# EN09 101: ENGINEERING MATHEMATICS I

(Common for all branches)

## SYLLABUS AND QUESTION BANK FOR MODULE 1II

### Matrices

**Syllabus**: Rank of a matrix-reduction to normal and echelon form-system of linear equations-consistency-Gauss elimination method-system of homogeneous linear equations-Eigen values and Eigen vectors-Cayley-Hamilton theorem-Diagonalization of a matrix using Eigen vectors-Quadratic form-Defenite,Semi-defenite,Indefenite forms-Matrix associated with quadratic form-Reduction to Canonical form by orthogonal transformation.

**Question Bank**

1. Reduce the quadratic form to canonical form by orthogonal Transformation (10 marks)
2. Find the eigen values of *A* and hence find if (10 marks)
3. Verify Cayley- Hamilton theorem for (5 marks)
4. Find eigen values and eigen vectors of (5 marks)
5. Verify that the eigenvalues of and are respectively the squares and reciprocals of eigenvalues of (10 marks)
6. Verify Cayley- Hamilton theorem for .Also find (10 marks)
7. Diagonalize by means of an orthogonal transformation.(10 marks)
8. Reduce to echelon form (5 marks)
9. Given that Verify that sum and product of the eigen values are equal to the trace of A and |A| resp. (7 marks)

10. Investigate the values of have (i) no solution (ii) a unique solution (iii) an infinite number of solutions (8 marks)

11. Reduce the quadratic form in to canonical form by orthogonal reduction. Also identify the nature of quadratic form.(10 marks)

12. Show that the equations are consistant.(5 marks)

13. Find the eigen values and eigen vectors of (8 marks)

14. Reduce the quadratic form to canonical form by orthogonal reduction (10 marks)

15. If the augmented matrix of a system is equivalent to find the values of and for which the system has no solution.(5 marks)

16. Find the rank of the matrix by reducing it to the normal form (5 marks)



17. Solve the system of equations by Gauss-elimination method:

(10 marks)

18. Show that the equations

(i) Have no solution if $a = b = c = 1$

(ii) Have many solution if $a = b/2 = c = 1$(8 marks)

19. Find the rank of the matrix (5 marks)

20. Solve by using matrix inversion method: (8 marks)