



UTTARAKHAND OPEN UNIVERSITY, HALDWANI (NAINITAL)  
उत्तराखण्ड मुक्त विश्वविद्यालय, हल्द्वानी (नैनीताल)

MCA 2<sup>ND</sup> YEAR 3<sup>RD</sup> SEMESTER ASSIGNMENT

*Last Date of Submission: 15/01/2016*

**Course Title: Discrete Mathematics**

**Course Code: MCA-09**

**Year: 2015-16**

**Maximum Marks: 40 Marks**

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

1. Let  $A = \{1, 2, 3\}$ ,  $B = \{3, 4, 5\}$ . How many relations are there from A to B? Write down any four relations from A to B.
2. What is the product rule for counting?
3. Define circular permutation.
4. State the principle of inclusion and exclusion.
5. Let S be a set having 3 elements. How many binary operations can be defined on S?
6. Define a graph.
7. What is incidence matrix?
8. What do you mean by level of a rooted tree and height of a tree?

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

1. State and prove the principle of inclusion and exclusion for three sets.
2. Prove that the number of vertices of odd degree in a graph is always even.
3. Prove that a connected graph with n vertices has at least n-1 edges
4. Prove the following using mathematical induction:

$$1+3+5+\dots+2n-1 = n^2$$