

**II B. TECH I SEMESTER REGULAR EXAMINATIONS, FEB - 2022**  
**MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE**  
**(Common to CSE, INF, CSM, CIC, CSO and AID)**

Time: 3 Hours

Max. Marks: 70

**Note:** Answer ONE question from each unit (5 × 14 = 70 Marks)

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UNIT-I

1. a) Define statement and explain various connectives with example. [8M]  
 b) Explain Free and Bound variables. [6M]

(OR)

2. a) Define Principle Disjunctive Normal Form (PDNF). Find the PDNF for  $(P \wedge Q) \vee (\sim P \wedge R) \vee (Q \wedge R)$  [7M]  
 b) Find whether the following arguments is valid (or) not: [7M]
- If a triangle has two equal sides, then it is isosceles.
  - If a triangle is isosceles then it has two equal angles.
  - A certain triangle ABC does not have two equal angles.
  - Therefore, triangle ABC does not have two equal sides.

UNIT-II

3. a) Explain Binary Operations on sets in brief [7M]  
 b) Let A be a given finite set and  $p(A)$  its power set. Let  $\subseteq$  be the inclusion relation on the elements of  $p(A)$ . Draw Hasse Diagram of  $\langle p(A), \subseteq \rangle$  for (i)  $A = \{a\}$ ; (ii)  $A = \{a,b\}$ ; (iii)  $A = \{a,b,c\}$ ; (iv)  $A = \{a,b,c,d\}$  [7M]

(OR)

4. a) With suitable example explain Equivalence relations. [7M]  
 b) Define Lattices. Explain Lattices properties with suitable examples. [7M]

UNIT-III

5. a) Let S is a semi group. If for all  $x, y \in s$ ,  $x^2y = yx^2$  prove that S is an abelian group. [7M]  
 b) Describe the properties of integers. [7M]

(OR)

6. a) How sub group differ with Abelian group? Explain. [7M]  
 b) Explain Fermat's theorem with example. [7M]

UNIT-IV

7. a) Find the coefficient of  $x^9y^3$  in the expansion of  $(2x - 3y)^{12}$ . [7M]

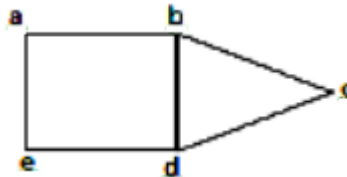
- b) Write the step-by-step procedure for solving recurrence relation using generating functions and solve  $a_n - a_{n-1} + 6a_{n-2} = 0$  for  $n \geq 2$ . [7M]

(OR)

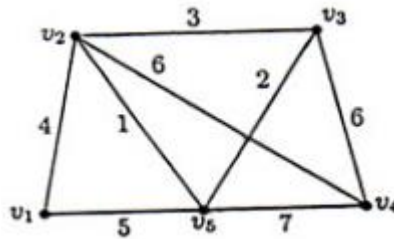
8. a) Describe Multinomial theorem. Find coefficient of  $x^{16}$  in  $(1 + x^3 + x^8)^{10}$ . [7M]
- b) Find a general expression for a solution to the recurrence relation  $a_n - 5a_{n-1} + 6a_{n-2} = 4^n$  for  $n \geq 2$ . [7M]

UNIT-V

9. a) Is adjacency matrix and incidence matrix being same? Justify answer following figure. [7M]

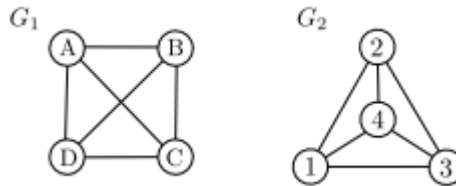


- b) Find the minimal spanning tree from the given graph by using Prim's algorithm [7M]

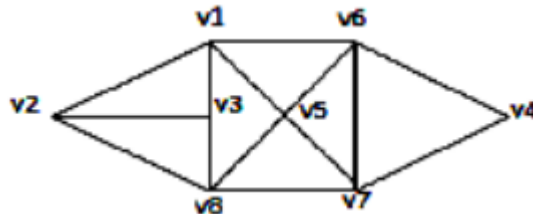


(OR)

10. a) Define the isomorphism of two graphs? Verify the two graphs are isomorphic (or) not? [7M]



- b) Explain BFS for following graph. [7M]



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