

**K. J. Somaiya Institute of Technology, Sion, Mumbai-22**  
**(Autonomous College Affiliated to the University of Mumbai)**

April - May 2023

B.Tech Program: Computer Engineering

Examination: TY Semester: VI

Course Code: CEC601

Course Name: System Programming and Compiler Construction

Date of Exam : 12/5/23

Duration: 2.5 Hours

Max. Marks: 60

**Instructions:**

- (1) All questions are compulsory.  
 (2) Draw neat diagrams wherever applicable.  
 (3) Assume suitable data, if necessary.

		Max. Marks	CO	BT level
<b>Q 1</b>	<b>Solve any six questions out of eight:</b>	<b>12</b>		
<b>i)</b>	Arrange the following System Software according to their role in Program Execution: Linker, Loader, Compiler, Macro-preprocessor, Assembler, Text Editor	<b>2M</b>	<b>CO1</b>	<b>Ap</b>
<b>ii)</b>	Enlist the data structures involved in the design of a Macroprocessor.	<b>2M</b>	<b>CO3</b>	<b>U</b>
<b>iii)</b>	What is a Loader?	<b>2M</b>	<b>CO4</b>	<b>U</b>
<b>iv)</b>	Enlist the functions of the Assembler	<b>2M</b>	<b>CO2</b>	<b>U</b>
<b>v)</b>	Define a Lexeme, Token and Pattern with an example	<b>2M</b>	<b>CO5</b>	<b>U</b>
<b>vi)</b>	Enlist the Top Down Parsing techniques	<b>2M</b>	<b>CO5</b>	<b>U</b>
<b>vii)</b>	Enlist the issues in Code Generation Phase in the process of Compilation?	<b>2M</b>	<b>CO6</b>	<b>U</b>
<b>viii)</b>	Enlist the different Intermediate Code Representations	<b>2M</b>	<b>CO6</b>	<b>U</b>
<b>Q.2</b>	<b>Solve any four questions out of six.</b>	<b>16M</b>		
<b>i)</b>	Differentiate between Compiler and Interpreter	<b>4M</b>	<b>CO1</b>	<b>U</b>
<b>ii)</b>	Explain how the Two Pass Assembler resolves Forward referencing problems.	<b>4M</b>	<b>CO2</b>	<b>U</b>
<b>iii)</b>	Explain Nested Macro Call with an example	<b>4M</b>	<b>CO3</b>	<b>U</b>
<b>iv)</b>	Describe Relocating Loader and Direct Linking Loader.	<b>4M</b>	<b>CO4</b>	<b>U</b>

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v)	Deduce the FIRST and FOLLOW of the non-terminals in the following Grammar : $S \rightarrow ACB / CbB / Ba$ $A \rightarrow da / BC$ $B \rightarrow g / \epsilon$ $C \rightarrow h / \epsilon$	4M	CO5	Ap
vi)	Generate the assembly language code for the following Arithmetic Expression: $a = b + (c * d)$ based on code generation algorithm. Also depict the updations in Register descriptors and address descriptors	4M	CO6	Ap
<b>Q.3</b>	<b>Solve any two questions out of three.</b>	<b>16M</b>		
i)	Explain the working of Pass 2 Macro Processor with flowchart.	8M	CO3	U
ii)	Construct the Predictive Parsing(LL) table for the given grammar. Also, mention the steps involved in deriving the Parsing Table. $E \rightarrow E + T \mid T$ $T \rightarrow T * F \mid F$ $F \rightarrow (E) \mid id$	8M	CO5	Ap
iii)	Write the Three Address Code (TAC) notation for the following Arithmetic Expression : $-(a * b) + (c + d) - (a + b + c + d)$	8M	CO6	Ap
<b>Q.4</b>	<b>Solve any two questions out of three.</b>	<b>16M</b>		
i)	Using a Flowchart to explain the working of Pass 2 of a Two Pass Assembler.	8M	CO2	U
ii)	Deduce the Operator Precedence Parsing Table for the given grammar. Also, perform the parsing action over the given input string Grammar : $E \rightarrow E - E \mid E * E \mid id$ Input string : $id - id * id$	8M	CO5	Ap
iii)	Explain any 4 Code Optimization techniques with proper examples.	8M	CO6	U

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