



VIT

Vellore Institute of Technology

Slot: C2+TC2+TCC2+V5

School of Advanced Sciences
Department of Mathematics

Continuous Assessment Test-I, Winter Semester-January 2020

Course Code & Name: MAT 3003-Complex Variables and Partial Differential Equations

Date & Time: 21.01.2020 & 90 Minutes

Max. Marks: 50

Answer ALL the Questions

S.No.	Questions	Marks
1.	<p>(i) Prove that an analytic function with its derivative zero is constant.</p> <p>(ii) Find the analytic function $f(z) = u + iv$ given</p> $v = \left(r - \frac{1}{r}\right) \sin \theta, r \neq 0.$	(5M+5M)
2.	Determine the function $u = 2xy + 3xy^2 - 2y^3$ is harmonic. Find the conjugate harmonic function v and express $u + iv$ as an analytic function $f(z)$ of z .	(10M)
3.	Use the transformation $w = z^2$ to find the image of	(10M)
	<p>(i). The straight lines through the origin of the z-plane are mapped onto the straight lines through the origin of the w-plane and</p> <p>(ii). Find the image of the circle $z = a$.</p>	
4.	Find the bilinear transform which maps the points $z = 2, i, -2$ into the points $w = 1, i, -1$ and also find the invariant points of this transform.	(10M)
5.	Determine the Laurent series expression $f(z) = \frac{1}{(z+2)(1+z^2)}$ valid for the regions (i) $ z < 1$, (ii) $1 < z < 2$, (iii) $ z > 2$	(10M)



SCAN ME

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