Enrollment No.....................................

Faculty of Engineering
End Sem Examination Dec-2023
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.　In a compiler, keywords of a language are recognized during-　**1**
　　　(a) Parsing of the program
　　　(b) The code generation
　　　(c) The lexical analysis of the program
　　　(d) Dataflow analysis

　　ii.　Regular expression are-　**1**
　　　(a) Type 0 language
　　　(b) Type 1 language
　　　(c) Type 2 language
　　　(d) Type 3 language

　　iii.　A PDA machine configuration (p, w, y) can be correctly　**1**
　　　represented as:
　　　(a) (current state, unprocessed input, stack content)
　　　(b) (unprocessed input, stack content, current state)
　　　(c) (current state(current state, unprocessed input, stack content),
　　　　　stack content, unprocessed input)
　　　(d) None of these

　　iv.　Which of the following statement is correct?　**1**
　　　(a) All Regular grammar are context free but not vice versa
　　　(b) All context free grammar are regular grammar but not vice
　　　　　versa
　　　(c) Regular grammar and context free grammar are the same
　　　　　entity
　　　(d) None of these

v. Which one of the following is a top-down parser? **1**
(a) An LALR(k) parser
(b) An LR(k) parser
(c) Operator precedence parser
(d) Recursive descent parser

vi. What is the similarity between LR, LALR and SLR? **1**
(a) Use same algorithm, but different parsing table
(b) Same parsing table, but different algorithm
(c) Their Parsing tables and algorithm are similar but uses top down approach
(d) Both Parsing tables and algorithm are different

vii. Who is responsible for the creation of the symbol table? **1**
(a) Assembler (b) Compiler (c) Interpreter (d) All of these

viii. Which of the following is drawback of static allocation strategy? **1**
(a) Size of the data objects must be known at compile time
(b) Data structures cannot be created dynamically
(c) Recursive procedure are restricted
(d) All of these

ix. The method which merges the bodies of two loops is? **1**
(a) Loop rolling (b) Loop jamming
(c) Constant folding (d) None of these

x. The graph that shows basic blocks and their successor relationship is called _____. **1**
(a) DAG (b) Flow Graph
(c) Control Graph (d) Hamilton Graph

Q.2 i. Differentiate Compiler and Interpreter. **3**
ii. What is Finite State Machine (FSM)? Design a DFA to accept the binary numbers which are divisible by 3. **7**
OR iii. Explain in detail the various phases of compiler with an example. **7**

Q.3 i. What is Bottom-Up Parsing? **2**
ii. Check whether the given grammar is LL(1) or not **8**
$S \rightarrow iEtSS' / a$
$S' \rightarrow eS / E$
$E \rightarrow b$

OR iii. Write the CFG for the following language: **8**
(a) $L = \{0^i 1^j 2^{i+j} | i , j > 0\}$
(b) $L = \{a^n b^m c^m d^n | m , n > 0\}$

Q.4 i. What is Syntax Directed Definition? Write its type. **3**
ii. Construct the SLR(1) parsing table for the following grammar. **7**
$S \rightarrow L = R / R$
$L \rightarrow R / id$
$R \rightarrow L$
OR iii. Construct the LR(0) parsing table for the following grammar **7**
$S \rightarrow AA$
$A \rightarrow aA | b$

Q.5 i. Explain in detail different dynamic storage allocation strategies. **4**
ii. Generate the three-address code for the following code segment: **6**
while (a < c and b < d) do
if a = 1 then c = c + 1;
else while (a < = d) do
a = a + 3;
OR iii. What are the features and capabilities of the symbol table? **6**

Q.6 Write short note on any two:
i. Peephole Optimization **5**
ii. Design Issues of Code generator **5**
iii. Code Optimization Techniques **5**

*****

Marking Scheme
CB3CO10 (T) Compiler Design

Q.1	i)	(c) the lexical analysis of the program	1
	ii)	(d) Type 3 language	1
	iii)	(a) (current state, unprocessed input, stack content)	1
	iv)	(a) All Regular grammar are context free but not vice versa	1
	v)	(d) Recursive descent parser	1
	vi)	(a) Use same algorithm, but different parsing table	1
	vii)	(b) Compiler	1
	viii)	(d) All of the above	1
	ix)	(b) Loop jamming	1
	x)	(b) Flow Graph	1

Q.2	i.	At least 3 difference each of :	(1 Mark*3)	3
	ii.	Definition:	2 Marks	
		Finite Automata design:	5 Marks	7
OR	iii.	Phases:	5 Marks	
		Exam:	2 Marks	7

Q.3	i.	Definition:	(As per explanation)	2
	ii.	First:	2 Marks	
		Follow :	2 Marks	
		Parsing table:	4 Marks	8

	OR	iii.	Each of : 4 Marks (Grammar 3 Marks and tuple 1 Marks)	8
Q.4	i.	Definition:	2 Marks	
		Types:	1 Marks	3
	ii.	First & follow :	3 Marks	
		LR(0) items:	2 Marks	
		parsing table:	2 Marks	7
OR	iii.	First & follow :	3 Marks	
		LR(0) items:	2 Marks	
		parsing table:	2 Marks	7

Q.5	i.	Each type storage allocation : 1 Marks	(1 Mark*4)	4
	ii.	Three-address code upto if condition	3 Marks	
		Three-address else condition to end	3 Marks	6
OR	iii.	Features :	3 Marks	
		Capabilities :	3 Marks	6

Q.6				
	i.	Concept :	2 Marks	
		Objective:	1 Marks	5
		Optimization Techniques :	2 Marks	
	ii.	Explain each issue :	(1 Mark*5)	5
	iii.	Explain each technique :	(1 Mark*5)	5

******