DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
B.TECH. SEMESTER VI [INFORMATION TECHNOLOGY]
SUBJECT: (IT 608) LANGUAGE TRANSLATOR

Examination	**: First Sessional**	**Seat No.**	**:**
Date	**: 10/01/2019**	**Day**	**: Thursday**
Time	**: 1.15 P.M. to 2.30 P.M.**	**Max. Marks**	**: 36**

INSTRUCTIONS:

1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.
5. Here | is rule separator and ^ or ε character stands for NULL.

Q.1 Do as directed.

(a) In Gcc compiler,the options -s is used to generate the assembly output code,whereas option -c is used to only compile the code and not proceed with linking further. **[1]**
[-s, -v, -l , -c, -o]

(b)With reference to flex scanner generator tool, identify the role of "yylval",from following given [Give the token attribute value/Used to access the matched lexeme/ Give the token name]. **[1]**
It is used to give the token attribute value. When a token is recognized, attribute information of that token is made available through the global variable yylval.

(c)Consider the **grammar G1** defined by the following production rules, with two operators * and + . What is associativity(left/Right / Both) of both operators ? **[2]**

Grammar G1: $S \to T * P \quad T \to U \mid T * U \quad P \to Q + P \mid Q \quad Q \to Id \;\; U \to Id$

(d)State following statements are true or false and give justification for your answers. **[8]**

(i) For source language supporting loops, the interpreter is preferable as compared to compiler. 2
The statement is False. Whether an interpreter or a compiler is preferable does not depend on whether the source language supports loops. Both interpreters and compilers are capable of handling languages that support loops

(ii) It is good to have separate scanner and parser phase in compilers. 2
The statement is true . It increases Modularity , efficiency,poratability

(iii) If source language supports dynamic data types, interpreters are preferable rather then compiler. 2
This statement is true.Interpreters are preferable for languages with dynamic data types because they can evaluate the type of each expression at run time and perform the appropriate operations.

(iv) If source language supports forward reference, a "single pass" translator **can not** be designed. 2
The statement is true. A single pass translator processes the source code only once, from left to right, and generates the target code on the fly. Therefore, a single pass translator cannot handle forward references, because it does not have the information about the symbol at the time of the reference.

Q.2 Attempt ***Any Two*** from the following questions. **[12]**

(a)Consider the following grammar G2 with terminals [,], a, b, c, +, and - : [6]

Grammar G2: $S \to [\, S\, X\,] \mid a \qquad X \to \varepsilon \mid + S\, Y \mid Y\, b \qquad Y \to \varepsilon \mid - S\, X\, c$

(I) Compute First and Follow sets for the non-terminals in this grammar. 2
(II) Create the top-down parsing table. 2
(III) Using your parse table, parse input string : ***[a+a-ac]*** 2

(b) Write Recursive Descendant Parser (RDP) for the following grammar G3. [6]
Grammar G3: S→ qABC A→a | bbD B→a | ε C→b|ε D→x|ε 3+3
Show parsing process using your handwritten parser for input string : qbbxa

(c) Discuss characteristics of various types of Top-down parser. [6]
Note: To support your discussion,
1. State: The problems associated with each parsing techniques with example.
2. Emphasis: What are the additional care we required to take for parser driver generation.

Q.3 (a)Consider following specification of a **language L1:** **[8]**
Keywords are "if" and "ifelse".
Rule for User identifiers is:- start with capital letters, followed by one or more letters.
Integer constants are written in single quotes.
The keywords are reserved. Also the language is a free flow language.
Now answer following questions with reference to L1.
(i) Identify the tokens formed for following program. **2**

If a='12' then '123'else'23a'

Also mention what attributes you would send to parser phase for each valid/invalid data identified.
(ii) Give a Finite automaton / transition diagram for scanner phase of L1. **3**
(iii) Write the algorithm for scanner of L1. **3**

(b) Explain following tools features in brief -1) LLVM 2) Clang **[2]**

(c) Consider the **grammar G4: S→ Sa / ε / bB / bD B → b D → d.** Is the given grammar suitable for LL(1) Top-down parsing? If yes, find first and follow set, else remove the problems and make it suitable for LL(1) parsing algorithm. **[2]**

OR

Q.3 (a) Consider 3 distinct languages with following special features - **[6]**
L_1) keywords not reserved.
L_2) Allows space between user defined identifiers.
L_3) User variable should start only from 10th column in a row.
Now explain what issues you would have to face to design translator for each of them.
And explain how you would solve them, using individual respective code snippets.

(b) (i)Give the phase structure of compiler. Explain benefits of logical organization of the phases. **[4]**
(ii) Explain the usage of "relocation table" in the translation process. **[2]**