05648

MCA(Revised)

Term-End Examination

June, 2014

MCS-013 : DISCRETE MATHEMATICS

Time : 2 hours *Maximum Marks : 50*

Note : *Question number **1** is **compulsory**. Attempt **any three** questions from the rest.*

1. (a) Let $f(x) = \frac{1}{x}$ and $g(x) = x^3 + 2$ where $x \in \mathbf{R}$. Find $(f+g)(x)$ and $(fg)(x)$? **3**

(b) Draw Venn diagram to represent $A \Delta B$ where A and B are two sets. **3**

(c) If A and B are two mutually exclusive events such that P(A) = 0.3 and P(B) = 0.4 What is the probability that either A or B does not occur ? **2**

(d) Prove that **3**

$$\frac{1}{1.2} + \frac{1}{2.3} + \dots + \frac{1}{n(n+1)} = \frac{n}{n+1} \text{ using}$$

Mathematical Induction.

(e) Show that $p \vee (q \wedge r)$ and $(p \vee q) \wedge (p \vee r)$ are logically equivalent. **3**

(f) Prove that product of two odd integers is an odd integer ? **3**

(g) How many different strings can be made from the letters of the word "SUCCESS" using all the letters ? **3**

2. (a) Let $A = R - \{3\}$ and $B = R - \{1\}$. $f : A \to B$ defined by $f(x) = \frac{x-2}{x-3}$ find f^{-1} ? 5

(b) Let R is the relation on the set of strings of Hindi letters such that aRb iff $l(a) = l(b)$ where $l(x)$ is length of string x. Show that R is an equivalence relation. 5

3. (a) Write contrapositive, converse and the inverse of the implication "The home team does not win whenever it is raining." 3

(b) Draw the logic circuit for the expression $Y = ABC + A'C' + B'C'$ 4

(c) Determine the number of integer solutions to the equation $x_1 + x_2 + x_3 + x_4 = 7$, where $x_i \geq 0 \ \forall i = 1, 2, 3, 4$. 3

4. (a) Five balls are to be placed in three boxes. Each box can hold all the five balls. In how many ways can we place the balls so that no box is empty if balls and boxes are different ? 5

(b) Show that $r \to s$ can be derived from $p \to (q \to s)$, $\sim r \vee p$ and q. 5

5. (a) Show that a map $f : R \to R$ defined by $f(x) = 2x + 1$ for $x \in \mathbf{R}$ is a objective map from R to R. 4

(b) If $f = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{pmatrix}$ and $g = \begin{pmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \end{pmatrix}$. Find *fog* and *gof* ? 4

(c) List all the permutations of {a, b, c}. 2
