# VIT

Vellore Institute of Technology

## SCHOOL OF ADVANCED SCIENCES

**Fall Semester 2023-2024**

**Continuous Assessment Test – II**

**Programme Name & Branch: B.Tech**

**Slot: B2+TB2+TBB2**

**Course Name & code: Complex Variables and Linear Algebra -BMAT2011L**

**Exam Duration: 90 Min.** **Maximum Marks: 50**

| Q.No. | Question | Max Marks | CO | BL |
|---|---|---|---|---|
| 1. | Evaluate $\int_{-\infty}^{\infty} \frac{x^3 - x + 2}{x^4 + 10x^2 + 9}\, dx$ using residue theorem. | 10 | CO3 | BL5 |
| 2. | For a matrix $A = \begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix}$.<br>(i) Find the Eigen values and Eigen vectors of A<br>(ii) Verify Cayley-Hamilton theorem and hence find the inverse of A. | 10 | CO5 | BL2 |
| 3. | Solve the following system of linear equations using Gauss Jordan method.<br>$x + 2y - 3z + w = 4;\ 2x - y + z + 5w = 1;$<br>$3x + y + 2z - w = 5;\ x + y + 3z - 2w = 2.$ | 10 | CO5 | BL3 |
| 4. | Let $V = \{(a, b, c, d) \mid b - 2c + d = 0\}$ and<br>$W = \{(a, b, c, d) \mid a = d,\ b = 2c\}$ be the subspaces of a vector space $R^4(R)$, where R is the set of real numbers. Find bases and the dimension of V, W and $V \cap W$. | 10 | CO4 | BL4 |
| 5. | Find the basis and dimension of the null space<br>$A = \begin{pmatrix} -3 & 6 & -1 & 1 & -7 \\ 1 & -2 & 2 & 3 & -1 \\ 2 & -4 & 5 & 8 & -4 \end{pmatrix}$ | 10 | CO4 | BL3 |