| BICS-016 |

B.Tech. – VIEP – COMPUTER SCIENCE AND ENGINEERING (BTCSVI)

Term-End Examination

00413 **June, 2018**

BICS-016 : SYSTEM PROGRAMMING AND COMPILER DESIGN

Time : 3 hours   *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks.*

1. Explain, with a neat diagram, the phases of a compiler. **10**

2. Define context free grammar. Give context free grammars that generate the following language : **10**

    $\{a^i\, b^j\, c^k \mid i, j, k \geqslant 0, \text{ and } i = j \text{ or } i = k\}$

3. Using CFG

    $G = \{S \rightarrow S \cup S \mid SS \mid S^* \mid (S) \mid 0 \mid 1 \mid \phi \mid e\}$,

    give a derivation and the corresponding parse tree for the string

    $(0 \cup (1\ 0)^*1)^*$. **10**

4. Design an NFA for regular expression a* + (ab)* and convert the NFA to DFA. **10**

5. (a) Obtain the directed acyclic graph for the expression

$$a + a*(b - c) + (b - c)*d.$$ *4*

(b) Translate the arithmetic expression $a + -(b + c)$ into quadruples, triples and indrect triples. *6*

6. (a) Discuss the schemes for error detection and recovery in each phase of a compiler. *5*

(b) Describe the merits and demerits of single-pass and multi-pass compilers. *5*

7. Define code optimization. Explain the different loop optimization techniques with the help of examples. *10*

8. Discuss input buffering and preliminary scanning in lexical analysis. *10*

9. (a) Describe the different data structures used in symbol table implementation. *5*

(b) Define basic blocks and flow graphs. *5*

10. Write short notes on any *two* of the following : *2×5=10*

(a) Lexeme

(b) Debug Monitors

(c) Type Checking