Nepal college of information technology

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| Level: Bachelor | Semester – Fall | Year : 2014 |
| Programme: BE(IT morning, CE and ELX) | | Full Marks: 100 |
| Course: Engineering Mathematics III | | Time : 3hrs. |

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| *Candidates are required to give their answers in their own words as far as practicable.* |
| *The figures in the margin indicate full marks.* |
| Attempt all the questions. |

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|  | 1. Define determinant of a square matrix. Show that .   OR  What do you mean by singular and non singular matrices? Prove that the necessary and sufficient condition for a square matrix to have its inverse is it is non singular.   1. What do you mean by consistency of a system of linear equations? Test,using Gauss elimination method,whether the given system of linear equations   2x + 5y + 6z = 13  3x + y -4z = 0  x - 3y –8z = -10  is consistent or not. Hence solve it. | 8  7 |
|  | 1. Define eigen value and eigen vector of a square matrix. Find the eigen values and eigen vectors of a matrix 2. Maximize F=subject to | 8  7 |
|  | 1. Define Divergence and Curl of a vector function. If  is a given scalar function, find div (grad ) and curl (grad ). 2. Define line integral of a vector valued function and give its physical significance. Also evaluate: , where  , and C is the curve where from (0,0,0) to (1,1,1). | 8  7 |
|  | 1. State Greens theorem. Use it to evaluate, where C is the boundary of the region between  and , where . 2. State Gauss Divergence theorem for vector calculus, hence evaluate where and S is the surface  OR,   Using Stokes theorem evaluate the line integral, where and S is the portion of the paraboloid | 7  8 |
|  | 1. Define even and odd functions with examples. Find the Fourier series expansion of f(x), if for –π <x < π. 2. Express f(x) = x as the half range series cosine series in 0 < x < 2. | 8  7 |
|  | 1. What do you mean by the convergence of an infinite series? Prove that the necessary condition for an infinite series to be convergent is  , but this is not sufficient condition. 2. Prove that , the infinite series , is convergent if and divergent if   **OR**  Define a linear transformation. Is a transformation , defined by linear? Justify. | 8  7 |
|  | Attempt all: (5×2=10)   1. Test the convergence and divergence of. 2. Evaluate. 3. If, , find curl (). 4. Find smallest period of f(x) =. 5. Are the vectors (2,-4), (1, 9), and (3, 5) linearly dependent or not? | 2  2  2  2  2 |