Course M.Sc. (Mathematics) **Session MAY-2017**
Subject Complex Analysis **Subject Code-MMAT1-207**
Semester- 2^{nd} **Date of submission 17/02/2017**

Assignment No.-I (Unit-I)

Ques.1. Obtain Cauchy-Riemann equations for an analytic function of complex variable.

Ques.2. Show that an analytic function cannot have a constant absolute value without reducing to a constant.

Ques.3. Show that the function $e^{-Z^{-4}}$ $(z \neq 0)$and $f(0) = 0$ is not analytic at although the Cauchy - Riemann equations are satisfied at the point.

Ques.4. if u - v = (x-y)(x^2 + 4xy + y^2)and f(z)= u + iv is an analytic function of z = x + iy, find f(z) in terms of z.

Ques.5. if f(z)= u + iv is an analytic function of z = x + iy and $u - v = \dfrac{e^y - \cos x + \sin x}{\cosh y - \cos x}$, find f(z) subject to the condition $f\left(\dfrac{\pi}{2}\right) = \dfrac{3-i}{2}$

Ques.6. if w = f(z) is a regular function of z, prove that $\left(\dfrac{\partial^2}{\partial x^2} + \dfrac{\partial^2}{\partial y^2}\right)\log\left|f^{'}(z)\right| = 0$

Ques7. if $u = x^3 - 3xy^2$, show that there exist a function v(x, y) such that w = u + iv is analytic in finite region.

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Assignment No.-II (Unit-II)

Ques.1. A function which is analytic and bounded in the whole plane must reduce to a constant.

Ques.2. If f(z) is continuous in a simply connected domain Ω and if for every closed contour C in the domain Ω, $\int_C f(z)dz = 0$, then f(z) is analytic within Ω.

Ques.3. Obtain Poisson's integral formula for the harmonic functions.

Ques.4. Evaluate by using the definition of integral

$$\int_{-2+i}^{5+3i} z^3 dz$$

Ques.5. Evaluate the following complex integration using Cauchy's integral formula $\int_C \frac{3z^2+z+1}{(z^2-1)(z+3)}dz$, where C is the circle $|z|=2$.

Ques.6. Integrate $(z^3-1)^{-2}$ the counter clockwise sense around the circle $|z-1|=1$.

Ques.7. Evaluate the line integral $\int_C (3y^2dx+2ydy)$ where c is the circle $x^2+y^2=1$, counter wise from (1,0) to (0,1).