



VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

REG.NO.:

SLOT:A1+TA1

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2025-2026

Programme Name & Branch : B.Tech CSE and Specialisation
 Course Code and Course Name : BCSE307L - Compiler Design
 Faculty Name(s) : Prof. MUTHUNAGAI S U, Prof. KRISHNARAJ N, Prof. NIVITHA K,
 Prof. ISLABUDEEN M, Prof. VISWANATHAN A, Prof. SUGANTHINI C, Prof. KANAGARAJ R, Prof. KATARI
 BALAKRISHNA, Prof. LAKSHMI S, Prof. BHAWANA TYAGI, Prof. BASKARAN P, Prof. SENDHIL KUMAR
 K.S, Prof. NAGA PRIYADARSINI R, Prof. VISHNU PRIYA A, Prof. BHUVANESWARI M
 Class Number(s) : VL2025260101612, 1590, 1614, 1619, 1579, 1627, 1592,
 1581, 1610, 1636, 1597, 1608, 1632, 1584, 1587
 Date of Examination : 05.10.2025 (AN)
 Exam Duration : 90 minutes Maximum Marks: 50

General instruction(s):

- Answer All Questions
- Mo – Module; M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level
 (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
 CO2. Develop language specifications using context free grammars (CFG).
 CO3. Apply the ideas, the techniques, and the knowledge acquired for the purpose of
 developing software systems.
 CO4. Constructing symbol tables and generating intermediate code.
 CO5. Obtain insights on compiler optimization and code generation.

Q. No	Question	Mo	M	CO	BL
1.	Let the grammar $G=(V,\Sigma,P,S)$ where: $V = \{ Stmt, DeclStmt, Type, IdList, IdListTail \}$, $\Sigma = \{ char, identifier, ,, ; \}$ and $S = Stmt$ Production rules are defined as follows. a. A statement consists of a declaration statement. b. A declaration statement starts with a type, followed by a list of identifiers, and ends with a semicolon. c. Only the char type is supported in this definition. d. The identifier list begins with an identifier, followed by optional additional identifiers. e. Allows declaring multiple variables, separated by commas f. Ends the identifier list when there are no more variables. Formulate the grammar. Demonstrate the formulated grammar is LALR or not with a detailed justification. And consider any string $w \in L(G)$ to illustrate the parsing process.	2	10	2	3
2.	We have the following grammar with translation rules. Here S, T, and R are Non-terminals; id represents an integer; id.val gives its integer value; # and % are operators. $S \rightarrow S_1 \# T \quad \{ \text{_____} \}$ $S \rightarrow T \quad \{ S.val = T.val \}$ $T \rightarrow T_1 \% R \quad \{ \text{_____} \}$ $T \rightarrow R \quad \{ T.val = R.val \}$ $R \rightarrow id \quad \{ R.val = id.val \}$	3	10	3	3



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	When we evaluate an expression $20 \# 10 \% 5 \# 8 \% 2 \% 2$ using this translation scheme, the S.val is 80. Hence answer the following. (a) Fill the blanks with appropriate semantic rules. (b) Write about operator precedence and associativity. (c) Build a parse tree using productions. (d) Perform bottom-up evaluation using semantic rules.				
3.	(a) Represent the following code into Quadruple, triples and indirect triples form. <pre>int main() { int i; int a[10]; for (i = 0; i < 10; i++) { a[i] = 0;} return 0;}</pre> (b) Write SDT to generate an intermediate code for the following code snippet. <pre>while (a < b && c != d) { count++; } count+=4;</pre> Do you think back patching is required for the above case? Justify your answer with a detailed explanation.	4	10	4	2
4.	Answer the following and design a syntax-directed definition for calculating the storage layout of a three-dimensional array declared with zero-based indexing. Consider the array declaration format: $T A[d1][d2][d3]$; Where: T is a primitive data type (int, float, or char), d1, d2, and d3 are the dimension sizes. (a) Complete the missing part of the grammar rule to represent the array declaration. (b) Define the semantic rules required to compute the total storage size for the given array. (c) Using a bottom-up parsing approach, demonstrate the step-by-step semantic evaluation and computation of the total size for a sample input declaration (e.g., $\text{int } A[2][3][4]$);. (d) Specify the attributes and its types used in the syntax-directed definition.	4	10	4	3
5.	Translate the following code snippet into three address code. Identify the basic blocks and construct a flow graph for the same. <pre>for (i = 2; i <= n; i++) { a[i] = TRUE; } count = 0; s = sqrt(n); for (i = 2; i <= s; i++) { if (a[i] == TRUE) { count++; for (j = 2 * i; j <= n; j = j + i) { a[j] = FALSE; } } }</pre>	5	10	5	2
