(b) State and solve Koingsberg seven bridge problem.

7. (a) State and prove Euler's formula for connected planar graph. **7½**

(b) Verify whether the graph with adjacency matrix given below is connected : **7½**

$$A = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 0 & 0 \\ 1 & 0 & 0 \end{bmatrix}$$

Unit IV

8. (a) A directed graph has the following adjacency matrix. Check whether it is strongly connected : **7½**

$$A(G) = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$$

(b) Define isomorphism of trees. Are the following trees isomorphic ? **7½**

No. of Printed Pages : 05 **Roll No. ....**

BB-344

Dual Degree B. Sc. (Hons.)
EXAMINATION, May 2018

(Second Semester)

(Main & Re-appear)

MATHEMATICS

MAT218H

Discrete Mathematics-II

Time : 3 *Hours*] [*Maximum Marks* : 75

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

Note : Q. No. **1** is compulsory. Attempt any *Four* questions *one* question from each Unit.

1. (a) Let $a, b, c \in L$ where $(L, \leq)$ is a distributive lattice. Then prove that : $a \vee b = a \vee c$ and $a \wedge b = a \wedge c$ implies $b = c$.

(b) Find the atoms of the Boolean algebra :

(i) B^2

(ii) B^4

(iii) B^n for $n \geq 1$.

(c) In a graph G, the number of odd vertices is an even number.

(d) If G is a tree on n vertices, then G has $(n - 1)$ edges. **15**

Unit I

2. (a) Define a lattice and give one example. Prove the associated law and absorption law of lattices. **7½**

(b) Define complemented distributive lattice and prove that de Morgan's laws hold good in it. **7½**

3. (a) Prove that direct product of any *two* distributive lattices is a distributive lattice. **7½**

(b) Is the Cartesian product of two lattices always a lattice ? Prove your claim. **7½**

Unit II

4. (a) Define Boolean algebra and prove associative laws of it. **7½**

(b) Let a be any element of a Boolean algebra then prove that :

(i) Complement of 'a' is unique

(ii) $(a')' = a$

(iii) $O' = I$ and $I' = O$. **7½**

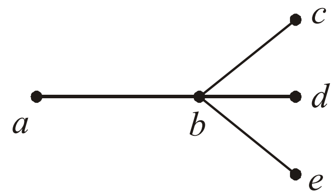
5. (a) Reduce the following Boolean function : $F = \Sigma m(0, 1, 2, 3, 8, 9, 13, 15$ **7½**

(b) Explain briefly switching circuits. **7½**

Unit III

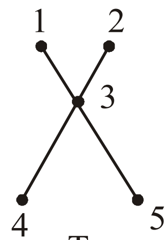
6. (a) If G is a connected graph and every vertex of G has even degree, then G has an Euler circuit. **7½**

(i)



T_1

(ii)

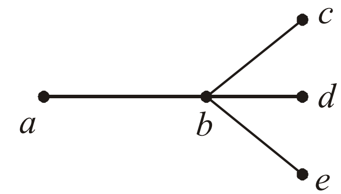


T_2

9. (a) A graph G has a spanning tree iff G is connected. **7½**

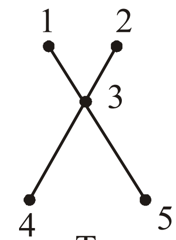
(b) Explain tree searching with an example. **7½**

(i)



T_1

(ii)



T_2

9. (a) A graph G has a spanning tree iff G is connected. **7½**

(b) Explain tree searching with an example. **7½**