DEPARTMENT OF BASIC SCIENCES AND ISLAMIAT

University of Engineering and Technology, Peshawar

PAPER: Complex Variables BSI-362

Mid-Term Examination 3rd semester Fall-2020

(Computer System Engineering)

Time Allowed: 2 hours **Max Marks: 20**

Note: Attempt all questions:

Q1 CLO-1, Cognitive Domain, PLO-1, Taxonomy Level-1 (5)

State and prove the De Moivere's Theorem for the following cases

(i) n is +ve integer

(ii) n is –ve integer

(iii) n=0

(iv) n is rational number

Q2 CLO-1, Cognitive Domain, PLO-1, Taxonomy Level-1 (2+3)

(a) Find the point where the CREs are satisfied for the function

$f(z) = xy^2 + ix^2y$ Where does $f'(z)$ exist? Where $f(z)$ is analytic?

(b) Find and plot all roots: $\sqrt[4]{-7+24i}$

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

(a) Discuss an Analytic function with example.

(b) Calculate the given function is analytic.

$$f(z) = z + \frac{1}{z}$$

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

(a) Discuss continuity of complex function and CREs both polar and Cartesian form.

(b) Determine whether the following function are harmonic if your answer is yes, find a corresponding analytic function $f(z) = u(x,y) + iv(x,y)$

$$u = \frac{x}{x^2 + y^2}$$