

Code: 9F00104

MCA I Semester Supplementary Examinations May 2016
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(For students admitted in 2010, 2011, 2012, 2013, 2014 & 2015 only)

Time: 3 hours

Max. Marks: 60

Answer any FIVE questions
All questions carry equal marks

- 1 (a) What is normal form? Explain applications of normal form using relevant examples.
(b) Present the implication of the following formula:
$$(A \rightarrow B) \rightarrow B \Rightarrow A \vee B$$
- 2 (a) Discuss about how predicative logic can be applied in a context.
(b) What is proof of contradiction? Write an expression to prove contradiction.
- 3 Draw the Hasse diagram for relation R on $I = \{1, 2, 3, 4, 5\}$, whose relation matrix is given below.
$$M_R = \begin{pmatrix} 1 & 0 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$
- 4 (a) Define Subgroups homomorphism. State an example to explain the concept.
(b) How many ways can 3 integers be selected from a set of integers 1, 2, 3, 4, ..., 30? So that their sum is even.
- 5 State and explain the following:
(a) Binomial multinomial theorem.
(b) Pigeon hole principle.
- 6 (a) Using generating function. Solve $Y_{n+2} - 4Y_{n+1} + 3Y_n = 0$ given $Y_0 = 2, Y_1 = 4$.
(b) Solve the recurrence relation by using substitution method:
$$t_n = t_{n-1} + n, \text{ where } t_0 = 2$$
- 7 Explain how minimal spanning tree of an undirected weighted graph G can be constructed using primes algorithm.
- 8 Write short notes on the following:
(a) Isomorphism and sub-graphs.
(b) Euler circuits.
(c) Hamiltonian graphs.
