PILLAI INSTITUTE OF INFORMATION TECHNOLOGY,
ENGINEERING, MEDIA STUDIES & RESEARCH, NEW PANVEL
INTERNAL ASSESSMENT- I EXAMINATION, SEPTEMBER, 2015
SEMESTER – I (CBGS)
BRANCH: FE (ALL DIVISIONS)

Subject : APPLIED MATHEMATICS – I
Max. Marks: 20

Time: 1 Hour
Date: 07-05-2015

NOTE : 1) Figures to the right indicates FULL marks.

Q.1 Attempt any five questions out of six

a) State Demoivre's theorem and hence prove that $\left(\sqrt{3}+i\right)^n+\left(\sqrt{3}-i\right)^n=2^{n+1}cos\left(\frac{n\pi}{6}\right)$. 2

b) Apply definition of hyperbolic functions to find x from the equation $cosh\,x+8sinh\,x=1$. 2

c) Compute $tanh^{-1}\left(\frac{2}{3}\right)$ by proving $tanh^{-1}x=\frac{1}{2}\log\left(\frac{1+x}{1-x}\right)$. 2

d) If $\alpha\ and\ \beta$ are the roots of the equation $x^2-2xcos\theta+1=0$ compute them to find the equation whose roots are $\alpha^n\ and\ \beta^n$. 2

e) Use PASCAL's triangle to expand $cos^5\theta$ in terms of cosines of multiple of θ. 2

f) If ω is a complex cube root of unity then use Demoivre's theorem to find the roots and hence prove that $1+\omega+\omega^2=0$. 2

Q.2 a) Use logarithms of functions to show that one of the principal value of real number $z=(1+\mathrm{itan}\alpha)^{(1+\mathrm{itan}\beta)}$ is $(\sec\alpha)^{\sec^2\beta}$. 5

OR

b) Evaluate real and imaginary parts of $\sin^{-1}e^{i\theta}$. 5

Q.3 a) Utilize real and imaginary parts of $u+iv=\frac{1}{i}\log\left(\frac{1+ie^{i\theta}}{1-ie^{i\theta}}\right)$ to prove that $u=\frac{\pi}{2}$ and $v=\log(\sec\theta+\tan\theta)$. 5

OR

b) Utilize expansions of functions to prove that $\frac{1+\cos 9A}{1+\cos A}=[16\cos^4A-8\cos^3A-12\cos^2A+4\cos A+1]^2$. 5