Nepal College of Information Technology

**Unit Test**

Fall 2013

Program : BE CE Time : 2 hrs

Semester : (III) FM : 70

Subject : Engineering Math-III PM : 35

* *Candidates are requested to give their answer as far as practicable in their own words.*
* *The figure in the margin indicates the full marks*
* ***Attempt ALL question***

1. a. When does the inverse of a matrix exist? Let A and B be two matrices of specified order, show that  where A and B both are non-singular matrices. (8)

b. What do you mean by Gauss elimination method? Solve the following system of linear equations by using Gauss elimination method. (7)

x + y + z = 6

x – y + z = 5

3x + y + z = 8

2. a. Define rank of the matrix. Find rank of the matrix (7)



b) Define eigen value and eigen vector of the square matrix A. Find eigen values and eigen vectors of the matrix  (8)

3. a. State Cayley-Hamilton theorem. Verify it for A = and hence find inverse of A. (7)

b) What do you mean by an infinite series? When does it converge and diverge? Show that the necessary condition for an infinite series to be convergent is  but it is not sufficient for the series to be convergent. (8)

4. a. Define linear transformation. Show that a transformation T:defined by T(x,y) = (x +3,y) is linear. Is a transformation T:RR defined by T(x) = x +3 linear?



b. When does an infinite geometric series converge and diverge? Prove that the infinite series is convergent if p>1 and divergent if p 1. (8)



**5. Attempt all: 2.5 \*4 = 10**

a) 

b) Check whether the following sets of vectors are linearly independent or dependent? **u** = (0, 1, 0), **v** = (0, 0, 1), **w** = (1, 1, 1)

c) Define vector sub space with an example.

d) Test the convergence and divergence of series 