Vellore Institute of Technology

DEPARTMENT OF MATHEMATICS
SCHOOL OF ADVANCED SCIENCES
Summer Semester June–2022
Digital Assignment – I

Course Code : MAT2002 **Slot : C**

Course Name : AOD

ANSWER ALL QUESTIONS

1. Find the Fourier coefficient a_0 of the function $f(x) = x - \pi$ in $-\pi < x < \pi$

2. If $f(x) = x\cos x$ in $0 < x < 2\pi$ then find the Fourier coefficients a_0

3. Find the eigen values and eigen vectors of $\begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$

4. The Quadratic form corresponding to the symmetric matrix $\begin{bmatrix} 1 & 2 \\ 2 & -4 \end{bmatrix}$

5. Verify Cayley – Hamilton theorem for the matrix $\mathrm{A} = \begin{bmatrix} 1 & 3 & 7 \\ 4 & 2 & 3 \\ 1 & 2 & 1 \end{bmatrix}$

   and also use it to find A^{-1}.

6. Reduce the quadratic form $3x_1^2 + 5x_2^2 + 3x_3^2 + 2x_1x_3 - 2x_1x_2 - 2x_2x_3$ to canonical form by orthogonal reduction.

Vellore Institute of Technology

DEPARTMENT OF MATHEMATICS
SCHOOL OF ADVANCED SCIENCES
Summer Semester June –2022
Digital Assignment – II

Course Code : MAT2002 **Slot : C**
Course Name : AOD

ANSWER ALL QUESTIONS

Solve $(x^2D^2 - 4xD + 6)y = x^2$
Apply the method of variation of parameters to solve $y'' + y = \cos ecx$
Use the method of diagonalization to obtain the general solution for $x'' + AX = 0$; where $X = (x_1, x_2)^T$ and $A = \begin{bmatrix} 1 & 2 \\ 3 & 2 \end{bmatrix}$
Solve the system of linear differential equations by matrix method $x'(t) = x(t) + 4y(t)$; $y'(t) = x(t) + y(t)$
Find the *Z*-transform of the Sin(3n+5)
Find the Inverse Z-Transform of $Z^{-1}\left[\dfrac{2z^2 + 3z}{(z+2)(z-4)}\right]$
Solve $u_{n+2} + 4u_{n+1} + 3u_n = 3^n$ with u_0=0, u_1=1 using *Z*-Transform.