Roll No.
**BCA-5**
**1st Year Examination, Academic Batch 2018**
**Discrete Mathematics**

*Time : 3 Hours ]*                                                      *[ Max. Marks : 100*

**Note**. *Attempt any five questions. Each questions carry equal marks.*

**Q.1**.Prove that if H, K are subgroups of a group G and H Ụ K = G. Then either H=G or K=G.

**Q.2**. Show that the intersection of any number of subgroups of G is a subgroup of G.

**Q.3.** Let G be a group and a, b Є G. Then the equation x*a=b has a unique solution given by x= b* a-

**Q .4.** Space over C w.r.t. matirix addition and scalar multiplication

     i C is a vector space over C       ii C is a vector space over R

     iii R is not a vector space over C vi Q is not a vector space over R

**Q.5** (a) Linear sum W1+ W2 of two subspaces W1and W2 of a vector spaceV(F) is
A subspace of V(F).
(b) show that the function T: $R_2 \rightarrow R_2$ such that T(0,1)=(3,4),T(3,1)=(2,2)
And T(3,2)=(5,7) is not a L.T.

**Q.6** (a) Let T:v $\rightarrow$ w be a linear transformation. Then T is onto iff p(T)= dim w.
(b) show that the function T: $R_2 \rightarrow R_2$ defined by T(x1,x2)=(x1-x2,x1+x2),for
(x1, x2)Є $R_2$ is bijective.

**Q.7** Write Short notes on: [Any Four]
(i) Connected graph (ii) Regular graph
(iii) Weighted graph (iv) Rooted Trees
(v) Spanning Tree

**Q.8** Which of the following sets form vector spaces over reals?

Explain

i All polynomials over R with constant term zero.

ii All polynomials over R with constant term 1.

iii Set if all ordered pairs (a,b) of integers.

iii All polynomials with positive coefficients