Code :4316

SEM-V EXAMINATION, NOV- 2014

M-505: COMPLEX ANALYSIS-I

TIME:2:30 HOURS

TOTAL MARKS:70

INSTRUCTIONS: (1) All questions are compulsory.
(2) Each question carries equal marks.

Q.1	A	State & prove De' moivre's theorem	[10]
	B	Expand : $\cos^n\theta$ in terms of $\cos\theta$	[4]
		OR	
Q.1	A	$a=Cis2\alpha$, $b=Cis2\beta$, $c= Cis2\gamma$, $d = Cis2\delta$ then prove that , (i) $\sqrt{abcd} + \frac{1}{\sqrt{abcd}} = 2\cos(\alpha+\beta+\gamma+\delta)$ (ii) $\frac{\sqrt{ab}}{\sqrt{cd}} + \frac{\sqrt{ad}}{\sqrt{bc}} = 2\cos(\alpha+\beta-\gamma-\delta)$	[8]
	B	$z_1 = 1+2i,\ z_2 = 2+i \Longrightarrow \arg\left(\frac{z_1}{z_2}\right) = \arg z_1 - \arg z_2$	[6]
Q.2	A	If $x = cis\alpha$, $y=cis\,\beta$,$z=cis\,\gamma$,$x+y+z=0 \Longrightarrow \frac{1}{x}+\frac{1}{y}+\frac{1}{z}=0$	[7]
	B	Prove : $1+\cos14\theta = 2(64\cos^7 - 112\cos^5\theta + 56\cos^3\theta - 7\cos\theta)$	[7]
		OR	
Q.2	A	Prove : $(a+ib)^{m/n}+(a-ib)^{m/n} = 2\,(a^2+b^2)^{m/2n}\cos(\frac{m}{n}\tan^{-1}\frac{b}{a})$	[7]
	B	Expand : $\cos\alpha$ in terms of α	[7]
Q.3	A	find value of $(1+i\sqrt{3})^8+(1-i\sqrt{3})^8$	[7]
	B	prove that $\cos8\theta = 1-32\sin^2\theta+160\sin^4\theta-256\sin^6\theta+128\sin^8\theta$	[7]
		OR	
Q.3	A	Prove that: (1) $(\sin(A+B) - e^{Ai}\sin B)^n = \sin^n A\, e^{-ni\theta}$ (2) $\cosh^6 y-\sinh^6 y=1+\frac{3}{4}\sinh^2 y$ (3) $\cosh(x+y)\cdot\cosh(x-y)= \cosh^2 y+\sinh^2 y$	[7]
	B	Prove that : $(\frac{1+tanh2A}{1-tanh2A})^3 = \sinh6A + \cosh6A$	[7]
Q.4	A	$\tan y= \tan\alpha\tanh\beta$, $\tan z= \cot\alpha\tanh\beta \Longrightarrow \tan(y+z)=\sinh2\beta\,\mathrm{cosec}2\alpha$	[7]
	B	Prove : $\frac{1-\cosh x}{1+\cosh x} = -(\mathrm{cosech}x - \coth x)$	[7]
		OR	
Q.4	A	Solve: $\sinh z=i$	[7]
	B	Prove $\tanh^{-1}\left(\frac{2x}{1+x^2}\right) = \sinh^{-1}\left(\frac{2x}{1-x^2}\right)$	[7]
Q.5	A	Obtain bilinear transformations from z-plane onto $\omega - plane$ 1) $z_1=0$, $z_2=1$, $z_3=-1$ onto $\omega_1=1$, $\omega_2=i$, $\omega_3=\infty$	[7]
	B	show that the set of all bilinear mapping is a group under composition	[7]
		OR	
Q.5	A	show that composition of two mobius mappings is again mobius mapping	[7]
	B	Prove : $\mathrm{Log}\left(\frac{1}{1-e^{ix}}\right) = \log\left(\frac{1}{2}\mathrm{cosec}\frac{x}{2}\right) + I\left(\frac{\pi}{4}-\frac{\theta}{2}\right)$	[7]