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Vellore Institute of Technology
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SCHOOL OF ADVANCED SCIENCES
DEPARTMENT OF MATHEMATICS
CONTINUOUS ASSESSMENT TEST – II
FALL SEMESTER 2023-2024

Programme Name : B. Tech
Course Code : BMAT201L
Course Name : Complex Variables and Linear Algebra
Slot : C2+TC2+TCC2 (Common Question Paper)
Exam Duration: 90 minutes Maximum Marks: 50
General instruction(s): Answer all the following questions. 5 x 10 = 50 Marks

Q.No	Question	Marks	(CO)	(BL)
1.	Evaluate $\int_0^{2\pi} \frac{1+2\cos\theta}{5+4\cos\theta} d\theta$ using contour integration.	10	3	3
2.	Find the eigen values and the corresponding eigen vectors of the matrix $A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$. Also, find the eigen values of A^T and A^{-1} .	10	5	2
3.	Apply the Gauss-Jordan method to solve the following system of equations. $2x+5y-3z=-10; -2x-2y+2z=2; -x-5y+z=17$.	10	5	3
4.	(a) Verify whether the set $H = \left\{ \begin{bmatrix} 2a & b \\ 3a+b & 3b \end{bmatrix}, \text{ where } a, b \in R \right\}$ forms a subspace of a vector space $M_{2 \times 2}(R)$. (b) Verify whether the set $S = \{(2,1,4), (1,-1,2), (3,1,-2)\}$ forms a basis of a vector space $R^3(R)$.	10	4	4
5.	Find the dimension of the null space of $A = \begin{bmatrix} 1 & 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & -2 & 0 \\ 4 & 2 & 0 & 0 & 3 \\ 1 & 1 & 1 & -2 & 1 \\ 2 & 2 & 0 & 0 & 2 \\ 1 & 1 & 2 & -4 & 1 \end{bmatrix}$	10	4	2