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**Matric number: 18/sci01/064**

**1i).** Linear dependence of vectors occurs when the scalars in a linear combination are not all equal to zero.

i.e. α1u1+α2u2+ α3u3+…+ αnun=0

**1ii).** Linear combination of vectors is a mathematical method of combining vectors using addition and scalar multiplication.

i.e. α1v1+α2v2+ α3v3+…+ αmum

**2).** Uα+Vβ+Wγ= (a,b,c)

1 2 1 a

0 α + 1 β + 1 γ = b

-1 3 -4 c

α + 2β + γ = a ……..(i)

β + γ = b ……..(ii)

-α + 3β - 4γ = c ……..(iii)

From eqn (ii)

β= b – γ …….(iv)

Put eqn (iv) into (i) and (iii)

α+ 2(b – γ) + γ =a

α+ 2b – 2γ + γ =a

α+ 2b – γ =a

α – γ =a – 2b ……(v)

For eqn (iii)

-α +3(b – γ) - 4γ = c

-α +3b – 3γ - 4γ = c

-α +3b – 7γ = c

-α – 7γ = c – 3b ……...(vi)

Compare eqns (v) and (vi) by addition

α- γ = a – 2b

-α - 7γ = c – 3b

-8γ = a – 2b + c – 3b

-8γ = a – 5b + c

γ = (a – 5b + c )

-8

γ = - (a – 5b + c )

8

γ = -a +5b - c

8

Put γ in (ii)

β + -a +5b – c = b

8

β = b - -a +5b – c

8

β = b + a – 5b + c

8

β = 8b + a – 5b + c

8

β = a + 3b + c

8

Put β and γ into eqn (i)

α + 2 a + 3b + c + -a + 5b – c = a

8 8

α + a + 3b + c + -a +5b – c =a

4 8

α = a - a + 3b + c - -a +5b – c

4 8

α = a – a – 3b – c + a – 5b + c

4 8

α = 8a +2(- a – 3b – c) + a – 5b +c

8

α = 8a – 2a – 6b – 2c + a – 5b + c

8

α = 7a – 11b – c

8

7a – 11b – c U + a + 3b + c V + - a + 5b – c W

8 8 8

**3). –** Commutativity of vector addition

**-**  Associativity of vector addition

**-** Identity element of addition

**-** Inverse element of addition