

Reg. No.: 21BCE1808

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VIT[®]

Vellore Institute of Technology

(Deemed to be University under section 3 of UGE Act, 1956)

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 $W = \{(x_1, x_2, \dots, x_{27}) \in \mathbb{R}^{27} x_k = 0 \text{ if } k \text{ is even}\}$ 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 $V = M_{2 \times 2}(\mathbb{R})$ are subspaces or not.	5
