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

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2022

CB3CO10 Compiler Design

Programme: B.Tech. Branch/Specialisation: CSBS

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. Which of the following is a definition of compiler? **1**

(a) Acceptance of a program written in a high-level language and produces an object program

(b) Program is put into memory and executes it

(c) Translation of assembly language into machine language

(d) None of these

ii. Which of the following is known as a compiler for a high-level language that runs on one machine and produces code for a different machine? **1**

(a) Cross compiler (b) Multi pass compiler

(c) Optimizing compiler (d) One pass compiler

iii. Which of the following statements is false? **1**

(a) Ambiguous grammar can't be LR (k)

(b) An LL (1) parser is a top-down parser

(c) LALR is more powerful than SLR

(d) Left as well as right most derivations can be in Unambiguous grammar

iv. Which of the following suffices to convert an arbitrary CFG to an LL(1) grammar? **1**

(a) Removing left recursion only (b) Factoring the grammar alone

(c) Factoring & left recursion removal (d) None of these

v. Type checking is normally done during _____. **1**

(a) Lexical Analysis (b) Syntax Analysis

(c) Code generation (d) Syntax Directed Translation

P.T.O.

vi. Which attributes get values from the attribute value of child nodes? **1**
(a) Synthesized attributes (b) Inherited attributes
(c) S-attributed SDT (d) L-attributed SDT

vii. What is the use of a symbol table in compiler design? **1**
(a) Finding name's scope
(b) Type checking
(c) Keeping all of the names of all entities in one place
(d) All of these

viii. Which of the following is not true about the Symbol Table? **1**
(a) All the labels of the instructions are symbols
(b) Table has entry for symbol name address value
(c) Perform the processing of the assembler directives
(d) Created during pass 1

ix. Which of the following is machine dependent code optimization? **1**
(a) Constant folding (b) Copy Propagation
(c) Peephole Optimization (d) Loop Optimization

x. A fragment of code that resides in the loop and computes the same value at each iteration is called a- **1**
(a) Induction analysis (b) Strength reduction
(c) loop-invariant code (d) None of these

Q.2 i. What is the significance of buffer pair in lexical analyzer? **2**
ii. What are the functions of lexical analyzer? **3**
iii. Explain various phases of compiler with neat and labelled diagram. **5**
OR iv. Explain the role of finite automata in case of lexical analyser with example. **5**

Q.3 i. Define context free grammar with example. **2**
ii. Remove left recursion and calculate FIRST and FOLLOW of given grammar, also state whether the given grammar is ambiguous or not: **8**
S → A
A → aB / Ad
B → b
C → g
OR iii. Create predictive parser parsing table for the grammar. Also identify whether the given grammar is ambiguous or not: **8**

S–>A
A–>aB / bd
B–>bBC / f
C→g

Q.4 i. What is symbol table and what is its significance? **3**
ii. What is Bottom-Up parsing? Differentiate SLR, LR and LALR parser? **7**
OR iii. Create SLR(1) parsing table for the given grammar. Check whether given grammar is SLR(1) or not- **7**
S→E
E→E+T / T
T → T * F / F
F → id

Q.5 i. What is DAG? Draw DAG for following expression: **4**
A = (B*-C) + (B*-C)
ii. Translate following expression into quadruples, triples and indirect triples: **6**
(X - Y) / (Z*C) - (X + Y - Z)
OR iii. What is the significance of Intermediate Code? Explain different forms of Intermediate Code Representation. **6**

Q.6 Attempt any two:
i. Explain Peephole optimization & its technique. **5**
ii. Elaborate Loop Optimization Techniques. **5**
iii. Construct basic block and flow graph for expression: **5**
if(x>y && y>z)
x++;

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Marking Scheme
CB3CO10 Compiler Design

Q.1	i)	a)Acceptance of a program written in a high-level language and produces an object program	**1**
	ii)	a) Cross compiler	**1**
	iii)	d) Left as well as right most derivations can be in Unambiguous grammar	**1**
	iv)	(d) None of these	**1**
	v)	d) Syntax Directed Translation	**1**
	vi)	a) Synthesized attributes	**1**
	vii)	d) all of the mentioned	**1**
	viii)	c) Perform the processing of the assembler directives	**1**
	ix)	c) Peephole Optimization	**1**
	x)	c) loop-invariant code	**1**
Q.2	i.	significance of buffer pair in lexical analyzer-2 Marks	**2**
	ii.	1 Mark for each functions of lexical analyzer(3 functions)	**3**
	iii.	For the explanation of different Phases of Compiler 4 marks,1 marks for diagram	**5**
OR	iv.	Role of finite automata- 3 marks Example- 2 marks	**5**
Q.3	i.	Definition: 1 Mark Example: 1 Mark	**2**
	ii.	For left recursion removal: 2 Marks For First set calculation 2 Marks For Follow set calculation 2 Marks Result: 1Marks Ambiguous grammar- 1 Mark	**8**
OR	iii.	For First set 2 marks For Follow set 2 marks For Parsing table 3 marks For Ambiguous or not verify 1 marks	**8**
Q.4	i.	Symbol table definition- 2marks Symbol table significance- 1 Mark	**3**
	ii.	For Bottom up parsing: 2.5 Marks 3 difference: 1.5 Mark for each difference between SLR,LR and LALR	**7**
OR	iii.	For DFA(canonical items set) 3 Marks SLR(1) parsing table 3 Marks SLR Grammar identification: 1 Mark	**7**
Q.5	i.	Intermediate code -2 Marks DAG: 2 Marks	
	ii.	Conversion into quadruples: 2 Marks Conversion into triples: 2 Marks Conversion into indirect triples: 2 Marks	**6**
OR	iii.	significance of intermediate code: 3 Marks intermediate code representation forms: 3 Marks	**6**
Q.6			
	i.	Peephole optimization: 1 Mark Its different techniques: 4 Marks (1 for each)	**5**
	ii.	2.5 Marks for each loop optimization techniques (2 techniques)	**5**
	iii.	3 address code-2 Marks Basic block-2 Marks Flow chart – 1 Mark	**5**

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