

CONTINUOUS INTERNAL EVALUATION- 1

Dept: BS	Sem / Div: IV/ A & B	Sub: Complex Analysis, Probability and Statistical Methods	S Code: 18MAT41
Date: 24/05/2021	Time: 9:30-11:00 am	Max Marks: 50	Elective: N
Note: Answer any 2 full questions, choosing one full question from each part.			

Q N	Questions	Marks	RBT	COs
PART A				
1 a	Derive Cauchy-Riemann equation in the Polar form.	8	L2	CO1
b	Show that the function $f(z) = z^2 + 2z$ is analytic and hence find its derivative.	8	L2	CO1
c	If f(z) is analytic, show that $\left[\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right] f(z) ^2 = 4 f'(z) ^2$	9	L2	CO1
OR				
2 a	Show that real and imaginary parts of an analytic function are harmonic in Cartesian and Polar form.	8	L2	CO1
b	Find the analytic function whose real part is $y + e^x \cos y$	8	L2	CO1
c	Show that $v = 2xy - 2x + 4y$ is harmonic. Find its harmonic conjugate. Also find the analytic function.	9	L2	CO1
PART B				
3 a	State and prove Cauchy's integral formula.	8	L3	CO1
b	Evaluate $\int_c \frac{(2z+1)dz}{z^2+z}$ where C is a circle $ z = \frac{1}{2}$	8	L3	CO1
c	Verify Cauchy's theorem for $f(z) = z^2$ where C is the square having the vertices (0,0), (1,0), (1,1) and (0,1)	9	L3	CO1
OR				
4 a	Evaluate $\int_0^{2+i} (\bar{z})^2 dz$ along the (i) line $x=2y$ (ii) the real axis upto 2 and vertically to $2+i$.	8	L2	CO1
b	State and prove Cauchy's Theorem.	8	L3	CO1
c	Evaluate $\int_c \frac{(z^2+1)dz}{z^2-1}$ where C is a circle $ z-1 =1$	9	L3	CO1