

II/IV B.Tech. DEGREE EXAMINATIONS, NOVEMBER- 2019**First Semester****CSE/IT****DISCRETE MATHEMATICAL STRUCTURES****Time: Three Hours****Maximum marks:60****Answer Question No.1 Compulsory****6X2=12 M****Answer ONE Question from each Unit****4X12=48 M**

1. a) What are basic logical operations? Define them
- b) When a lattice is said to be bounded?
- c) Find the minimum number of persons selected so that at least eight of them will have birthdays on the same day of week.
- d) Find a chromatic number of a bipartite graph.
- e) What is a spanning tree?
- f) State any two properties of a group.

UNIT-I

2. Establish the validity of the argument: $[(P \rightarrow Q) \wedge (\neg R \vee S) \wedge (P \vee R)] \rightarrow [\neg Q \rightarrow S]$
- (OR)**
3. Show that $p \vee (q \wedge r)$ and $(p \vee q) \wedge (p \vee r)$ are logically equivalent.

UNIT-II

4. a) Show that among any $n+1$ numbers one can find 2 numbers so that their difference is divisible by n .
- b) Explain the concept of enumerating permutations with constrained repetitions with an example.

P.T.O

(OR)

5. If n Pigeonholes are occupied by $(kn+1)$ pigeons, where n is positive integer, prove that at least one Pigeonhole is occupied by $k+1$ or more Pigeons. Hence, find the minimum number of m integers to be selected from $S=\{1,2,3,\dots,9\}$ so that the sum of two of the m integers are given.

UNIT-III

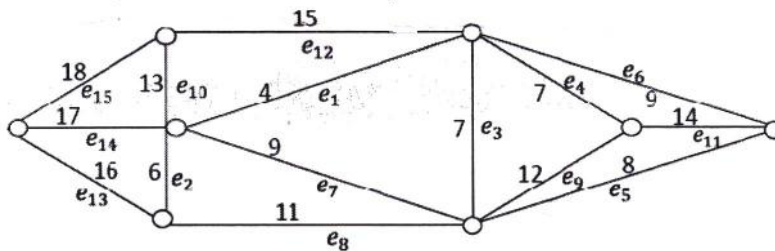
6. a) Let $P(A)$ be the power set of any non empty set A , then prove that the relation I of set inclusion is not an equivalence relation.
b) Explain the special properties of binary relations.

(OR)

7. Solve the recurrence relation, $S(n)=S(n-1)+2(n-1)$ with $S(0)=3, S(1)=1$ by finding its generating function.

UNIT-IV

8. Using Kruskal's algorithm, obtain a minimal tree for the graph given in below.



(OR)

9. a) Give a brief on directed graph and explain how it can be represented using adjacency matrix.
b) Explain Four color problem with suitable example.



II/IV B.Tech. (Supple) DEGREE EXAMINATIONS, JUNE- 2019**First Semester****CSE/IT****DISCRETE MATHEMATICAL STRUCTURES****Time: Three Hours****Maximum marks:60****Answer Question No.1 Compulsory****6X2=12 M****Answer ONE Question from each Unit****4X12=48 M**

1. a) What is the minimal set of connectives required for a well formed formula
- b) What is the compound statement that is true when exactly two of the three statements P,Q and R are true?
- c) Explain in brief about modular arithmetic?
- d) Write about minimization of circuits
- e) What is chromatic number of a graph
- f) Define four color problem

UNIT-I

2. a) Write the negation of the following statements
 - i) Jan will take a job in industry or go to graduate school
 - ii) James will bicycle or run tomorrow
 - iii) If the processor is fast then the printer is slow
- b) Obtain the principal disjunctive normal form of the propositional formula:
 $(\sim P \rightarrow R) \wedge (Q \leftrightarrow P)$

(OR)

3. a) Prove that the proposition: $(P \rightarrow Q) \rightarrow (P \wedge Q)$ is a Contingency.
- b) Write each of the following statements in symbolic form
 - i) Anil & Sunil are rich
 - ii) Neither Ramu nor Raju is poor
 - iii) It is not true that Ravi & Raju are both rich.

UNIT-II

4. a) How many 7-digit numbers are there with exactly one 5?

- b) There are five different roads from city A to city B, three different roads from city B to city C, and three different roads that go directly from A to C.
- i) How many different ways are there from A to C altogether?
- ii) How many different trips are there from A to C and back to A that visit B at least once.

(OR)

5. a) A palindrome is a word that reads the same forward or backward. How many 9-letter palindromes are possible using English alphabets?
- b) How many integers between 1 and 104 contain exactly one 8 and one 9.

UNIT-III

6. a) Solve $a_n = 3a_{n-1}$, $n \geq 1$, using generating functions.
- b) A bank pays 8 percent each year on money in saving accounts. Find recurrence relation for the amount of money in saving account that would have after n years if it follows the investment strategies of : i) Investing \$1000 and leaving it in the bank for n years. ii) Investing \$100 at the end of each year.

(OR)

7. a) Explain different operations on relations.
- b) Solve the recurrence relation: $a_n = a_{n-1} + \frac{n(n+1)}{2}$, $n \geq 1$

UNIT-IV

8. a) Explain the steps involved in deriving a spanning tree from the given undirected graph using breadth first search algorithm.
- b) Show that two simple graphs are isomorphic if and only if their Complements are isomorphic.

P.T.O

(OR)

9. a) Explain about the adjacency matrix representation of graphs. Illustrate with an example. Give the advantages of adjacency matrix representation.
- b) Derive all possible spanning trees for the graph shown

