National University of Computer and Emerging Sciences, Lahore Campus

Course Name:	Theory of Programming Languages	Course Code:	CS 507
Program:	CS	Semester:	Spring 2018
Duration:	75 Minutes	Total Marks:	30
Paper Date:	27-Mar-18	Weight	
Section:		Page(s):	2
Exam Type:	Midterm		

Student : Name:_____ Roll No._____

Instruction/Notes:

1. [5] Explain the concept of orthogonality in design of programming languages. You should give at least two examples of language features where the design is orthogonal and two examples where it is not.

2. [4] A class of assignment statements in C/C++ has the following form: a **op**= b where **op** is an arithmetic or logic operator. Discuss the pros and cons of these statements from the perspective of readability and writability.

3. [4] For the following SNOBOL program, explain the meaning of each line and show the output.

```
    COLOR = ('GOLD' | 'BLUE') . SHADE
    CRITTER = ('FISH' | 'BIRD') . ANIMAL
    BOTH = COLOR CRITTER
    'BLUEBIRD' BOTH

    OUTPUT = SHADE
    OUTPUT = ANIMAL
END
```

4. [2] List two features of ADA programming language that are not usually found in other programming languages.

5. [5] Complete POP or PUSH function / procedure in ADA programming language. You need to take care of all the conditions. Package STACK is already created and given below:

```
package STACK is
        procedure PUSH (x : INTEGER);
        function POP return INTEGER;
end STACK;

package body STACK is
```

6. [5] Write a recursive function in LISP programming language that determines whether a given element exists in the given list or not. If yes, the function should return all the elements followed by the first occurrence of the element that is being found, otherwise the function should return NIL.
   Note: Do not use the member function of LISP library.
   Syntax: (defun func-name (arg-1 ... Arg-n) func-body)

7. [5] Write a function that counts total occurrences of an element X in the list or array. You can complete this question in ADA or LISP Programming language.