

**II B. Tech I Semester Supplementary Examinations, July - 2023**  
**DISCRETE MATHEMATICS AND GRAPH THEORY**  
 (Information Technology)

Time: 3 hours

Max. Marks: 70

Answer any **FIVE** Questions, each Question from each unit  
 All Questions carry **Equal** Marks

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## UNIT-I

- 1 a) Define truth table and obtain the truth table for the statement  $(A \leftrightarrow B) \rightarrow (A \wedge B)$ . [7M]  
 b) Show that the following premises are inconsistent. [7M]  
 1. If RAM misses many classes through illness, then he fails high school.  
 2. If RAM fails high school, then he is uneducated.  
 3. If RAM reads a lot of books, then he is not uneducated.  
 4. RAM misses many classes through illness and reads a lot of books.

Or

- 2 a) Verify the validity of the statement  $(\neg PVQ) \rightarrow R$ ,  $R \rightarrow (SVT)$ ,  $\neg S \wedge \neg U$ ,  $\neg U \rightarrow \neg T$  [7M]  
 derives a conclusion P  
 b) Compare CNF with PCNF using a case study. [7M]

## UNIT-II

- 3 a) Prove the statement The inverse of a function  $f: S \rightarrow T$  exists if and only if  $f$  is a [7M]  
 bijection.  
 b) Let A and B be two sets. Then, [7M]  
 (i)  $(A \cup B)^c = A^c \cap B^c$  (ii)  $(A \cap B)^c = A^c \cup B^c$

Or

- 4 a) Define Lattice. List and explain the features of Lattice. [7M]  
 b) Explain the concepts of partition and covering with an example. [7M]

## UNIT-III

- 5 a) Demonstrate primality testing with the algorithm and trace it with examples. [7M]  
 b) How many license plates are there (with repetition) if [7M]  
 (i) There is a letter followed by 3 digits followed by 3 letters followed by letter  
 or digit?  
 (ii) There are 1,2,3 digits followed by 1,2, or 3 letters followed by a letter or a  
 digit?

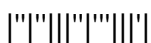
Or

- 6 a) State and prove Fermat's theorem. [7M]  
 b) A test with 30 questions is a multiple-choice test with 5 answers for each [7M]  
 question but only one correct answer to each question. How many ways are there  
 to have  
 (i) Exactly 6 correct answers  
 (ii) At least 5 correct answers

## UNIT-IV

- 7 a) Explain the methods to solve homogeneous functions. [7M]  
 b) Solve the following recurrence relation [7M]  
 $a_n + 7a_{n-1} + 8a_{n-2} = 0$  for  $n \geq 2$   $a_0 = 1$   $a_1 = -2$

Or



- 8 a) Find the simple expression for the sequence generated by [7M]  
$$\frac{3}{(1-2X)} + \frac{5}{(1-X)^3} + \frac{X^2}{(1-3X)^3}$$
- b) Write the general and particular solution for the following [7M]  
 $a_n - 9a_{n-1} + 14a_{n-2} = 5(3)^n$

## UNIT-V

- 9 a) Compare the methods BFS and DFS. [7M]
- b) Derive the chromatic number for the 4 regular graph. [7M]

Or

- 10 a) Demonstrate Prim's algorithm with an example graph. [7M]
- b) How to verify the isomorphism of two graphs. [7M]

