



## II B.Tech II Sem Regular End Examination, July 2021

**DISCRETE MATHEMATICS****(CSE & INF)****Time: 3 Hours.****Max. Marks: 70**

Note: 1. Answer any FIVE questions.

2. Each question carries 14 marks and may have a, b as sub questions.

- |      |  |    |    |    |
|------|--|----|----|----|
| 1 a) | What is a Well Formed Formula? What are rules of the Well Formed Formulas?   | 7M | CO | BL |
| b)   | Obtain the PCNF of the following formula $(\sim P \rightarrow R) \wedge (Q \rightarrow P)$<br>(i) Using Truth Table.   | 7M | CO | BL |
| 2 a) | Show that the following statement is tautology or not. $(\sim P \wedge (P \rightarrow Q)) \rightarrow \sim Q$  | 7M | CO | BL |
| b)   | Discuss in brief about Rules of inference.   | 7M | CO | BL |
| 3 a) | Let $X = \{1, 2, 3, 4, 5, 6, 7\}$ and $R = \{(x,y) / x-y \text{ is divisible by } 3\}$ in $X$ . show that $R$ is an Equivalence Relation.?   | 7M | CO | BL |
| b)   | How many relations are there on a set with 'n' elements? If a set A has 'm' elements and a set B has 'n' elements, how many relations are there from A to B? If a set $A = \{1, 2\}$ , determine all relations from A to A.  | 7M | CO | BL |
| 4 a) | Let $A = \{1, 2, 3, 4\}$ and $P = \{\{1, 2, 3\}, \{4\}\}$ be a partition of A. Find the equivalence relation determined by P. ?  | 7M | CO | BL |
| b)   | Define Recursion? Write in brief about recursive functions?  | 7M | CO | BL |
| 5 a) | What is an algorithm? Write in brief about complexities of an algorithm?   | 7M | CO | BL |
| b)   | Describe in brief about Strong Induction and Well-Ordering?  | 7M | CO | BL |
| 6 a) | In a class of 100 students 50 students play chess, 20 students play cricket and 10 students play volley ball, 15 students can play both cricket and chess, 5 students can play chess and volleyball, 3 students can play volleyball and cricket, 1 student can play all 3 games then find out number of students who does not play cricket & volleyball & chess? | 7M | CO | BL |
| b)   | Solve the recurrence relation $u_{n+2} - u_{n+1} - 12u_n = 10$ , $u_1 = 13$ , $u_0 = 0$  | 7M | CO | BL |
| 7 a) | Solve the recurrence relation $u_{n+2} + 4u_{n+1} + 3u_n = 5(-2)^n$ , $u_0 = 1$ , $u_1 = 0$ using generating function.   | 7M | CO | BL |
| b)   | Write the rules for constructing Hamiltonian paths and cycles?   | 7M | CO | BL |
| 8 a) | How many vertices will the graph contain 6 edges and all vertices of degree 3?   | 7M | CO | BL |
| b)   | Prove that a connected plane graph with 7 vertices and degree $(V) = 4$ for each vertex V of G must have 8 regions of degree 3 and one region of degree 4.   | 7M | CO | BL |