DPB – 510 (Math)

M.Sc. Mathematics (Final) Examination, August/September 2010
Directorate of Distance Education
(Freshers)
MATHEMATICS
Paper : PM-10.05 : Complex Analysis

Time : 3 Hours | Max. Marks : 80

*Note : 1) Answer **any FIVE** questions.*

*2) **All** questions carry **equal** marks.*

1. a) Explain stereographic projection. **6**

   b) State and prove sufficient condition for the function f(z) to be analytic. **5**

   c) Show that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)\left[\log\left(1+|f(z)|^2\right)\right]=\frac{4|f'(z)|^2}{1+|f(z)|^2}$. **5**

2. a) Show that the power series and its derived series has the same radius of convergence. **6**

   b) State and prove Abel's limit theorem. **5**

   c) Show that the map $\omega = 1/z$ transforms circles and lines into circles and lines. **5**

3. a) Prove that the product transformations is again bilinear. **5**

   b) Find the bilinear transformation which maps $\{\infty, i, 0\}$ onto $\{0, i, \infty\}$. **5**

   c) Prove that the line integral $\int_\gamma P\cdot dx + Q\cdot dy$ defined in Ω depends only on the end points of the curve γ if and only if there is a function U(x, y) in Ω with $\frac{\partial U}{\partial x}=P, \frac{\partial U}{\partial y}=Q$. **6**

P.T.O.