EAST WEST UNIVERSITY

Semester Final Examination, Fall-2021
Department of Mathematics and Physical Sciences
Course Code: MAT 205 (Linear Algebra and Complex Variables)
Section: 7, Time: 90 minutes, Full Marks: 50
Course Instructor: Dr. Nepal Chandra Roy (DNCR)

N.B.: Answer all the questions. Figure in the right margin indicates the full marks of the corresponding question.

1. (a) Find the LU factorization of [5]

$$A=\begin{bmatrix} 1 & -3 & 5 \\ 2 & -4 & 7 \\ -1 & -2 & 1 \end{bmatrix}.$$

(b) Find the least square solution of the linear system A**x**=**b** given by [5]

$$2x_1 - 2x_2 = 2$$
$$x_1 - x_2 = -1$$
$$3x_1 + x_2 = 1$$

2. (a) Evaluate $\oint_C \frac{e^{2z}}{(z+2)^4}dz$ where C is the circle $|z|=3$. [5]

(b) Evaluate $\oint_C \frac{e^{z}}{(z^2+\pi^2)^2}dz$ where C is the circle $|z|=4$. [5]

3. (a) Expand $f(z)=\ln\left(\frac{1+z}{1-z}\right)$ in a Taylor series about $z=0$. [5]

(b) Find Laurent series of $f(z)=\frac{1}{(z+1)(z+3)}$ valid for $1<|z|<3$. [5]

4. Evaluate the integral $\int_0^{2\pi}\frac{d\theta}{1+a\sin\theta}$, $0<a<1$. [10]

5.(a) Evaluate $\int_{(0,3)}^{(2,4)}\{(2y+x^2)dx+(3x-y)dy\}$ along the straight line $x=2t$ and $y=t^2+3$. [5]

(b) Evaluate $\int_C \bar{z}dz$ from $z=0$ to $z=4+3i$ along the curve C given by the line from $z=0$ to $z=3i$ and then the line $z=3i$ to $z=4+3i$. [5]