

Enroll No

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

Q.P.Code
UT 3474

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

**F.Y. B. Tech (Div. H, I, J, K, L, M, N) Engineering mathematics-I**

Day & Date: Wednesday 15-10-2025

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 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	BL	COs
<b>Q.1</b>	Attempt the following:	<b>13</b>		
a)	Solve the system for $x, y, z$ using rank method $-\frac{1}{x} + \frac{3}{y} + \frac{4}{z} = 30, \quad \frac{3}{x} + \frac{2}{y} - \frac{1}{z} = 9, \quad \frac{2}{x} - \frac{1}{y} + \frac{2}{z} = 10$ (Formation of matrix(1M), Consistency condition (3M), Calculation (2M))	7	3	1
b)	Find the eigen values & eigen vectors for smallest eigenvalue $\begin{bmatrix} 2 & -3 & 1 \\ 3 & 1 & 3 \\ -5 & 2 & -4 \end{bmatrix}$ (Characteristic Equation(2M), Eigen Values (2M), Eigen Vector (2M))	6	3	1
OR				
b)	Determine the rank of $5 \times 4$ matrix using echelon form where matrix $A = (a_{ij})$ whose elements are given by $a_{ij} = i^2 + j^2$ (Formation of matrix(2M), Consistency condition (3M), Calculation (2M))	6	3	1
<b>Q.2</b>	Attempt the following:	<b>12</b>		
a)	A nature tracker is studying the flight path of a rare butterfly. The tracker notices the butterfly follows a perfect parabolic trajectory described by the equation: $y = ax^2 + bx + c$ Through careful observation, the tracker records the butterfly passing through these three points: At 1 PM: Position (1, 2), At 2 PM: Position (2, 3), At 3 PM: Position (3, 5) The tracker needs to predict using Gauss Jordan method: Will the butterfly be at position (4, 7) at 4 PM? (Formation of equation and matrix(2M), Reduction operation (2M), Back Substitution (2M))	6	4	1
b)	Solve by Jacobi's iteration method, correct to two decimal places $8x - y + 2z = 13, \quad x - 10y + 3z = 17, \quad 3x + 2y + 12z = 25$	6	3	1



(Applicability (1M), Formation of variables (1M), Each Iteration(1M))

OR

- b) Solve the system of equations by using Gauss-Seidel method  
 $x + 2y + z = 0$ ,  $3x + y - z = 0$ ,  $x - y + 4z = 3$  starting with (1,1,1)  
(Applicability (1M), Formation of variables (1M), Each Iteration(1M))

6      3      1

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

