National University of Computer and Emerging Sciences, Lahore Campus

Course Name:	Compiler Construction	Course Code:	CS-402
Program:	BS (CS)	Semester:	Spring 2018
Duration:	60 Minutes	Total Marks:	35
Paper Date:	28-Feb-2018	Weight	
Section:	ALL	Page(s):	2
Exam Type:	Midterm-I		

Student : Name:_____ Roll No._____
Section:_____

Instruction/Notes: Solve question 1 on the question paper, while rest on the answer sheet.

Question 1 (5+5 marks)

a) Answer the following multiple choice questions:

1. Which of the following language processor provides fastest execution:
   a) Compiler
   b) Interpreter
   c) Hybrid system
   d) Both compiler and hybrid
   e) Both interpreter and hybrid

2. Which of the following language processor provides code protection:
   a) Compiler
   b) Interpreter
   c) Hybrid system
   d) Both compiler and hybrid
   e) Both interpreter and hybrid

3. Which of the following language processor is best for debugging:
   a) Compiler
   b) Interpreter
   c) Hybrid system
   d) Both compiler and hybrid
   e) Both interpreter and hybrid

4. Which of the following language processor provides plate-form independence (portability):
   a) Compiler
   b) Interpreter
   c) Hybrid system
   d) Both compiler and hybrid
   e) Both interpreter and hybrid

5. Which of the following language processor uses both a compiler and an interpreter:
   f) Compiler
   g) Interpreter
   h) Hybrid system
   i) Both compiler and hybrid
   j) Both interpreter and hybrid

b) Match the entries in the first column with the corresponding description in the second:

a) Lexical analyzer	i. Convert words into sentences
b) Parser	ii. Type checking
c) Semantic analyzer	iii. Translator
d) Intermediate code generator	iv. Execute program
e) Interpreter	v. Identify words

Question 2 (5+5 marks)

a) Give output of a lexical analyzer for the following program:

```
int sum(int a[], const int N) {
   int s = 0;
   for (int i = 0; i < N; ++i)
               s = s + a[i];
   return s;
}
```

b) Consider a programming language that allows programmer to write date-literal as follows:

```
Date birthday = 15-Apr-1990;
```

Here a new variable "birthday" of Date type is declared and initialized. The date literal has two integers, then three letters for the month, and finally four digits for year.

Give a regular definition for all possible date literals. You need not to perform any checks, such as the day cannot exceed 31, etc.

Question 3 (5+5+5 marks)

a) Consider the following grammar:

```
E -> E + E | E - E | E * E | E / E | id | num | ( E )
```

Set precedence of addition and subtraction higher than that of multiplication and division. Also set associativity of all the operators from right to left.

b) Remove left recursion from the following grammar:

```
BE -> BE and BF | BE or BF | BF
BF -> true | false | ( BE )
```

c) Left factor the following grammar:

```
S -> IF | ELSE
IF -> if ( E ) S
ELSE -> if ( E ) S else S
```