

Code No: 123BN/113BN

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B.Tech II Year I Semester Examinations, March - 2021****MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE****(R15 - Common to CSE, IT; R13 - Common to CSE, IT)****Time: 3 hours****Max. Marks: 75**

**Answer any five questions**  
**All questions carry equal marks**

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- 1.a) Obtain principal conjunctive normal form (PCNF) for the formula  $(\sim p \rightarrow r) \wedge (q \leftrightarrow p)$ .  
 b) Using automatic theorem proving, prove that  $(\sim Q \wedge (P \rightarrow Q)) \Rightarrow \sim P$ . [7+8]
- 2.a) Use indirect method to show that  $P \rightarrow Q, Q \rightarrow R, \sim (P \wedge R), P \vee R \Rightarrow R$ .  
 b) Show that  $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ , Where A, B and C are any sets. [8+7]
3. Consider the algebraic system  $G = \langle \{e, a, b\}, * \rangle$  in which \* is defined as follows:
 

*	e	a	b
e	e	a	b
a	a	b	e
b	b	e	a

 Show that G is Abelian group. [15]
- 4.a) Illustrate Pigeon hole principle and its applications.  
 b) Find the number of non negative integral solutions to the in equality  $X_1 + X_2 + X_3 \leq 12$  [8+7]
5. Find the number of ways of distributing 48 similar balls in 6 distinct boxes where first two boxes contains atleast 3 balls and remaining boxes contains atleast 4 balls. [15]
6. Solve the recurrence relation  $a_n - 5 a_{n-1} + 8 a_{n-2} - 4 a_{n-3} = 0$  for  $n \geq 3$ ,  $a_0 = 1$  and  $a_1 = 0$ ,  $a_2 = 1$ . [15]
7. Find the solution for the Fibonacci series  $a_n = a_{n-1} + a_{n-2}$ ,  $n \geq 2$  and  $a_0 = 1$ ,  $a_1 = 1$ . [15]
8. What is spanning tree? What is minimum cost spanning tree? What are the different algorithms to compute minimum cost spanning tree? Explain with suitable, examples. [15]

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