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MCS-013(S)

MCA (Revised) / BCA (Revised)

Term-End Examination

December, 2018

MCS-013(S) : DISCRETE MATHEMATICS

Time : 2 hours *Maximum Marks : 50*

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

1. (a) Find the dual of

(i) $A \cap (B \cap C) = (A \cap B) \cap C$ and

(ii) $(A \cup B) \cap (A \cup C)$. *4*

(b) Give the geometric representation of $R \times \{2\}$. R is the set of Real Numbers. *4*

(c) Find the number of distinct sets of 5 cards that can be dealt from a deck of 52 cards. *4*

(d) Find the number of ways of placing n people in (n – 1) rooms, no room being empty. *4*

(e) Verify that $p \wedge q \wedge (\sim p)$ is a contradiction and $p \rightarrow q \leftrightarrow \sim p \vee q$ is a tautology. *4*

2. (a) Prove that if x, y $\in$ I such that xy is odd, then both x and y are odd, by proving its contrapositive. I is the set of Integers. 5

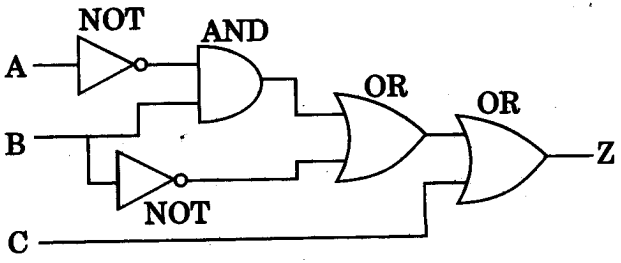
(b) Design a logic circuit to operate a light bulb by two switches x_1 and x_2. 5

3. (a) A box contains 3 red, 3 blue and 4 white socks. In how many ways can 8 socks be pulled out of the box, one at a time, if order is important ? 5

(b) Suppose 5 points are chosen at random within or on the boundary of an equilateral triangle of side 1 metre.

Show how we can find two points at a distance of at most $\frac{1}{2}$ metre. 5

4. (a) Find the boolean expression for the following circuit : 4



(b) Find the inverse of the following function : 3

$$f(x) = x^3 - 3$$

(c) State and explain Pigenhole principle. 3

5. (a) A car manufacturer has 5 service centres in a city. 10 identical cars were served in these centres for a particular mechanical defect. In how many ways could the cars have been distributed at the various centres ? 6

(b) Show that $\sqrt{5}$ is irrational. 4