



Seat No.	
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T.Y. B.Sc. (Semester – IV) Examination, 2013
MATHEMATICS (Paper – II)
MT – 342 : Complex Analysis
(2008 Pattern) (New Course)

Time : 2 Hours

Max. Marks : 40

N.B. : 1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*

1. Answer **any five** of the following :**10**

- a) Show that $f(z) = e^z$ is an entire function.
- b) Show that $f(z) = |z|^2$ is not differentiable at $z = 5 + 7i$.
- c) Let $z(t) = \begin{cases} t + it & \text{if } 0 \leq t \leq 1 \\ t + i & \text{if } 1 \leq t \leq 2 \end{cases}$
Show that $z(t)$ is not a smooth arc.
- d) Show that $\text{Log}(1-i) = \frac{1}{2} \ln 2 - \frac{\pi}{4}i$.
- e) Evaluate $\int_C \frac{z+2}{z} dz$, where C is given by $z(t) = 2e^{it}$ ($0 \leq t \leq 2\pi$).
- f) State Cauchy-Riemann equations in polar form.
- g) Find the residue at $z = 1$ of the function $f(z) = \frac{z}{(z-1)(z-1)^2}$.

2. Answer **any two** of the following :**10**

- a) If a function $f(z) = u(x, y) + iv(x, y)$ is analytic in a domain D , then prove that its component functions u and v are harmonic in D .
- b) State and prove Liouville's theorem.
- c) Using definition of limit, prove that $\lim_{z \rightarrow 0} \frac{z^{-2}}{z} = 0$.

Burdwan University B Sc Mathematics Honours Question Paper 2014

F Rizvi



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