

B.Sc. B.Ed SEM-II Examination: 2020

Course-SEC 1.1

Subject: Mathematics (Discrete Mathematics and Graph Theory)

Time: 2 Hours

F.M. 30

Answer any *six* questions

(5 × 6 = 30)

- (a) Prove that intersection of two equivalence relations is again an equivalence relation. 5

(b) Give an example to show that the Union of two equivalence relations may not be an equivalence relation. (3 + 2)
- Design a simple circuit connecting two wall switches and a light bulb in such a way that either switch can be used to control the light independently. 5
- (a) Define Lattice. (b) Draw the Hasse diagram of the Poset (S, \leq) where, S is the set of all positive divisors of 72 and $a \leq b$ means 'a is a divisor of b' for all a, b in S . (1 + 4)
- (a) What is non atomic Boolean algebra?
(b) Show that, every finite Boolean algebra is atomic. (1 + 4)
- (a) State Pigeonhole principle.
(b) Show that among any $(m + 1)$ integers selected from $\{1, 2, \dots, 2m\}$ there must be an integer that divides one of the other integers. (1 + 4)
- State and prove principles of Inclusion and Exclusion. 5
- Let G be a simple graph with 50 vertices. If each vertex has degree at least 25, then show that G is a Hamiltonian graph. 5
- Let G be a graph with 13 vertices and 7 connected components. Then show that G has at least 6 edges. 5