Rani Rashmoni Green University

M.Sc. 1st Semester Exam
Subject: Computer Science
Course code: COS-104 (Discrete Mathematics)
FM= 40 marks

1. Answer any four out of six questions from the followings: 2×4=8

a) Define Tautology? Give an example.
b) What is Equivalence Relation? Explain.
c) Write the Principle of Inclusion Exclusion.
d) Define the Big-oh notation for asymptotic upper bound.
e) Define Bijective.
f) How many one-to-one functions are possible from a set of elements to a set of elements?

2. Answer any four out of six questions from the following: 4x4=16

a) Prove that$(p\text{—>}r)v(q\text{—>}r)and(p\Lambda q)\text{—>}r$are logically equivalent.
b) Check whether the following function is one-to-one and also onto
$f(x)=|x|+x, \forall x \in R$
c) Use mathematical induction, prove that if S is a finite set of n elements, where n>=0,then S has 2^n subsets.
d) Find the number of positive integers not exceeding 1000 are divisible by 7 o r11?
e) Show that if $f(n)=n\log_2 n$, then $f(n)=O(n^2)$.
f) Explain the utility of generating functions.

3. Answer any two out of four questions from the following: 2x8=16

a) Solve the following recurrence relation of the Fibonacci Series:
$F_n=F_{n-1}+F_{n-2}$, n>=2
$F_0=0$, $F_1=1$
b) Let R be a relation on the set of ordered pairs of positive integers such that$((a,b),(c,d)) \in R$if and only if a+d=b+c. Show that R is an equivalence relation.
c) A Multiple Choice Question set contains 10 questions. There are 4 options for each question.
   i) How many ways can a student answer the questions on the test if the student answers every question?
   ii) How many ways can a student answer the questions if he/she can leave some answers blank?
d) How many different license plates are available if each plate contains a sequence of three letters followed by 3 digits? [show both the cases where repetitions are allowed and not-allowed]