The Open University of Sri Lanka
BSc. Degree Programme: Level 05
Department of Mathematics & Computer Science
Open Book Test (OBT) 2012/2013
CSU3276/PMU3294-Discrete Mathematics

Duration: One and Half Hours (1 ½ Hours)

Date :27.02.2013	Time: 4.00pm-5.30pm

1. (a) Let p and q be two statements. By using the truth table show that the conditional statement $p \Rightarrow q$ is logically equivalent to the disjunctive statement $\sim p \cup q$. Hence, find the negation of $p \Rightarrow q$.

(b) Without using truth table, show that the inverse and converse of a conditional statement are contra-positive of each other.

2. (a) Prove that the number of ways in which n distinct objects can be distributed into k boxes, $B_1, B_2, B_3 \ldots\ldots\ldots B_k$ such that there are r_i objects in box B_i for i=1,2,3,.....k is

$$\frac{n!}{r1!r2!r3!\ldots\ldots\ldots\ldots rn!}$$

(b) (i) Find the number of ways that seven toys can be divided among three children if the youngest child is to receive three toys and each of the other to have two toys.

(ii) Let a box B contains seven marbles numbered 1 to7. Find the number of ways of drawing from B, first two marbles, then three marbles and lastly the remaining two marbles.

3. Let $\Re$ be the set of real numbers. We define a relation R on $\Re$ by

$\forall x, y \in \Re$: xRy if $|x - y| \leq 1$

(i) Draw the relation set R explicitly on the plane $\Re \times \Re$
(ii) Is the relation reflective?
(iii) Is the relation symmetric?
(iv) Is the relation an equivalence relation?
(v) Is the relation a partial order relation?
(vi) What type of a order the relation R has?