Department of Computer Science and Engineering, SVNIT, Surat.
End Semester Examination, April 2024
B.Tech.- III (CSE) Semester-VI
Course: System Software(CS306)

Date: 17-04-2024 **Time: 9.00hrs to 12.00hrs** **Marks: 50**

Instruction:

1. **Write your Admission number clearly in the answer books along with the other details.**
2. **Assume any necessary data but give proper justifications.**
3. **Be brief, precise, clear and to the point in answering the questions. Unnecessary elaboration WILL NOT fetch more marks.**
4. **Begin new question in a new page**

Q1 a. Explain the different phases of a compiler. Show the output of the various phases for the following assignment statement : **a = a+b*c*2** **[3]** **[5]**

b. Write the rules to compute FIRST and FOLLOW sets **[2]**

[OR]

b. Write the rules to remove left recursion and left factoring **[2]**

Q2 a. Consider the following syntax-directed definition (SDD): **[5]**

$E \rightarrow E + E$	{ E.val = E_1.val + E_2.val}
$\mid E - E$	{ E.val = E_1.val - E_2.val}
$\mid E * E$	{ E.val = E_1.val * E_2.val}
$\mid E / E$	{ E.val = E_1.val / E_2.val}
$\mid (E)$	{ E.val = E_1.val }
$\mid unary - E$	{ E.val = - E_1.val }
$\mid num$	{ E.val = num.val}

Give the annotated parse tree and find the value for the expression :$((2 + 3) * 5)/9 + (-5)$ **[3]**

b. Give a leftmost derivation, a rightmost derivation, a parse tree for the following grammar and string : $S \rightarrow S\,(\,S\,)\,S \mid \epsilon$ *with the string* (()()). **[2]**

Q3 Consider the following grammar: **[4]**

$$S \rightarrow SS + \mid SS * \mid a$$

a. Is the grammar SLR? Justify your answer through the LR(0) DFA and Parse table.

b. If the above answer is yes, show the parsing actions for the the input $aa * a +$

[OR]

Consider the following grammar:

$$E \rightarrow E + T \mid T$$
$$T \rightarrow T * F \mid F$$
$$F \rightarrow (E) \mid id$$

a. Is the grammar LR? Justify your answer through the LR(0) DFA and Parse table.

b. If the above answer is yes, show the parsing actions for the the input $id * id + id$

Q4 a. Construct LR(1) items for the following grammar : **[3]** **[6]**

$$S \rightarrow CC$$
$$C \rightarrow cC$$
$$C \rightarrow d$$

b. Explain the different types of conflicts in bottom up parsers with example **[3]**

Q5 a. Explain Quadruples and Triple with example.**[2]** **[5]**

b. For the following grammar.

$$S \rightarrow [SX]|a$$
$$X \rightarrow \varepsilon \mid +SY \mid Yb$$
$$Y \rightarrow \varepsilon \mid -SXc$$

Compute First and Follow sets for the non-terminals and construct LL(1) parsing table.**[3]**

Q6 a. Differentiate between Top-Down and Bottom-up Parsers **[2]** **[5]**

b. What do you understand by handle? What is Handle pruning ? Explain stack implementation of shift reduce parser with the help of an example **[3]**

Q7 a. Write an assembly program ***using macros*** for calculating ***power of any number*** , i.e, a^n, where "a" is a public variable and "n" is an external variable. Both should be the parameters. **[6]**

Note: Use advanced macro facilities to cover all possible cases of digit n. **[3]**

b. For any macro call of the above program, make all applicable macro preprocessor tables. **[3]**

OR

b. Compare and contrast macro preprocessor and macro assembler.

Q8 Differentiate between literal and constant in assembler along with their syntax. Justify the need of POOLTAB. **[4]**

OR

How can we handle **nested macro call** expansions? Discuss the same with suitable data structures.

Q9 a. What are the types of loaders? Discuss any four functions of loaders. **[2]** **[5]**

b. Explain Compile and go loader schemes with its advantages and disadvantages. **[3]**

Q10 a. What is the need of DLL? Differentiate between Static and Dynamic Linking. **[2]** **[5]**

b. What is an object module and what comprises it ? How the data in the object module is used in linking as well as relocation of the program? **[3]**

*******Best of Luck*******