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MCA I Semester Supplementary Examinations June/July 2018 **MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE** (For 2011 (I.C), 2012, 2014, 2015, 8, 2016, admitted batches only)

(For 2011 (LC), 2012, 2013, 2014, 2015 & 2016 admitted batches only)

Time: 3 hours

Max. Marks: 60

Answer any FIVE questions

All questions carry equal marks

- 1 (a) Verify the identity, inverse and domination laws through truth tables.
 - (b) Show that $P \to (Q \to P) \Leftrightarrow 7P \to (P \to Q)$ using (i) truth table. (ii) without truth table.
- 2 (a) Test whether the following argument is valid I will get grade A in this course or I will not graduate. If I do not graduate, I will join the army.

Therefore, I will not join the army.

- (b) Prove the statement "The square of an even integer is an even integer" by the method of contradiction.
- 3 (a) Explain about the properties of a binary relation in a set with suitable example.
 - (b) Define a partial order relation. 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 diagrams of $(P(A), \subseteq) for (i)A = \{a, b, c\}$ $(ii)A = \{a, b, c, d\}$
- 4 (a) Write about general properties of an algebraic system.
 - (b) With an example, explain the concept of homomorphism and isomorphism.
- 5 (a) Find the coefficient of $x^9 y^3$ in the expansion of $(2x-3y)^{12}$.
 - (b) Explain the principle of inclusion-exclusion with a suitable example.
- 6 Find a generating function for the recurrence relation $a_{n+2} 5a_{n+1} + 6a_n = 2$, $n \ge 0$ and $a_0 = 3$, $a_1 = 7$.
- 7 (a) Prove that the sum of degrees of the regions of a planar graph G is equal to twice the number of edges in G.
 - (b) What is a spanning tree? Explain any two ways for finding out spanning tree of a given graph with examples.
- 8 (a) Find the chromatic number of:
 - (i) A bipartite graph $K_{3,3}$. (ii) A complete graph K_n .
 - (b) What is a Euler circuit? Explain the process of finding a Euler circuit in a given graph.
