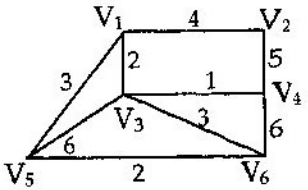
8. (a) Find the minimal spanning tree for the graph using Prim's method : 6



(b) Prove that A vertex V is a cut – vertex of a connected graph G iff there exist two vertices x and y distinct from V such that every path between x and y passes through V.

SECTION – V

9. (a) Define direct product of lattices.

(b) Write De-Morgan's laws for Boolean Algebra.

(c) Define complement of a simple graph.

(d) Define Binary tree.

(e) Define Bridge of a graph.

(f) Define Modular lattice.

Roll No. .....

91557

B. Sc. 2nd Sem. (Mathematics) (Hons.)
Old & New Examination – May, 2016

DISCRETE MATHEMATICS-II

Paper : BHM-124

Time : Three Hours] *[Maximum Marks : 60*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *one* question from each Section. Section-*V* is *compulsory.*

SECTION – I

1. (a) Let $(L, \leq)$ be a lattice in which $\wedge$ and $\vee$ denote the operations of meet and joint. Then prove that for any $a, b \in L$: 6

(i) $a \leq b$ iff $a \wedge b = a$ (ii) $a \leq b$ iff $a \vee b = b$

(b) Consider the lattice $L = \{1, 2, 3, 6\}$ under divisibility relation and the lattice $(P(S), \subseteq)$ where $S = \{a, b\}$. Then show that the lattices L and $P(S)$ are isomorphic. 6

2. (a) Consider the lattice $L = \{0, 1, 2, 3, 6\}$ under divisibility relation. Then show that $(L, /)$ is a complete lattice. 6

(b) Show that the lattice of factors of 45 under divisibility is a distributive lattice. 6

SECTION – II

3. (a) Show that complement of an element a in Boolean algebra B is unique. 6

(b) Consider the Boolean algebra B of power set of $\{a, b, c\}$ and the Boolean algebra $B' = \{1, 2, 5, 7, 10, 14, 35, 70\}$. Then show that B and B' are isomorphic. 6

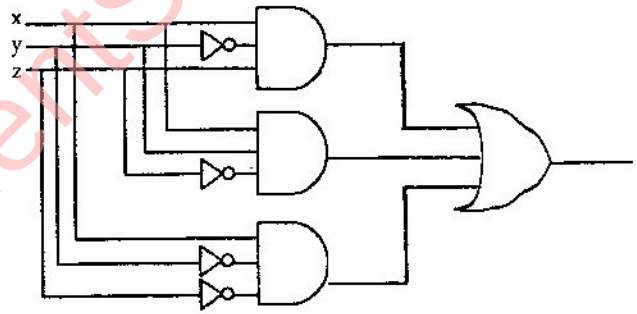
4. (a) Use the Karnaugh map representation to find a minimal form of each of the following functions : 6

(i) $f(x,y,z) = xyz' + xy'z' + x'y'z' + x'y'z + x'yz + x'yz'$

(ii) $f(x,y,z,w) = xyz'w' + xyz'w + xy'zw + xy'zw' + x'y'zw + x'y'zw' + x'yw'z'$

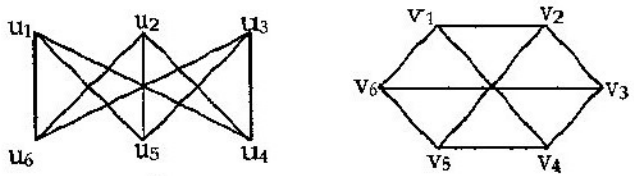
(iii) $f(x,y,z,w) = xyzw' + xy'zw' + xy'z'w' + xy'z'w + x'y'zw' + x'y'z'w' + x'yz'w'$

(b) Use Karnaugh maps to redesign logic circuit given below : 6



SECTION – III

5. (a) Show that the graphs given below are isomorphic ? 6



(b) Draw a graph that has : 6

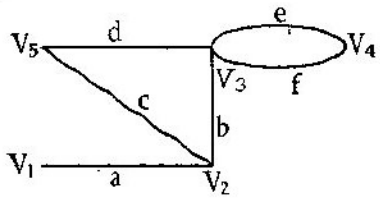
(i) an Euler circuit but has no Hamiltonian circuit.

(ii) has Hamiltonian circuit but has no Euler circuit.

(iii) has neither an Euler circuit nor a Hamiltonian circuit.

6. (a) Show that in a simple planar graph G of n vertices ($n \geq 3$), there is at least one vertex of degree ≤ 5. 6

(b) Write the incidence and adjacency matrix of the graph : 6



SECTION - IV

7. (a) Prove that every connected graph has at least one spanning tree. 6

(b) Construct the tree for the expression $(a + b - c.d) \div \left(g^3 - f\right)$ and convert the expression in Polish notation also. 6