**United College of Engineering and Research, Prayagraj**

**Department of Computer Science and Engineering**

**B.Tech.**

**IIIrd Sessional Examination (2017-18)**

**Semester: IIIrd Branch: CSE/IT**

**Subject Name: Discrete Structure and Theory of Logic Subject Code: RCS-301**

**Time: 2:00 Hours Max Marks: 30**

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| **Section-A** | | | | | | | | |
| **Question**  **No.** | **Question** | | **Max. Marks** | | **CO** | | | **BL** |
| 1 | **Attempt all** | | | | | | | |
| a | Define symmetric relation. | | 1 | | CO1 | | L1 | |
| b | Define partition of a set. | | 1 | | CO1 | | L1 | |
| c | Define onto and into function. | | 1 | | CO1 | | L1 | |
| d | Define order of an element. | | 1 | | CO2 | | L1 | |
| e | Define normal subgroup. | | 1 | | CO2 | | L1 | |
| f | Define Boolean ring. | | 1 | | CO2 | | L1 | |
| g | Define regular graph | | 1 | | CO5 | | L1 | |
| h | What is simple graph? Explain with example. | | 1 | | CO5 | | L1 | |
| i | Obtain the generating function for the sequence 1,-1, 1, -1,1,-1,……………. | | 1 | | CO5 | | L2 | |
| **Section-B** | | | | | | | | |
| 2 | **Attempt all** | | | | | | | |
| a | Draw the Haase diagram of < D(30), / >. Find greatest element, least element, minimal element & maximal element.  OR  In a Lattice if a≤b≤c , then show that   1. a∨b=b∧c 2. (a∨b)∨(b∧c) = (a∨b) ∧ (a∨c) = b | | 3 | | CO3 | | L3 | |
| b | Rewrite the following arguments using quantifiers, variables and predicate symbols.   1. All birds can fly. 2. Some men are genius. 3. Some numbers are not rational. 4. There is a student who likes mathematics but not geography.   OR  Obtain the principle disjunctive and conjunctive normal forms of the formula ( p→r) ∧ ( q↔ p) | | 3 | | CO4 | | L2 | |
| c | Construct the ordered rooted tree whose preorder traversal is a, b, f, c, g, h, i, d, e, j, k, l, where a has four children, c has three children, j has two children, b and e have one child each, and all other vertices are leaves.  OR  Solve the recurrence relation  ar+2-5ar+1+6ar = (r+1)2 | | 5 | | CO5 | | L2 | |
| **Section-C** | | | | | | | | |
| 3. | | **Attempt any one** | | | | | | |
| a | | Prove that a simple graph with n vertices and k components can have at most edges. | | 10 | | CO5 | | L4 |
| b | | Solve the recurrence relation yn+2 – 5yn+1 + 6yn = 5n  subject to the condition y0 = 0, y1 = 2. | | 10 | | CO5 | | L4 |