H.T.No. | | | | | | | | | | |

Code No: MA2502 **GEC-R17**

I B. Tech I Semester Regular Examinations, December 2017

LINEAR ALGEBRA AND INTEGRAL TRANSFORMS

(Common to Computer Science and Engineering and Information Technology)

Time: 3 Hours **Max. Marks: 60**

Note: All Questions from **PART-A** are to be answered at one place.
Answer any **FOUR** questions from **PART-B.** All Questions carry equal Marks.

PART-A

6 × 2 = 12M

1. Using Echelon form of a matrix, find the rank of $\begin{bmatrix} 3 & 1 & 2 & 3 \\ 2 & -3 & -1 & -3 \\ 1 & 2 & 1 & 4 \end{bmatrix}$
2. Find the characteristic equation of the matrix $\begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 1 \\ 1 & 1 & 2 \end{bmatrix}$
3. Define index and signature in Quadratic form.
4. Find L[cos(at + b)].
5. Find $L^{-1}[\frac{3(s^2-2)^2}{2s^5}]$
6. Find Fourier Sine transform of $f(x) = e^{-ax}$, a>0.

PART-B

4 × 12 = 48M

1. a) Reduce A = $\begin{bmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \\ 1 & 3 & 2 \\ 2 & 1 & 3 \end{bmatrix}$ to normal form and hence find its rank. (6M)

   b) Solve completely the system of equations: x+y-2z+3w=0, x-2y+z-w=0, 4x+y-5z+8w=0, 5x-7y+2z-w=0; (6M)

2. a) Find the Eigen values and corresponding Eigen vectors of the matrix:

   $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ (8M)

   b) If $A = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$ express $A^6 - 4A^5 + 8A^4 - 12A^3 + 14A^2$ as polynomial in A. (4M)

3. Reduce the quadratic form $x_1^2+3x_2^2+3x_3^2-2x_2x_3$ to canonical form by an orthogonal transformation. (12M)

4. a) Find the Laplace transform of f(t), where $f(t) = e^{2t} + 4t^3 - 2\sin 3t + 3\cos 3t$ (8M)

   b) Define unit step function and write Laplace transform of unit step function. (4M)

5. Using Laplace transform method, solve the differential equation $(D^2 + 1)y = Sin2t, t > 0$, if y(0)=1, $y^1(0)=0$. (12M)

6. a) Find the Fourier Sine transform of f(x) = $e^{-|x|}$ for x≥0 and a>0. And show that $\int_0^\infty \frac{\alpha . Sinmx}{\alpha^2 + 1} d\alpha = \frac{\pi}{2} e^{-m}, m > 0$ (8M)

   b) Find the Fourier cosine transform of e^{-3x}. (4M)

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