Total No. of Questions : 8] *[Total No. of Printed Pages : 2*

Roll No .....

MCA-102

MCA. I Semester

Examination, December 2016

Mathematical Foundation of Computer Science

Time : Three Hours

Maximum Marks : 70

Note: i) Answer any five questions.
ii) All questions carry equal marks.

1. a) If A,B,C are three sets, Prove:
$A \cap (B - C) = (A \cap B) - (A \cap C)$
b) Prove that:
$1.3+2.4+3.5+.....+n(n+2)=\frac{1}{6}n(n+1)(2n+7)$
$n \in N$ [By mathematical Induction]

2. a) If $A=\{1,2\}$, $B=\{2,3\}$ and $C=\{3,5\}$, then find:
$(A \times B) \cap (A \times C)$
b) If a relation $R=\{(x,y): x, y \in N \text{ and } x+y=8\}$, then find the domain and range of R.

3. a) Prove that $(p \Leftrightarrow q) \Leftrightarrow (p \Rightarrow q) \wedge (q \Rightarrow p)$ is a tautology.
b) Prepare the truth table of the statement:
$(P \Rightarrow Q \wedge R) \vee (\sim P \wedge Q)$

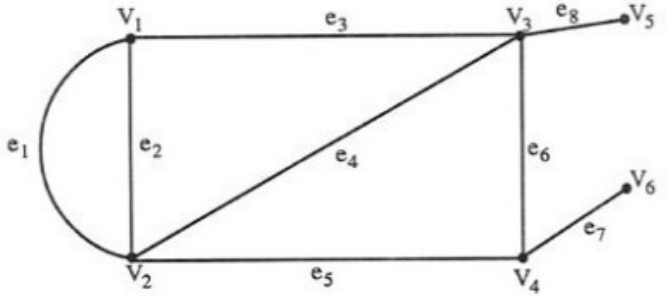
4. a) Prove that the relation "a divides b", If there exists an integer c such that $ac=b$ and denoted by a/b, on the set of all positive integers N is a partial order relation.

b) Consider the chains of divisions of 4 and 10, i.e. $L_1=\{1,2,4\}$ and $L_2=\{1,2,5,10\}$ and partial ordering relation of division on L_1 and L_2. Represent $L_1 \times L_2$.

5. a) Define group with its properties.
b) Show that the set of numbers of the form $a+b\sqrt{2}$, with a and b as rational number is a field.

6. a) Prove that the sum of the degrees of all vertices in a graph is equal to twice the number of edges.
b) Define followings for a graph.
i) Graph
ii) Sub-Graph
iii) Finite and Infinite Graph

7. a) What is a tree? Prove that a tree with n vertices have $(n-1)$ number of edges.
b) Write the incidence matrix for the following graph:



8. a) Determine the discrete numeric function to the generating function $A(Z)=\frac{1}{5-6Z+Z^2}$
b) Given $Y_h = A \cdot 2^h + B \cdot 3^h$, find the corresponding recurrence relation.

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