BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BE **SEMESTER : VII/ADD**
BRANCH: IT **SESSION : MO/18**

SUBJECT: IT7043 COMPILER DESIGN

TIME: 3 HOURS **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) What is the first thing a compiler does when a source program is passed to it? [2]

Q.1(b) Explain types of errors may detected by the compiler during compilation process. [4]

Q.1(c) Explain other supporting software required for the language processing system other than compiler. Explain the flow of source program to target machine code. [6]

Q.2(a) Identify lexical error if any in following code: [2]

i) Int b = “ 2…5” ;

ii) Int float = ‘a ;

Q.2(b) Design and specify regular expression to construct Lexical Analyser for Real Constants. [4]

Q.2(c) Verify the string id + id * id is member of the following grammar or not, by using LL(1) algorithm and consider the following parsing table for the same: [6]

E → T X
X → + T X / ε
T → F Y
Y → * F Y / ε
F → id

	Id	**+**	*****	**$**
E	E → T X			
X		X → + T X		X → ε
T	T→ F Y			
Y		Y → ε	Y → * F Y	Y → ε
F	F → id			

Q.3(a) Compute **FIRST** set of all Non-Terminals for following Grammar: [2]

S → AB
B → aAB **/** ε
A → XY
Y → bXY **/** ε
X → d **/** nSm

Q.3(b) Compute **FOLLOW** set of all Non-Terminals for above Grammar: [4]

Q.3(c) Construct LL(1) parsing table for the following grammar: [6]

S → aABC
A → a / bb
B → a / ε
C → b / ε

Q.4(a) Construct an equivalent grammar after removing left recursion: [2]

E → Ea **/** Eb **/** b **/** a

Q.4(b) Explain shift-reduce and reduce-reduce conflicts in SLR(1) with an example. [4]

Q.4(c) Construct LALR(1) table and verify the following grammar is LALR(1) or not: [6]

S → Aa
S → bAc
S → Bc
S → bBa
A → d
B → d

PTO

Q.5(a) Differentiate between Synthesized and Inherited attributes. [2]

Q.5(b) Construct Syntax Directed Translation that would compute total number of one's present in binary string, where "count" is a attribute and "S.count" would give the total no 1's in the string (given). [4]

S → L
L → LB
L → B
B → 0
B → 1

Q.5(c) Construct operator precedence parsing table for the following grammar [6]

A → B * A / B
B → B + C / C
C → D @ C / D
D → d

Q.6(a) Explain the concept of Optimization. [2]

Q.6(b) Generate Assembly code for the following code with one register only. How many number of spills required for generating the code: [4]

A = a+ b
B = c +d
C = e – B
D = A - C

Q.6(c) Generate three address code for the following code: [6]

```
Switch(a+b)
{
        Case 1: c = a + b ; break ;
        Case 2: {
                        If( (a>b) or (c<d) )
                                A = x + y * z ;
                    } break ;
       Default: x = y + z ; break ;
}
```

Q.7(a) Explain concept of induction variable in optimization technique. [2]

Q.7(b) Construct DAG for the following code: [4]

A = b * c
D = x + y
G = b * c
H = D – A

Q.7(c) Briefly describe the process of static and dynamic allocation of memory by compiler. [6]

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