DEPARTMENT OF BASIC SCIENCES AND ISLAMIAT

University of Engineering and Technology, Peshawar

PAPER: Complex Variables BSI-362

Final-Term Examination 3rd semester Fall-2020

(Computer System Engineering)

Time Allowed: 3 hours **Max Marks: 50**

Note: Attempt all questions:

Q1 CLO-1, Cognitive Domain, PLO-1, Taxonomy Level-1 (6+6)

(a) Define Cauchy-Riemann equations also discuss CRE in polar form with examples.

(b) Find out (and give reason) whether $f(z)$ is continuous at $z=0$ if $f(0)=0$ and for $z\neq 0$ the function $f(z)=\dfrac{(\operatorname{Re} z-\operatorname{Im} z)}{|z|^2}$

Q2 CLO-1, Cognitive Domain, PLO-1, Taxonomy Level-1 (6+6)

(a) Find the value of $\int_c \dfrac{z+4}{z^2+2z+5}dz$, if c is the circle $|z+1|=1$.

(b) Find the Fourier sine integral of the given function.

$$f(x)=\begin{cases}\sin x & if \quad 0<x<\pi\\ 0 & if \quad x>\pi\end{cases}$$

Q3 CLO-2, Cognitive Domain, PLO-2, Taxonomy Level-3 (6+6)

(a) Discuss the Fourier series of the function $f(x)$, which is assumed to have the period 2π, of the first three partial sums where

$f(x)=x+|x| \qquad (-\pi<x<\pi)$

(b) State whether the given function is even or odd. Find its Fourier series. Sketch the function and some partial sums. Which are assume to have The period 2π, where

$$f(x)=\begin{cases}k & if \quad -\pi/2<x<\pi/2\\ 0 & if \quad \pi/2<x<3\pi/2\end{cases}$$

Q4 CLO-2, Cognitive Domain, PLO-2, Taxonomy Level-3 (7+7)

(a) Compute $\int_C f(z)dz$, where $f(z)=2z^4-z^{-4}$, C the unit circle (C.C.W)

(b) Expand each of the following function in a Laurent Series that converges for $0<|z|<R$ and determine the precise region of convergence, where

$f(z)=e^z/z^2$