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

M.A./ M.Sc. Mathematics

ASSIGNMENT- FIRST YEAR

Last Date of Submission: *15 May* **जमा करने की अन्तिम तिथि:** **15 मई**

Cosurse Title: Advanced Algebra **Course code:** MAT 501

Year: **2012-13** **Maximum Marks :** **40**

Section 'A'
भाग क

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.

Briefly discuss the following:

1. Let G be any group, a is a fixed element in G. Defined $f:G\rightarrow G$ by $f(x)=axa^{-1}$. Prove that f is an isomorphism of G onto G.
1. If R be a Euclidian ring. Then any two elements a and b in R have a greatest common divisor d. Moreover, $d=\lambda a + \mu b$ for some $\lambda, \mu \in R$.
2. If R is a ring and I is any left ideal in R, then I is a left module over R.
3. If G is a solvable group and if G_1 is a homomorphic image of G, then G_1 is solvable.
4. If T is a linear transformation on a finite dimensional vector space V over F then T is regular if and only if T maps V onto V.
5. If $\alpha,\beta \in V$ then $|(u,v)| \leq \|u\| \|v\|$.
6. Show that a square matrix A is invertible if and only if $|A|\neq 0$.
7. Define
   (i) Composition Series
   (ii) Nullity of Matrices.

Section 'B'
भाग ख

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

1. Let V be a finite dimensional inner product space, then V has an Orthonormal set as a basis.
2. If L is a finite extension of K and if K is a finite extension of F, then L is a finite extension of F. Moreover $[L:F]=[L:K][K:F]$.
3. Show Gaussian integer J(i) is a Euclidean ring.
4. Every finite abelian group is the direct product of cyclic groups.