

Unit IV

No. of Printed Pages : 04

Roll No.

7. (a) State and prove Konigsberg Bridge problem.
- (b) Prove that a connected graph G is a Euler path if and only if it can be decomposed into circuits.
8. (a) Prove that the number of vertices is one more than the number of edges in a tree. Is the converse true ? Justify.
- (b) Explain tree searching with examples.

CC-313

M. Sc. EXAMINATION, Dec. 2017

(Third Semester)

(Main & Re-appear)

MATHEMATICS

MAT-605-B

Discrete Mathematics

Time : 3 Hours]

[Maximum Marks : 100

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 : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Developing a recurrency relation, find the number of bit strings of length n that does not contain the pattern 111.
(b) Find the explicit formula for the sequence :

$$a_n = r_1 a_{n-1} + r_2 a_{n-2}$$

if its characteristic equation has two distinct roots.

2. (a) Find the total solution of the difference equation :

$$a_n - a_{n-1} - 2a_{n-2} = 3n \cdot 4^n$$

- (b) Explain convolution of numeric functions and hence find the generating function of the sequence $a_n = n + 1$.

Unit II

3. (a) A doctor gives a prescription of 20 tablets to a patient with the instructions to take at least one tablet per day for 15 days.

Show that there is a period of consecutive days during which the patient takes a total of 9 tablets.

- (b) Explain basic logical operations with truth tables and one example of each.

4. (a) Define lattice as an algebraic system and hence show that partial order and lub and glb exists in a lattice.

- (b) The direct product of two distributive lattices is a distributive lattice.

Unit III

5. (a) Define a boolean algebra with its axioms and prove that :

$$(a \wedge b) \wedge c = a \wedge (b \wedge c)$$

for all a, b, c in a boolean algebra.

- (b) Explain logical gates with truth tables and symbols.

6. (a) Explain full-adder.

- (b) Find the Boolean expression $E(x, y, z)$ corresponding to the truth table $T(E) = 01001001$ and $T(E) = 00010001$.