GOVERNMENT COLLEGE OF ENGINEERING , AMRAVATI

(An Autonomous Institute of Govt. of Maharashtra)

CT-II W-2018 **SHU101 ENGG. MATHS-I** **Marks :15**

Date: 15/11/18 **TIME- 1 HOUR**

Q 1) If $z^3 = i(z-1)^3$ then prove that $z = \frac{1}{2} - \frac{i}{2}\cot\frac{\theta}{2}$. **(03)**

Q 2) Solve any Four: **(12)**

(i) If n be the positive integer ,prove that $(1+i)^n + (1-i)^n = 2^{\frac{n+2}{2}} \cos\frac{n\pi}{4}$

(ii) Show that n^{th} roots of unity form a G.P. with the common ratio

$(\cos\frac{2\pi}{n} + i\sin\frac{2\pi}{n})$ and show that continued product of roots is $(-1)^{n+1}$.

(iii) Prove that $\text{sech}^{-1}(\sin\theta) = \log\cot\frac{\theta}{2}$

(iv) Prove that $\log\left[\frac{\cos(x-iy)}{\cos(x+iy)}\right] = 2i\tan^{-1}(\tan x.\tanh y)$

(v) If $\frac{(1+i)^{x+iy}}{(1-i)^{x-iy}} = \alpha + i\beta$, then show that $\tan^{-1}\frac{\beta}{\alpha} = \frac{\pi x}{2} + y\,log2$.