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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: V**

Branch: Computer Science and Engineering **Duration: 3 hrs.**

Course Code: 23CS5PECPD **Max Marks: 100**

Course: Compiler Design

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	CO	PO	Marks
1	a)		Explain the different phases of compiler and describe the translation of the statement "Position = initial + rate *6" at each phase.	*CO1*	*PO1*	**14**
	b)		Construct the transition diagram and regular definition for recognizing lexemes matching token for unsigned numbers.	*CO*	*PO3*	**6**
			OR			
2	a)		Explain the applications of compiler technology.	*CO1*	*PO1*	**5**
	b)		Describe the input buffer scheme used in lexical analysis with look ahead code with sentinels.	*CO1*	*PO1*	**9**
	c)		Construct the transition diagram for recognizing lexemes matching token for identifiers and white space.	*CO3*	*PO3*	**6**
			UNIT - II			
3	a)		Consider the grammar, S → +SS | *SS | a Show that the grammar is suitable for the construction of predictive parsing table and parse the input string +*aaa.	*CO2*	*PO2*	**10**
	b)		Construct LR(0) automata for the given grammar S → Aa | bAc| Bc | bBa A → d B → d	*CO3*	*PO3*	**10**
			OR			

	4	a)	Using the given predictive parsing table, Parse the input string "aaaccbbb". Terminal/ Input | a | c | b | $ S | S → ASb | S→C | S → ε | S → ε A | A → a | | S` → +S | S` → ε C | | C → c C | C → ε | C → ε	*CO2*	*PO2*	**10**
		b)	Verify whether any conflicts arise for the given input string id + id * id and (id + id) in Shift-Reduce parser using the grammar. E → E + T | T T → T * F | F F → (E) | id	*CO2*	*PO2*	**10**
			UNIT - III			
	5	a)	For the given syntax directed definition (SDD), verify the dependency between the variables in the expression 1*2*3*(4+5)n using S attributed SDT and construct semantic rules, annotated parse tree and dependency graph. PRODUCTION 1) $L \rightarrow E$ n 2) $E \rightarrow E_1 + T$ 3) $E \rightarrow T$ 4) $T \rightarrow T_1 * F$ 5) $T \rightarrow F$ 6) $F \rightarrow (E)$ 7) $F \rightarrow$ digit	*CO2*	*PO2*	**10**
		b)	Design an SDD and SDT for type setting boxes for the grammar B → B1 B2 | B1 sub B2 | (B1) | text	*CO3*	*PO3*	**10**
			OR			
	6	a)	For the given syntax directed definition (SDD), verify the dependency between the variables in the expression "int a, b" and float a, b, c using annotated parse tree and dependency graph. Production | Semantic Rules 1) $D \rightarrow T\ L$ | *L.inh* = *T.type* 2) $T \rightarrow$ **int** | *T.type* = integer 3) $T \rightarrow$ **float** | *T.type* = float 4) $L \rightarrow L_1$, **id** | L_1.*inh* = *L.inh* *addType* (**id**.*entry*, *L.inh*) 5) $L \rightarrow$ **id** | *addType* (**id**.*entry*, *L.inh*)	*CO2*	*PO2*	**10**

		b)	Explain L Attributed and S attributed SDD with an example	*CO1*	*PO1*	**10**
			UNIT - IV			
	7	a)	Translate the arithmetic expression a < b or c > d or e < f into the following i) Syntax tree ii) Three address code iii) Quadruple iv) Triples v) Indirect triples	*CO2*	*PO2*	**10**
		b)	Illustrate the steps involved in translation of switch statements with syntax directed translation.	*CO2*	*PO2*	**10**
			OR			
	8	a)	Define Directed acyclic graph. Give the DAG for the following. Show the steps as each instruction is processed *a = b x c* *d = b* *e = d x c* *b = e* *f = b + c* *g = f + d* Give the quadruple representation for the same.	*CO1*	*PO1*	**10**
		b)	Write code and syntax directed definition for flow-of-control statements.	*CO1*	*PO1*	**10**
			UNIT - V			
	9	a)	Describe the issues in the design of a code generator**.**	*CO1*	*PO1*	**10**
		b)	Design an activation record and Activation Tree for quick_sort ([38, 27, 43, 3, 9, 82, 10])	*CO3*	*PO3*	**10**
			OR			
	10	a)	Describe the concepts of stack allocation space with example.	*CO1*	*PO1*	**10**
		b)	Construct and explain the Directed acyclic graph for the following basic blocks. i) b= 12 + a x = b[t1] b[t2] = y ii) x =a[t1] a[t2] = y z = a[t1]	*CO1*	*PO1*	**6**
		c)	Write flow graph for the following snippet.	*CO3*	*PO3*	**4**

```
 1)   i = 1
 2)   j = 1
 3)   t1 = 10 * i
 4)   t2 = t1 + j
 5)   t3 = 8 * t2
 6)   t4 = t3 - 88
 7)   a[t4] = 0.0
 8)   j = j + 1
 9)   if j <= 10 goto (3)
10)   i = i + 1
11)   if i <= 10 goto (2)
12)   i = 1
13)   t5 = i - 1
14)   t6 = 88 * t5
15)   a[t6] = 1.0
16)   i = i + 1
17)   if i <= 10 goto (13)
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