

Code No: 53022

R09

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, November - 2015

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(Common to CSE, IT)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) Obtain principal disjunctive normal form (PDNF) for the following
 $p \vee (\sim p \wedge \sim q \wedge r)$
- b) Verify whether the following formula is tautology or not?
 $[(p \rightarrow r) \wedge (q \rightarrow r)] \rightarrow [(p \vee q) \rightarrow r]$ [8+7]
- 2.a) Show by direct proof $R \rightarrow (S \rightarrow Q), \sim P \vee R$ and $S \Rightarrow P \rightarrow Q$
- b) Show that the following premises are inconsistent.
 $P \rightarrow Q, R \rightarrow S, P \vee R, \sim (Q \vee S)$. [8+7]
- 3.a) Suppose R and S are symmetric relations on a set A . Then show that $R \cap S$ is also symmetric.
- b) Draw the Hasse diagram for the divisibility on the set $\{1, 2, 3, 6, 12, 24, 36, 48, 96\}$. [8+7]
- 4.a) Verify that addition modulo 5 is a group on the set $\{0, 1, 2, 3, 4\}$.
- b) Prove that the set of integers forms an abelian group under addition. [8+7]
- 5.a) Find the number of integral solutions to $x_1 + x_2 + x_3 + x_4 = 50$, where $x_1 \geq -4, x_2 \geq 7, x_3 \geq 14, x_4 \geq 10$.
- b) How many different 8-digit numbers can be formed by arranging the digits 1, 1, 1, 1, 2, 3, 3, 3. [8+7]
- 6.a) Find the co-efficient of X^{16} in $(1 + X^4 + X^8)^{10}$
- b) Solve the following recurrence relation using characteristic roots method
 $a_n - 3a_{n-1} - 4a_{n-2} = 0$ for $n \geq 2, a_0 = 1$ and $a_1 = 1$ [6+9]
- 7.a) What is the difference between Prim's and Kruskal's algorithm for spanning trees?
- b) Construct spanning tree by applying BFS algorithm on the following graph (figure 1). Follow alphabetical order. [7+8]

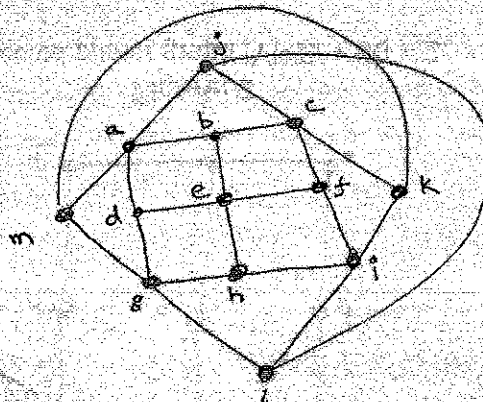


Figure: 1

8.a) What do you mean by chromatic number? Find the chromatic number of the following graph (figure 2).

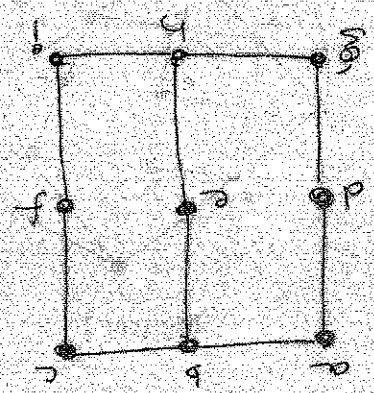


Figure: 2

b) Show that in any connected planar graph $|V| - |E| + |R| = 2$. [8+7]

--0000--

