Vellore Institute of Technology

SCHOOL OF ADVANCED SCIENCES
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2024-2025

SLOT:B2+TB2+TBB2

Programme Name & Branch	:B.Tech & Common
Course Code and Course Name	:BMAT201L and Complex variables and Linear Algebra
Faculty Name(s)	: Poornima T, Subramanyam Reddy A, Arun Kumar B, Chandru M, Uma K, Rajesh Bhatt
Class Number(s)	: VL2024250102483, VL2024250102488,VL2024250102484, VL2024250102485, VL2024250102487, VL2024250102486
Date of Examination	: 14-10-2024
Exam Duration	: 90 minutes

Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes (Type the CO statements covered in this question paper. Use the CO number as per the syllabus copy)
  CO - 3,5

Q. No	Question	M	CO	BL
1.	Evaluate the integral I= $\int_C \frac{\tan\left(\frac{z}{2}\right)}{(z-a)^2}dz, -2<a<2$ where C is the boundary of the square where sides lie along $x=\pm 2$ and $y=\pm 2$ described in the positive sense, using Cauchy integral formula.	10	3	2
2.	By Cauchy residue theorem, Compute the value of the integral $\int_{-\infty}^{\infty} \frac{\sin(x)}{x^2+x+1}dx$.	10	3	3
3.	Consider the economy described in Table 1. Suppose that the open sector has a demand for \$7900 worth of manufacturing products, \$3950 worth of agricultural products, and \$1975 worth of utilities. The consumption matrix, production vector, and outside demand vector are $C=\begin{bmatrix} 0.5 & -0.1 & -0.1 \\ -0.2 & 0.5 & -0.3 \\ -0.1 & -0.3 & 0.6 \end{bmatrix}, P=\begin{bmatrix} p_1 \\ p_2 \\ p_3 \end{bmatrix}$ and $D=\begin{bmatrix} 7900 \\ 3950 \\ 1975 \end{bmatrix}$ (a) Can the economy meet this demand? (b) If so, find a production vector P that will meet it exactly applying Gauss-Jordan method.	10	5	3
4.	a) If 2, 3 are the eigen values of $A=\begin{bmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ a & 0 & 2 \end{bmatrix}$, find the value of a.	5	5	3
	b) In the given circuit,the two point network has the impedence matrix $Z=\begin{bmatrix} 4 & 6 \\ 6 & 12 \end{bmatrix}$. Simplify the circuit analysis by determine the eigenvalues and eigenvectors.	5		

REG.NO.:

VIT

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

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5.	a) Determine whether the set $\{x^3+2x^2, -x^2+3x+1, x^3-x^2+2x-1\}$ in $P_3(\mathbb{R})$, is linearly dependent or linearly independent.	5	5	3
	b) Let P_3 be the vector space over $\mathbb{R}$ of all degree three or less polynomial with real number coefficients. Let $W=\{p(x)\in P_3(\mathbb{R}) / p'(-1)=0 \ \& \ p''(-1)=0\}$ be the subset of $P_3(\mathbb{R})$. Is W, a subspace of $P_3(\mathbb{R})$?	5		

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