COMSATS Institute of Information Technology, Islamabad Campus

Department of Computer Science

Discrete Structures – CSC102

BSE – II

Assignment #3 Marks: 15 Mapped to CLO5 &CLO6

Q1: Counting

a) **There are 18 mathematics majors and 325 computer science majors at a college.**

   i. **In how many ways can two representatives be picked so that one is a mathematics major and the other is a computer science major? [Product Rule]**
   ii. **In how many ways can one representative be picked who is either a mathematics major or a computer science major? [Sum Rule]**

b) **How many license plates can be made using either two or three uppercase English letters followed by either two or three digits? [P+S]**

Q2: Permutation

A club has 25 members.

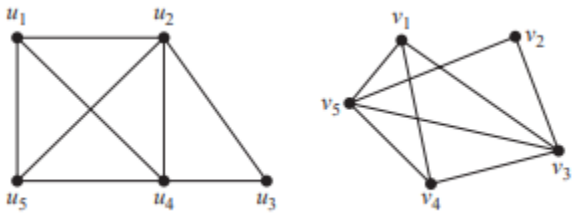
   i. **How many ways are there to choose four members of the club to serve on an executive committee?**
   ii. **How many ways are there to choose a president, vice president, secretary, and treasurer of the club, where no person can hold more than one office?**

Q3: Binomial Theorem

a) **Find the coefficient of x^5y^8 in $(x + y)^{13}$.**

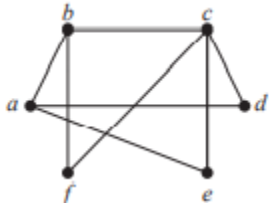
Q4: Graph Isomorphism

Determine whether the following graphs are isomorphic or not by evaluating the necessary conditions like vertices, edges, degree of vertices and their connectivity..



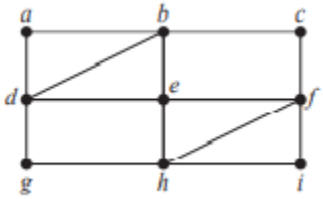
Q5: Bipartite Graph

Apply graph coloring and determine whether the following graph is bipartite or not.



Q6: Euler circuit and path

Determine whether the given graph has an Euler circuit. Construct such a circuit when one exists. If no Euler circuit exists, determine whether the graph has an Euler path and construct such a path if one exists.



Q7: Trees

Answer these questions about the rooted tree illustrated.

a) Which vertex is the root?

b) Which vertices are internal?

c) Which vertices are leaves?

d) Which vertices are children of j?

e) Which vertex is the parent of h?

f) Which vertices are siblings of o?

g) Which vertices are ancestors of m?

h) Which vertices are descendants of b?