**Roll No.** ☐☐☐☐☐☐☐☐☐☐☐☐          **Total No. of Pages : 02**

**Total No. of Questions : 07**

**B.Sc.(CS) (2013 & Onwards)     (Sem.–6)**
# LINEAR ALGEBRA
## Subject Code : BCS-602
## M.Code : 72782

**Time : 3 Hrs.**                                                    **Max. Marks : 60**

**INSTRUCTIONS TO CANDIDATES :**
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

### SECTION-A

**Q1   Answer the followings in short :**

a)  Define Groups.

b)  Define Field.

c)  Define Vector Spaces.

d)  Define Linear dependent.

e)  Define Quotient Space.

f)  Define Linear Transformations.

g)  If T is a linear operator on V such that $T^2 - T + I = 0$. Prove that T is invertible.

h)  Define isomorphism.

i)  Define Nullity of a Matrix.

j)  If V and W are finite dimensional vector spaces such that $dimV = dimW$. Then prove that a linear transformation $T : V \rightarrow W$ is one-one iff T is onto.

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**SECTION-B**

Q2   Prove that the union of two subspaces is a subspace if and only if one of them is contained in other.

Q3   Write the vector v = (1, –3,5) belongs to the linear space generated by S, where $S = \{(1,2,1), (1,1,-1), (4,5,-2)\}$ or not?

Q4   State and prove Existence theorem for basis.

Q5   State and prove Rank-Nullity theorem.

Q6   Let T be a linear operator on $R^2$ defined by T($x,y$) = (4$x$ – 2$y$, 2$x$ + $y$) Find the matrix of T relative to the basis $B = \{(1,1); (–1,0)\}$.

Q7   Prove that the characteristic and minimal polynomials of an operator or a matrix have the same roots except for multiplicities.

**NOTE : Disclosure of identity by writing mobile number or making passing request on any page of Answer sheet will lead to UMC case against the Student.**