No. of pages : 2

Roll. No.:..... Name:.....

Government College of Engineering Kannur

S3: Third Semester B-Tech Degree Exam(2021 Admns)

Time: 1.5 hrs **Second Series Test: Dec 2022** Max. Marks: 50

ECE B

MAT 201: PARTIAL DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS

Course Outcome: Student will be able to:
CO3: Understand complex functions, its continuity differentiability with the use of CauchyRiemann equations.
CO 4: Evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula, understand the series expansion of analytic function.

PART A

Answer All Questions (Each question carries 3 marks: **5 x 3 = 15 marks)**

1		Show that an analytic function f(z) = u + iv is constant if its real part is constant	[CO3]
2		Show that $w = e^z$ is differentiable for all values of z	[CO3]
3		Find the fixed points of $w = (a+ib)z^2$	[CO3]
4		Evaluate $\oint_C \frac{e^z}{z-2} dz$ where C is $\lvert z\rvert = 3$	[CO4]
5		State Cauchy's Integral theorem and Cauchy's integral formula	[CO4]

PART B

Answer any ONE Full question from each module
(Each question carries 14 marks: 1 x 14 = 14 marks)

Module III

6	a)	Show that $u = y^3 - 3x^2y$ is harmonic and hence find its harmonic conjugate	[CO3] 7marks
	b)	Find the image of $\left\lvert z - \frac{1}{2}\right\rvert = \frac{1}{2}$ under $w = \frac{1}{z}$	[CO3] 7marks
		OR	
7	a)	Is the function $f(z) = \begin{cases} \frac{\mathrm{Re}\, z^2}{\lvert z\rvert^2}, & z \neq 0 \\ 0, & z = 0 \end{cases}$ continuous at $z = 0$	[CO3] 7 marks
	b)	Check whether $w = \log z$ is analytic.	[CO3] 7 marks

Module IV

8	a)	Evaluate $\oint_C \frac{e^z}{(z-1)(z-2)} dz$ where C is the circle $\lvert z\rvert = 3$	[CO4]
	b)	Find the Maclaurin's series of f(z) = sinz	
		OR	
9	a)	Evaluate $\int_C \mathrm{Re}(z) dz$ where C is a straight line from 0 to 1 +2i	

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	b)	Find the Taylors series expansion of $f(z) = \frac{1}{z}$ about $z = 1$	[CO4] 7 marks
		PART C **Answer any one Question. Each question caries 7 marks 1 x 7 = 7 marks**	
10		Show that $f(z) = \|z\|^2$ is differentiable only at $z = 0$, hence it is nowhere analytic	[CO3] 7marks
		OR	
11		Find the analytic function whose real part is u = sinxcoshy	[CO3] 7marks

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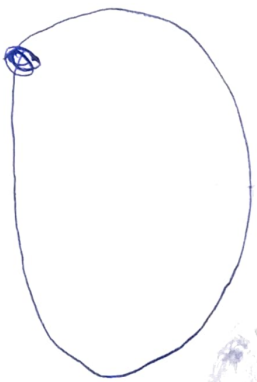

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