Enrolment Number: _____

# PARUL UNIVERSITY
## FACULTY OF ENGINEERING & TECHNOLOGY
### B.TECH MIDSEM EXAMINATION
### 3ᵗʰ SEMESTER
### ACY-2022-23 (ODD SEM)

**Subject Name (Code):** Complex Varibles and PDE(203191205)
**Branch:** IC/CHEMICAL/MECHATRONICS/AERO/PETRO/BIO
**Date:**09/08/2022
**Total Marks: 40**

Time: 2:30 – 4:00

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**Q.1** **(A) One-line Questions**

05

(1) Multiplicative Identity for entire complex number is _____

(2) If $Z_1 = x_1 + iy_1$ and $Z_2 = x_2 + iy_2$ then find $Z_1 + Z_2$

(3) Argument of z = -i is_____

(4) PDE $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ is known as _____

(5) The order and degree of the PDE $x\left(\frac{\partial^3 z}{\partial x^3}\right)^2 + y\left(\frac{\partial z}{\partial y}\right)^5 = z$ is,

**(B) Compulsory Questions**

05

(1) Find modulus value of $(2 - 5i)$

(2) Define Analytic function.

(3) Principal argument of Z = 1+i

(4) If f(z) =$|z|^2$ then find Re{f(z)}

(5) A transformation of the type w = Az+C is called_____

**Q.2** **Attempt any four (Short Questions)**

12

(1) Form PDE from the relation $z^2 = ax^2 + by^2$

(2) By using the definition show that $f(z) = iz^3$ is differentiable for all z.

(3) Determine whether the function f(z) is continuous at z = -i

$$f(z) = \begin{cases} \dfrac{(z^2+3iz-2)}{z+i} & z \neq -i \\ 5 & z = -i \end{cases}$$

can the function be redefined to make it continuous at z = -i?

(4) Evaluate $\int_0^{2+i} z^2 dz$ along the line $y = \dfrac{x}{2}$

(5) Evaluate $\int_c \dfrac{e^z dz}{(z-1)(z-2)}$ where c is $|z| = \dfrac{1}{2}$

**Q.3** **Attempt any two** 08

(1) Form PDE from $f(x + y + z, x^2 + y^2 + z^2) = 0$

(2) Evaluate $\int_{1-i}^{2+i} (2x + iy + 1)\, dz$ along the path x = t+1, y = 2t² − 1

(3) Find the image of infinite strip $\dfrac{1}{4} \leq y \leq \dfrac{1}{2}$ under the transformation $w = \dfrac{1}{z}$ Also show the regions graphically.

**Q.4** (A) Find the bilinear transformation which maps the points z =-1, 0 1 into the points w = -i, 1 ,i 05

(B) Find root of $z^3 = 2 + 2i$ 05

OR

(B) Determine harmonic conjugate function of the given function v(x,y) 05 =$x^2 - y^2$ and also find analytic function f(z).