EAST WEST UNIVERSITY

Mid-II Examination, Fall-2021
Department of Mathematics and Physical Sciences
Course Code: MAT 205 (Linear Algebra and Complex Variables)
Section: 8, Time: 90 minutes, Full Marks: 40
Course Instructor: Dr. Nepal Chandra Roy (DNCR)

N.B.: Answer all the questions. Figure in the right margin indicate full marks.

1. (a) Find the eigenvalues and eigenvectors of the matrix [6]

$$A=\begin{bmatrix}1 & 3\\ 1 & -1\end{bmatrix}.$$

(b) Find the matrix P that diagonalizes A in 1(a) and determine $P^{-1}AP$. [4]

2. (a) Find the characteristic equation of the matrix [5]

$$A=\begin{bmatrix}1 & 2 & 3\\ 2 & -1 & 1\\ 3 & 1 & 1\end{bmatrix}.$$

(b) Using Cayley-Hamilton theorem find inverse of A in 2(a). [5]

3. Consider the vector space $\mathbb{R}^3$ with the Euclidean inner product. Apply the Gram-Schmidt process to transform the basis $u_1=(1,1,0), u_2=(1,0,1)$ and $u_3=(1,0,0)$. [10]

4. (a) Show that $f(z)=\bar{z}$ is non-analytic anywhere. [5]

(b) If $u=e^{-x}(x\sin y-y\cos y)$ then find v such that $f(z)=u+iv$ is analytic. [5]