Reg. No.:

Name :

VIT

Vellore Institute of Technology

Continuous Assessment Test -II: October 2022

Programme	: **B.Tech**		**Semester**	:	**Fall 2022-23**
Course Title	: **Complex Variables and Linear Algebra**		**Code**	:	**BMAT201L**
Class No.	: CH2022231001185, 1186, 1187, 1188, 1189, 1190, 1191, 1192, 1193, 1194, 1195, 1196, 1197		**Slot**	:	**A2+TA2+TAA2**
Faculty (s)	: Dr Jaganathan B, Dr Manivannan A, Dr. Felix A Dr Dhivya M, Dr Sudip Debnath, Dr Durga N Dr Prasanna Lakshmi M, Dr Harshavarthini, Dr Ashish Kumar, Dr Kamalesh, Dr Sushmitha, Dr Amit Kumar Rahul, Dr Balaji S		**Max. Marks**	:	**50**
			Time	:	**90 Minutes**

Answer ALL questions

Q.No.	Sub. Sec.	Question Description	Marks
1.		Find the valid regions and expand as a Taylor series and Laurent series about origin in the suitable domains for the function $f(z) = \frac{z^2-z+1}{z(z^2-3z+2)}$.	10
2.		Evaluate $\int \frac{z^2-1}{z^2+2z+10} dz$ over the circle $\|z+1+i\| = 6$.	10
3.		Evaluate $\int_0^{2\pi} \frac{d\theta}{(5+4\cos\theta)^2}$.	10
4.	a)	Verify the polynomials $p_1 = t^2 + t + 1$, $p_2 = t^2 + 2t + 3$ and $p_3 = t^2 + 5t + 8$ span the vector space $P_2(\mathbb{R})$ of polynomials of degree ≤ 2.	6
	b)	Find the basis and dimension of W if $W = \{(x_1, x_2, \ldots, x_{27}) \in \mathbb{R}^{27} \mid x_k = 0 \text{ if } k \text{ is even}\}$ is the subspace of $\mathbb{R}^{27}$.	4
5.	a)	Let W be the subspace of $\mathbb{R}^4$ spanned by the vectors $u_1 = (1,0,1,-2)$, $u_2 = (-3,4,5,6)$, $u_3 = (1,2,3,-2)$, $u_4 = (0,1,2,0)$. Find a basis and dimension of W.	5
	b)	Check whether the given subsets $W_1 = \left\{\begin{bmatrix} a & b \\ c & a \end{bmatrix} \in V : a,b,c \in \mathbb{R}\right\}$ and $W_2 = \left\{\begin{bmatrix} 0 & a \\ -a & b \end{bmatrix} \in V : a,b, \in \mathbb{R}\right\}$ of vector space $V = M_{2\times 2}(R)$ are subspaces or not.	5