

UG-510

BCA-15

**B.C.A. DEGREE EXAMINATION –
DECEMBER, 2018.**

Third Year

THEORY OF COMPUTER SCIENCE

Time : 3 hours

Maximum marks : 75

PART A — (5 × 5 = 25 marks)

Answer any FIVE questions.

1. $n(A) = 6, n(B) = 8, n(C) = 6, n(A \cup B) = 11, n(A \cap B) = 3,$
 $n(A \cap C) = 2$ and $n(B \cap C) = 5$. Find $n(A \cap B \cap C)$.
2. If $A \cap B \rightarrow C$, the show that $A = B \rightarrow C$.
3. Explain phase structure grammar and context sensitive grammar.
4. Partition $A = \{0,2,4,6,8,10\}$ with minsets generated by $B_1 = \{0,4,8\}$ and $B_2 = \{2, 10\}$.
5. Prove that maximum number of edges in simple graph with 'n' vertices is $n(n-1)/2$.

6. Find the truth value for $(P \rightarrow Q) \leftrightarrow (\neg P \vee Q)$.
7. Obtain grammar for the language.

$$L(G) = \{a^m b^n \mid m \neq n, m, n > 0\}.$$

PART B — (5 × 10 = 50 marks)

Answer any FIVE questions.

8. Show that $A \leq B \leftrightarrow A \cap B = A$.
9. Explain the different types of grammar.
10. Show the following equivalence with and without constructing the truth table.
$$(P \rightarrow (Q \vee R)) \leftrightarrow (P \rightarrow Q) \vee (P \rightarrow R).$$
11. Define Turing machine. Design Turing machine to accept language $L(G) = \{0^n 1^n \mid n \geq 1\}$.
12. Define connected graph and directed graph. Show that every connected graph with n vertices must at least $(n-1)$ edges.
13. Define DFA and N DFA and explain with an example.
14. Define path, reachability and connected in detail.