

Subject: Applied Mathematics IV

SEM:IV

$$\underline{z=3}$$

$$2 = 4B$$

$$\Rightarrow \boxed{B = 1/2}$$

$$\underline{z=-1}$$

$$-2 = -4A$$

$$\Rightarrow \boxed{A = 1/2}$$

$$\frac{z-1}{z^2-2z+3} = \frac{1}{2(z+1)} + \frac{1}{2(z-3)}$$

$f(z)$ is not analytic in $z=-1$ & $z=3$.

\therefore The possibilities are $|z| < 1$, $|z| > 1$,
 $|z| < 3$ & $|z| > 3$.

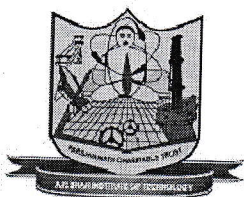
$$\Rightarrow \text{(i) } |z| < 1$$

$$\text{(ii) } 1 < |z| < 3$$

$$\text{(iii) } |z| > 3.$$

$$\text{(i) } |z| < 1$$

$$\Rightarrow |z| < 3$$



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$$f(z) = \frac{1}{2(1+z)} + \frac{1}{2 \times 3 \left(\frac{z}{3} - 1\right)}$$

$$= \frac{1}{2(1+z)} - \frac{1}{6(1-\frac{z}{3})}$$

$$= \frac{1}{2} (1+z)^{-1} - \frac{1}{6} (1-\frac{z}{3})^{-1}$$

$$= \frac{1}{2} (1 - z + z^2 - z^3 + \dots) - \frac{1}{6} (1 + \frac{z}{3} + (\frac{z}{3})^2 + (\frac{z}{3})^3 + \dots)$$

$$\text{ii) } 1 < |z| < 3$$

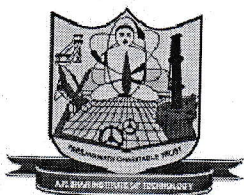
$$\Rightarrow |z| > 1 \text{ \& } |z| < 3$$

$$f(z) = \frac{1}{2z(1+\frac{1}{z})} + \frac{1}{2 \times 3 \left(\frac{z}{3} - 1\right)}$$

$$= \frac{1}{2z} (1+\frac{1}{z})^{-1} - \frac{1}{6} (1-\frac{z}{3})^{-1}$$

$$= \frac{1}{2z} \left(1 - \frac{1}{z} + \left(\frac{1}{z}\right)^2 - \left(\frac{1}{z}\right)^3 + \dots\right)$$

$$- \frac{1}{6} (1 + \frac{z}{3} + (\frac{z}{3})^2 + (\frac{z}{3})^3 + \dots)$$



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iii) $|z| > 3$

$$\Rightarrow |z| > 1$$

$$\therefore f(z) = \frac{1}{2(z+1)} + \frac{1}{2(z-3)}$$

$$= \frac{1}{2z \left(1 + \frac{1}{z}\right)} + \frac{1}{2 \times 3 \left(1 - 3/z\right)}$$

$$= \frac{1}{2z} \left(1 + \frac{1}{z}\right)^{-1} + \frac{1}{6} \left(1 - 3/z\right)^{-1}$$

$$= \frac{1}{2z} \left(1 - \frac{1}{z} + \left(\frac{1}{z}\right)^2 - \left(\frac{1}{z}\right)^3 + \dots\right)$$

$$+ \frac{1}{2z} \left(1 + \frac{3}{z} + \left(\frac{3}{z}\right)^2 + \left(\frac{3}{z}\right)^3 + \dots\right)$$

HW

1) Expand $f(z) = \frac{1}{z^2 - 3z^2 + 2z}$ as Laurent's series

about $z=0$ for i) $|z| < 1$ ii) $1 < |z| < 2$

iii) $|z| > 2$.