

**UTTARAKHAND OPEN UNIVERSITY, HALDWANI (NAINITAL)****MCA-II 2<sup>nd</sup> YEAR 3<sup>rd</sup> SEMESTER ASSIGNMENT***Last Date of Submission: 15 Jan., 2015***Course Title: Discrete Mathematics****Course Code: MCA-09****Year: 2014-15****Maximum Marks: 40 Marks**

**Section 'A' contains 08 short answer type questions of 5 marks each. Learners are required to answer 4 questions only. Answers of short answer-type questions must be restricted to 250 words approximately.**

1. What is minimum spanning tree?
2. Define Tautology with an example.
3. Define combination.
4. Define Pigeonhole principle.
5. Define a planar graph
6. Define finite and infinite graphs.
7. Using a truth table, prove that proposition  $P \vee \neg(P \wedge Q)$  is a Tautology.
8. Show that a tree with  $n$  vertices has  $(n-1)$  edges.

**Section 'B' contains 04 long answer-type questions of 10 marks each. Learners are required to answer 02 questions only.**

1. Let  $G$  be a simple undirected graph with  $n$  vertices,  $n \geq 3$  and the minimum degree  $\geq (n/2)$ . Then prove that  $G$  is Hamiltonian.
2. Define rooted binary tree, spanning tree and weighted graph.
3. Explain Kruskal's algorithm with the help of an example.
4. Answer the following:
  - (i) In how many ways can four mathematics books, three history books, three chemistry books and two sociology books be arranged on the shelf so that all books of the same subject are together.
  - (ii) Assume that there are three men and five women at a party. Show that if these people are lined up in a row, at least two women will be next to each other.