University of Sargodha

M.A/M.Se Part-I, 1st Annual Exam 2008

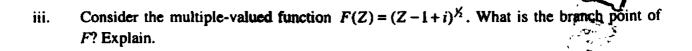
Mathematics- III Complex Analysis & Differential Geometry

Maximum Marks: 40			Fictitious #:			
Time Allowed: 45 Min.			Signature of CSO:			
		New Pattern	Objective Part			
Note:	Cutting, Erasing,	overwriting and use	of Lead Pencil are not	i allowed.		
Q.1.A i.	: Cipuse the The Primitive Perio	correct option.			(5)	
1.	a. 2π	b. πi	c. 2 <i>π i</i>	d. 2 <i>Kπi</i>		
ii.	A pole of Frier 'n'					
•••	a. 2n times	b. n times	c. $(n-1)$ times	d. $(n + 1)$	times	
iii.		n with constant modu				
	a. $\sqrt{x^2 + y^2}$	b. Constant	c. $\sqrt{U^2+V^2}$	d. Zero		
iv.	When two suffaces a. Point	intersect then resultar		d Dlane		
٧.		b. Curve of the binormal is den	c. Line noted by:	d. Plane		
	a. σ	b. τ	c. <i>K</i>	d.f		
B:	Mark true and fak	se.			(10)	
i.	$ Z-1 = \overline{Z}-1 $			Т	F	
ii.	values for arg (Z)		re are an infinite numbe	Т	F	
iii.			$-\frac{1}{i}$ is all complex number		F	
iv.	The image of the cir	$rcle Z - Z_0 = P \text{ under}$	er a linear mapping is a	circle		
		fferent center, but the			F	
v. vi.			t point Z then f is analy		F .T F	
vi. vii.		im equations are nece is nowhere analytic.	ssary conditions for dif	T	F	
viii.	$\ell ni = \frac{1}{2}\pi i$	o novinoro unui yiio.		T	F	
ix.	In first order magnit	tudes $\vec{F}_i = \vec{r}_i \cdot \vec{r}_i$		Т	F	
x.		clix $\vec{t} \cdot \vec{a}$ must not be constant.	onstant.	T	F	
C:	Fill in the blanks.				(5)	
i.	quadrant.		t, then $i\overline{Z}$ is in the _			
ii.			$= Z_0, \text{ if } Z \xrightarrow{\text{lim}} Z_0 f(Z)$			
iii.	If $f(Z) = \frac{1}{Z^2 + 5iZ}$	$\frac{1}{-4}$, then $f'(Z) = \underline{\hspace{1cm}}$		 ·		
iv.	If $e^{iz} = 2$, then $Z = $			•		
v. Q.2.	The Principal value Give short answers	of $i^{''}$ is s. (Answers should b	e One or Two lines)		(20)	
i.	Consider the limit 2	_			(,	

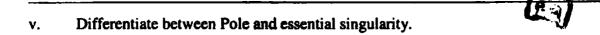
a.	What value does the limit approach as Z approaches 0 along the real axis?
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b.	What does the	limit approach	as Z approaches	0 along the	imaginary axis?
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c. Do the answers from (a) and (b) imply that
$$Z \xrightarrow{\text{Lim}} 0 \left(\frac{Z}{\overline{Z}}\right)^2$$
 exists? Explain.



iv. Find two complex numbers
$$Z_1$$
 and Z_2 so that $Ln(Z_1Z_2) \neq LnZ_1 + LnZ_2$.





vii. Differentiate between simply and multiply connected regions.

viii. Define Principal curvature.

ix. Differentiate between curvature and torsion.

x. Differentiate between evolute and involute.

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M.A/M.Sc Part-I, 1st Annual Exam 2008

Mathematics- III Complex Analysis & Differential Geometry

Maximum Marks: 60 Time Allowed: 2:15 Hours

New Pattern Subjective Part

Note: Attempt three questions in all. Selecting at least one question from each section. All questions carry equal marks.

Section- I

- Q.3. (a) Derive Cauchy-Riemann equations in Polar form from Cartesian form. (12)
 - (b) Evaluate $\iint Z |dz| dz$ where contour 'C' is a unit circle having centre at $Z_0 = 1$ (8)
- Q.4. (a) State and prove converse of Cauchy's Fundamental Theorem. (10)
 - (b) Find the Laurent's expansion of $f(Z) = \frac{1}{(Z+2)(1+Z^2)}$ for

a. 1 < |Z| < 2 b. |Z| < 1 c. |Z| > 2

Q.5. (a) Prove that (10)

$$\int_{0}^{\infty} \frac{x^{\alpha}}{x^{2} - x + 1} dx = \frac{2\pi}{\sqrt{3}} \frac{1}{\sin \pi \alpha} \sin \frac{2}{3} \pi \alpha$$

Where α is a fraction.

(b) Define a bilinear transformation. Under the bilinear transformation (10) $\omega = \frac{2Z+3}{Z-4}$, discuss the mapping of the circle $x^2 + (y-2)^2 = 4$.

Section- II

- Q.6. (a) Prove that the curve $x = aSin^2u$, $y = a\sin u\cos v$, $z = a\cos u$ Lies on the sphere and also verify that all the normal planes pass through origin. (10)
 - (b) Prove that there are infinite family of evolutes for the space curve 'C' (10) (involute)
- Q.7. (a) Show that the sum of the squares of the intercepts on the coordinate axes (10) made by the tangent plane to the surface $x^{\frac{1}{5}} + y^{\frac{1}{5}} + z^{\frac{1}{5}} = a^{\frac{1}{5}}$ is constant.
 - (b) Calculate the first and second curvature of the helicoids $x = u \cos v \qquad , \qquad y = u \sin v \qquad , \qquad z = f(u) + cv$ (10)

Notes, e-books and papers for MSc Mathematics

http://www.MathCity.org/MSc