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MCS-013

MCA(Revised)

Term-End Examination

June, 2013

08694

MCS-013 : DISCRETE MATHEMATICS

Time : 2 hours *Maximum Marks : 50*

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

1. (a) A carpenter has twelve patterns of chairs and five patterns of tables. In how many ways can he make a pair of chair and table ? **3**

(b) If 30 books in a school contain a total of 61,327 pages, then show that one of the books must have at least 2045 pages. **3**

(c) Prove that $A - B = A \Rightarrow A \cap B = Q$ **3**

(d) Find the domain for which the functions $f(x) = 2x^2 - 1$ and $g(x) = 1 - 3x$ are equal. Also find a domain for which the functions are not equal. **4**

(e) Construct the truth table of $(7p \vee q) \wedge (7r \vee p)$. **4**

(f) Show that $a.b + a'.b' = (a' + b).(a + b')$ **3**

2. (a) Use mathematical induction method to prove that $1 + 3 + 5 + ... + (2n - 1) = n^2$. **4**

(b) Prove that $n!(n+2) = n! + (n+1)!$ 3

(c) Consider the set of ordered pair of natural numbers $N \times N$ defined by : 3

$(a, b)\ R\ (c, d) \Leftrightarrow a + d = b + c$. Prove that R is an equivalence relation.

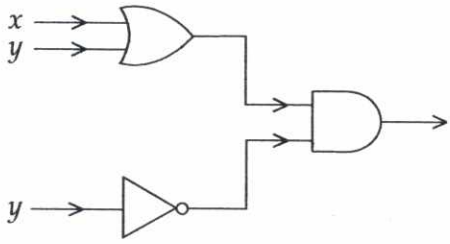
3. (a) Show that $(p \wedge q) \Rightarrow (p \vee q)$ is a tautology. 3

(b) Prove that the inverse of one-one onto mapping is unique. 4

(c) How many solutions does the equation $x_1 + x_2 + x_3 = 11$ have, where x_1, x_2 and x_3 are non negative integers ? 3

4. (a) Express the Boolean expression $xyz' + y'z + xz'$ in a sum of product form. 4

(b) Find the output of the given circuit. 3



(c) Show that : 3

$(p \rightarrow q) \rightarrow q \Rightarrow p \vee q$

5. (a) In how many ways a person can invite eight of his friends to a party by inviting at least one of them be a female. Considering that the person is having 15 male and 8 female friends. 4

(b) Let A be the set { 1, 2, 3, 4 }. Which ordered pairs are in the relation 3

$R = \{(a, b) \mid a \text{ divides } b\}$?

(c) Explain duality principle with the help of example. 3