



VR Siddhartha Engineering College
Department of Information Technology



20BS3101B COMPLEX ANALYSIS AND NUMERICAL METHODS

A .Y:2021-22 ASSIGNMENT-2 QUESTIONS

S.No	Question	Course Outcome	BTL
1	State and prove the necessary condition for analyticity of complex variable function $w=f(z)$	CO 1	Apply
2	Determine whether the following functions are analytic: (i) $1/z$ (ii) $\cosh z$ (iii) $\frac{x+iy}{x^2+y^2} + i\frac{x-iy}{x^2+y^2}$	CO 1	Apply
3	Determine the value of p such that $f(z) = \frac{1}{2} \log(x^2 + y^2) + i \tan^{-1} \left(\frac{px}{y} \right)$	CO 1	Understand
4	Prove that the function $f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^2+y^2}$, $z \neq 0, f(0) = 0$ is continuous and the C-R equations are satisfied at the origin, yet $f'(0)$ does not exist	CO 1	Apply
5	Prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) f(z) ^2 = 4 f'(z) ^2$ if $f(z)$ is a regular function of z	CO 1	Apply
6	Prove that (i) $u=x^3-3xy^2+3x^2-3y^2+1$ is Harmonic and find its Harmonic conjugate (ii) $u(r, \theta) = r^2 \cos 2\theta$ is Harmonic and find its Harmonic conjugate (iii) Find the orthogonal trajectories of $x^3 - 3xy^2 = c$	CO 1	Apply
7	Determine the analytic function whose real part is (i) $e^x(x \cos y - y \sin y)$ (ii) $\log \sqrt{x^2 + y^2}$ (iii) $\sin 2x / (\cosh 2y - \cos 2x)$	CO 1	Apply

	Determine the analytic function whose imaginary part is (i) $x-y/x^2+y^2$ (ii) $\cos x \cosh y$ (iii) $e^x \sin y$		
8	If $u-v=(x-y)(x^2+4xy+y^2)$ and $f(z)=u+iv$ is Regular function find $f(z)$ in terms of z and hence find $f(1)$	CO 1	Apply
9	Evaluate $\int_0^{1+i} (x^2 - iy) dz$ along the path $y=x$ and $y=x^2$	CO 1	Apply

Course Coordinators	Dr. M.V.D.N.S.MADHAVI	
Module Coordinator		
Program Coordinator		
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<https://brainly.in/question/15554146>

<https://www.ques10.com/p/53247/find-the-analytic-function-fzuiv-in-terms-of-z-i-1/?>



20BS3101B COMPLEX ANALYSIS AND NUMERICAL METHODS

A .Y:2021-22 HOME ASSIGNMENT-2

S.No	Question	Course Outcome	BTL
1	State and prove Cauchy's integral theorem Verify Cauchy's integral theorem for z^2 taken over the boundary of the triangle with vertices (1,2),(1,4),(3,2)	CO 1	Apply
2	State and prove Cauchy's integral formula Evaluate using Cauchy's integral formula the following <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>(i) $\oint_c \frac{z^2+1}{z(2z+1)} dz$ where c is $z =1$</p> <p>$\oint_c \frac{\sin \pi z + \cos \pi z}{(z-1)(z-2)} dz$ where c is $z =4$</p> <p>is $z-1 =1/2$</p> </div> <div style="text-align: center;"> <p>(ii) $\oint_c \frac{\log z}{(z-1)^3} dz$ where c is $z-1 =1/2$</p> </div> </div>	CO 1	Apply
3	Find Taylor Series expansion of $f(z) = \frac{2z^3+1}{z^2+z}$ about the point $z = i$	CO 1	Apply
4	Find Laurent Series expansion of $f(z) = \frac{z^2-6z-1}{(z-1)(z-3)(z+2)}$ in the region $3 < z+2 < 5$	CO 2	Apply
5	Evaluate using Residue theorem the following <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>(i) $\oint_c \frac{z-3}{z^2+2z+5} dz$ where c :: $z+1+i =2$</p> </div> <div style="text-align: center;"> <p>(ii) $\oint_c \frac{1-2z}{z(z-1)(z-2)} dz$ where c :: $z =1.2$</p> </div> </div>	CO 2	Apply
6	Apply Residue theorem to evaluate $\int_0^{2\pi} \frac{\cos 3\theta}{5-4\cos \theta} d\theta$	CO 2	Apply

7	Apply Residue theorem to evaluate $\int_0^{\infty} \frac{\cos ax}{x^2 + 1} dx$	CO 2	Apply
8	Find the Bilinear transformation which maps the points (i) $z=1,i,-1$ to the points $w=i,0,-i$ (ii) $z=1,i,-1$ into the points $w=0,1,\infty$	CO2	Apply

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