**Reg. No:**

Time: **3 hours**                                                                              Max. Marks: **60**

(Answer all Five Units **5 X 12 = 60** Marks)

## UNIT-I

**Q.1**  a.  Explain conjunction and disjunction with suitable examples.                     6M
         b.  Find the truth table for the propositional formula $(p \leftrightarrow q) \leftrightarrow (q \to p)$.     6M

**OR**

**Q.2**  a.  Show that $(P \vee Q) \wedge (\neg P \wedge Q) \leftrightarrow (\neg P \wedge Q)$.     6M
         b.  Show the implication $(p \to q) \to q \Rightarrow p \vee q$.     6M

## UNIT-II

**Q.3**  (i) Let $S = \{1, 2, 3, 4, 5\}$ and let $A = S \times S$. Define the following relation $R$ on

A such that $(a, b) R (a', b')$ if and only if $ab' = a'b$.

(ii) Show that R is an equivalence relation.
(iii) Compute A/R                                                                           12M

**OR**

**Q.4**  a.  Let the relation, R = {(1, 2), (2, 3), (3, 4)} on the set {1, 2, 3, 4}. Obtain
             transitive closure of R.                                                        6M
         b.  If H is a non-empty complex of a group G, then prove that H is a
             subgroup of G if and only if $a, b \in H \Rightarrow ab^{-1} \in H$, where $b^{-1}$ is the inverse
             of $b$ in G.                                                                     6M

## UNIT-III

**Q.5**  a.  In how many ways can 10 people be seated in a row, so that a certain
             pair of them are not next to each other?                                        6M
         b.  How many 6 digit decimal numbers contain exactly three different
             digits?                                                                         6M

**OR**

**Q.6**  a.  In how many ways can a committee of 5 ladies and 4 gents be chosen
             from 9 ladies and 15 gents, if gent, A refuses to take part if lady, B is
             on the committee?                                                               7M
         b.  Show that if eight people are in a room, at least two of them have
             birthday that occur on the same day of the week.                                5M

## UNIT-IV

**Q.7**  Solve $a_n - 4a_{n-1} + 4a_{n-2} = (n+1)^2$, given $a_0 = 0, a_1 = 1$.                 12M

**OR**

**Q.8**  a.  Explain the recurrence relation. What is its application in computer
             science with suitable examples?                                                 6M
         b.  Solve $a_n - 3a_{n-1} - 4a_{n-2} = 3^n$, given $a_0 = 1, a_1 = 2$.               6M

## UNIT-V

**Q.9**     Explain the algorithm for the depth first search (DFS) traversal of a graph with suitable example.     12M

**OR**

**Q.10**     Determine the number of edges in,
   i. Complete graph $K_n$
   ii. Complete bipartite graph $K_{m,n}$
   iii. Cyclic graph $C_n$ and
   iv. Path graph $P_n$.     12M

**\*\*\* END \*\*\***