

Enroll No

K.E.Society's  
**Rajarambapu Institute of Technology,**  
**Rajaramnagar**  
 (An Empowered Autonomous Institute, affiliated to SUK)

Q.P.Code
UT 3498

**Unit Test -II(2025-26)**

**F.Y. B. Tech (All Division)**

**Course Code-** Engineering Mathematics-I

**Course Name:** SH1057

**Day & Date:** Monday, 01-12-2025

**Time:** 10.30 a.m. to 11:30 a.m.

**Max Marks-** 25

- Instructions:**
- 1) All questions are compulsory.
  - 2) Figures in rounded ( ) brackets within the question indicate the scheme of marking for respective part of the question, whereas figures in the first right column indicate the total marks for that whole question.
  - 3) CO is the index number of the Course Outcome statement.
  - 4) The Bloom's taxonomy level (BL) for 1,2,3,4,5 and 6 is remember, understand, apply, analyze, evaluate, and create, respectively.
  - 5) Assume suitable data if necessary.
  - 6) Use of non-programmable calculators is allowed

			M	COs	BL
Q.1		Attempt the following:	13		
	a)	Let V be the set of all ordered pairs (x, y) of real numbers and let F be the field of real numbers ( $F = R$ ). Addition and scalar multiplication are defined by $(x, y) + (x_1, y_1) = (x + x_1, y + y_1)$ and $\alpha(x, y) = (x, \alpha y)$ where x, y, $x_1, y_1$ and $\alpha$ are real numbers Is V with these operations a vector space over the field of real numbers? (Addition axioms(3M), Scalar Multiplication axioms(3M)), Conclusion(1M)	7	4	1
	b)	Check whether the vectors (1,2,1), (2,1,0), (1,-1,2) form a basis of the vector space $R^3$ over the field of real number. (L.I. condition(3M), Spanning(3M)) <b>OR</b> Check whether $S = \{(x, y, z) : x^2 + y^2 = z^2\}$ is a subspace of $R^3$ ? (Correct Calculations (6M))	6	3	1
Q.2		Attempt the following:	12		
	a)	Solve $\sqrt{1-y^2}dx = (\sin^{-1}y - x)dy$ (Identification of correct method (1M), I.F.(2M), General formula(1M), Calculation(2M)) <b>OR</b> Solve $(2xy \cos x^2 - 2xy + 1)dx + (\sin x^2 - x^2)dy = 0$ ((Identification of correct method (1M), General formula(1M), Calculation(4M))	6	3	1
	b)	Find the orthogonal trajectory of the curve i) $y^2 = 4ax$ , a -parameter ii) $xy = c$ , c -parameter (Each question (3M), Correct Calculation (3M))	6	3	1

\*\*\*\*\*Best of Luck\*\*\*\*\*

