

Level: Bachelor

Semester: Spring

Year : 2017

Programme: BE

Full Marks: 100

Course: Mathematical Foundation of Computer
Science

Pass Marks: 45

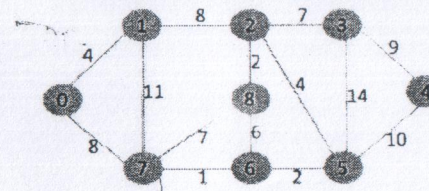
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Define proposition and predicate logic. Use truth table to show that $p \rightarrow q \equiv \sim p \vee q$ 7
b) Prove $\neg(A \vee B)$ and $(\neg A) \wedge (\neg B)$ are equivalent. 8
2. a) Show that $n^2 > 2n + 1$ for $n \geq 3$ by the mathematical induction. 7
b) Prove the validity of the following argument "If I get the job and work hard, then I will get promoted. If I get promoted, then I will be happy. I will not be happy. Therefore either I will not get the job or I will not work hard." 8
3. a) Describe direct and indirect proof techniques. Proof that product of two odd integer is an odd integer. 8
b) Solve the recurrence relation $F_n = 5F_{n-1} - 6F_{n-2}$ where $F_0 = 1$ and $F_1 = 4$. 7
4. a) Define the terms: Multigraph, pseudograph, complete graph, platonic graph. List out the application of graph theory. 7
b) A connected graph contains Eulerian trail, but not Eulerian circuit if and only if it has exactly two vertices of odd degree. Prove it. 8
5. a) State Dirac's & Ore's theorem. Let 'G' be a connected planar graph with 20 vertices and the degree of each vertex is 3. Find the number of regions in the graph. 7
b) What is minimum spanning tree? Find the minimum spanning tree of the graph using Kruskal algorithm. 8



6. a) Define DFA. Design a DFA for a language: 7
 $L = \{w \in (0,1)^* \mid \text{Second symbol of } w \text{ is '0' and fourth input is '1'}\}$
b) Define regular expression. Design a Finite automata from regular expression $01(10+11)^*1$. 8
7. Write short notes on: (Any two) 2×5
a) Hamiltonian Circuit
b) Alphabet, language, string
c) Tautology and contradiction