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**GIET UNIVERSITY, GUNUPUR – 765022**

M. Sc. (Second Semester) Examinations, September – 2021

**20MTPC204 - Complex Analysis**

(Mathematics)

Time: 2 hrs

Maximum: 50 Marks

(The figures in the right hand margin indicate marks.)

**PART – A**Q.1. Answer **ALL** questions**(2 x 10 = 20 Marks)**

- Define an analytic function. Give an example.
- Verify whether the function  $F(z) = \frac{2}{z^2}$  is Analytic or not
- State Cauchy's integral formula
- Evaluate  $\oint_c \frac{dz}{z-3i}$ ,  $c: |z| = 1$
- Write the parametric representation of  $(x+3)^2 + (y-5)^2 = 8$ .
- Is the function  $f(Z) = e^z$  is analytic? Justify your answer
- Find centre and radius of convergence of  $\sum \frac{1}{n(n+1)} (z-2)^n$
- State Cauchy's residue theorem.
- Find the Residue at the singular point of  $f(z) = \cos z/z^4$
- Define conformal mapping.

**PART – B (6 x 5 = 30 Marks)**Answer ANY FIVE

Marks

- Prove that an analytic function of constant absolute value is constant (6)
- Evaluate  $\oint \frac{z^2 \sin z}{4z^3-1} dz$ ;  $c: |z| = 2$  by residue theorem (6)
- Prove that the function  $u = x^3 - 3x^2y$  harmonic. Find its harmonic conjugate also find the corresponding analytic function. (6)
- State and prove Morera's theorem (6)
- Find the Laurent series of  $\frac{z^2}{(z-1)(z-2)}$ , valid in the region  $1 \leq |z| \leq 2$  and  $|z| \geq 2$  (6)
- Evaluate  $\int_0^{2\pi} \frac{dz}{2+\cos z}$ . by residue theorem (6)
- Find the image of the infinite strip i)  $\frac{1}{4} \leq y \leq \frac{1}{2}$  ii)  $0 \leq y \leq \frac{1}{2}$  under the mapping  $w = \frac{1}{z}$ . (6)

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