print} "2" \}$
 $A \rightarrow \epsilon \{ \text{print} "3" \}$
 Using the above SDTS, the output printed by a top down parser for the input aaabbb is
 (a) 321 (b) 3221 (c) 1223 (d) None of these
- ix. The specific task storage manager performs **1**
 (a) Allocation/ deallocation of programs
 (b) Protection of storage area assigned to the program
 (c) Both (a) and (b)
 (d) None of these
- x. The method which merges the bodies of two loops is **1**
 (a) Loop rolling (b) Loop jamming
 (c) Constant folding (d) None of these
- Q.2 Attempt any two:
- i. Construct finite automata that will accept set of all strings of zeros and ones that contain even numbers of zeros and odd numbers of ones. **5**
- ii. Construct a minimal state DFA for the following regular expression: **5**
 $(alb)^* \mid (ab)^*b \mid a^*(bb)^*$
- iii. Construct finite automata that accept all possible strings of zeros and ones that do not contain 011 as a substring. **5**
- Q.3 i. What do you mean by token and lexeme? **2**
 ii. What is bootstrapping? Explain with a suitable example? **3**
 iii. Draw and explain various phases of compiler. **5**
- OR iv. What are error recovery actions in lexical analysis phase? **5**
- Q.4 i. Compare the top-down and bottom-up parsing techniques. **3**

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- ii. Test whether the grammar is LL(1) or not and construct predictive parsing table for it- **7**
 $S \rightarrow AaAb \mid BbBa$
 $A \rightarrow \epsilon$
 $B \rightarrow \epsilon$
- OR iii. Construct the LALR(1) parsing table for the following grammar- **7**
 $S \rightarrow Aa \mid bAc \mid dc \mid bda$
 $A \rightarrow d$
- Q.5 i. Give a brief introduction of Syntax Directed Translation Scheme. **4**
 ii. What is attributed grammar? Explain synthesized and inherited attributed grammar with the help of suitable example. **6**
- OR iii. Generate the three-address code for the following program fragment- **6**
 while (A < C and B > D) do
 if A = 1 then
 C := C + 1
 else
 while A <= D do
 A := A + 3
- Q.6 Attempt any two:
- i. What is activation record? Give the general activation record field and their purpose. **5**
- ii. Write short note on Basic Blocks. **5**
- iii. Compare various symbol table management techniques. **5**

Marking Scheme
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Q.1	i.	A grammar that produces more than one parse tree for some sentence is called	1
		(a) Ambiguous	
	ii.	A finite automata recognizes	1
		(d) Regular Language	
	iii.	The symbol table implementation is based on the property of locality of reference is	1
		(c) Hash Table	
	iv.	A system program that combines separately compiled modules of a program into a form suitable for execution is	1
		(b) Linking loader	
	v.	Which of the following describes a handle (as applicable to LR-parsing) appropriately?	1
		(d) It is the production p that will be used for reduction in the next step along with a position in the sentential form where the right-hand side of the production may be found	
	vi.	Which of the following production rule does not satisfy the property of operator grammar?	1
		(c) Both (a) and (b)	
	vii.	Which of the following is not an intermediate code form?	1
		(d) None of these	
	viii.	Consider the following Syntax Directed Translation Scheme (SDTS), with non-terminals {S, A} and terminals {a, b}	1
		(b) 3221	
	ix.	The specific task storage manager performs	1
		(c) Both (a) and (b)	
	x.	The method which merges the bodies of two loops is	1
		(b) Loop jamming	
Q.2		Attempt any two:	
	i.	Construct finite automata	5
		For Correct steps	2 marks
		For Correct diagram	5 marks
	ii.	Construct a minimal state DFA	5
		For each correct step 1 mark	(1 mark * 5)
	iii.	Construct finite automata	5
		For each correct step 1 mark	(1 mark * 5)

Q.3	i.	Token	1 mark	2
		Lexeme	1 mark	
	ii.	Definition of bootstrapping	1 mark	3
		Explanation	1 mark	
		Example	1 mark	
	iii.	Various phases of compiler.		5
		Phases diagram	2 marks	
		0.5 mark for each phase explanation (0.5 mark * 6)	3 marks	
OR	iv.	Error recovery actions in lexical analysis phase		5
		1 mark for each action	(1 mark * 5)	
Q.4	i.	Compare the top-down and bottom-up parsing techniques.		3
		0.5 mark for each difference	(0.5 mark * 6)	
	ii.	First and follow	2 marks	7
		Predictive parsing table	4 marks	
OR		Grammar is LL(1)	1 mark	
	iii.	Closer function	1 mark	7
		Goto graph/ steps	3 marks	
		LALR(1) parsing table	3 marks	
Q.5	i.	Syntax Directed Translation Scheme		4
		Definition	1 mark	
		Introduction	2 marks	
		Example	1 mark	
	ii.	Attributed grammar	2 marks	6
		Synthesized attributed grammar	1 mark	
OR		Inherited attributed grammar	1 mark	
		Example	1 mark	
	iii.	Generate the three-address code		6
		Stepwise marking 1 mark for each step	(1 mark * 6)	
Q.6		Attempt any two:		
	i.	Activation record	1 mark	5
		Diagram	1 mark	
		Explanation and purpose of activation record field	3 marks	
	ii.	Basic Blocks	3 marks	5
		Example	2 marks	
	iii.	Each comparison between three different techniques		5
		1 mark for each comparison	(1 mark * 5)	
