SEM I - M O D U L E S O V E R S E M I R I N G S

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The study in semirings has been carried out by several researchers like Louis Dale, Chris Monico, Hebisch Udo, Hans J.W. and W.B. Vasantha Kandasamy. We are unaware of the fact whether the study of semimodules has been carried out by any researcher. The study of semivector spaces over semifields have been carried out by researchers. Here we introduce the concept of semimodules over semirings. The very well-known class of semirings are $\mathbb{Z}^\circ$, $\mathbb{Q}^\circ$, $\mathbb{R}^\circ$ and all distributive lattices. To ones surprise $\mathbb{Z}^\circ$, $\mathbb{Q}^\circ$, $\mathbb{R}^\circ$ and all chain lattices happens to be semifields. So the semimodules if defined over these semirings will reduce to the study of semivector spaces. Thus in this paper we take those semirings which are not semifields. Thus all distributive lattices which are not chain lattices are taken. For this we take any semilattice and consider when are those semilattices, semimodules over distributive lattices. Another class of semirings which are not semifields are square matrices with...
entries from $Z^\circ$, $Q^\circ$ and $R^\circ$. We study these semimodules and obtain interesting results about them.

Let $S$ be a semiring. $T$ an additive abelian semigroup with 0 is said to be a semimodule over $S$ if the following conditions are true.

i. For all $s \in S$ and $t \in T$; $st, ts \in T$

ii. $1t = t.1 = t$

iii. $(ss_1)t = s(s_1t)$

for all $s, s_1 \in S$ and $t \in T$.

$s(t + t_1) = st + st_1$; $(s + s_1)t = st + s_1t$

for all $t, t_1 \in T$ and $s, s_1 \in S$.

We can define a semi-module is a semivector space over a semiring. We can define both left and right semimodule over the semiring $S$. 

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