

Enroll No

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

Q.P.Code
UT3483

Unit Test -I (2025-26)

F.Y. B. Tech (Div. A, B, C, D, E, F, G)

Course Code- Engineering Mathematics-I

Course Name: SH 1057

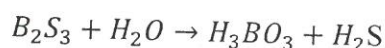
Day & Date: Wednesday 15-10-2025

Time: 3:45 p.m. to 4:45 p.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 | BL | COs |
|------------|---|-----------|----|-----|
| Q.1 | Attempt the following: | 13 | | |
| a) | In a given electrical network, the equations for the currents i_1, i_2, i_3 are
$3i_1 + i_2 + i_3 = 8, \quad 2i_1 - 3i_2 - 2i_3 = -5, \quad 7i_1 + 2i_2 - 5i_3 = 0$
Calculate i_1, i_2, i_3 by matrix method
(Formation of matrix(1M), Consistency condition (3M), Calculation (2M)) | 6 | 4 | 1 |
| b) | Boron sulfide (B_2S_3) reacts violently with water (H_2O) to form boric acid (H_3BO_3) and hydrogen sulfide gas (H_2S). The unbalanced chemical equation for this reaction is: | 7 | 3 | 1 |



Balance this chemical equation by setting up and solving a system of linear equations.

(Formation of matrix(2M), Consistency condition (2M), Calculation (3M))

- OR
- | | | | | |
|----|---|---|---|---|
| b) | Find the eigen values & eigen vector for smallest eigen value | 7 | 3 | 1 |
|----|---|---|---|---|

$$\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$$

(Characteristic Equation(2M), Eigen Values (2M), Eigen Vector (3M))



Q.2

Attempt the following:

12

- a) The perimeter of a triangular garden is 30 meters. The length of the longest side is twice the length of the shortest side. The middle side is 6 meters longer than the shortest side. Find the length of each side of the garden using Gauss Elimination method. 6 3 1
- (Formation of equation and matrix(2M), Reduction operation (2M), Back Substitution (2M))

- b) Solve using Gauss-Jacobi method: 6 3 1
- $$10x + y + z = 12, \quad 2x + 10y + z = 13, \quad x + y + 5z = 7$$
- (Applicability (1M), Formation of variables (1M), Each Iteration(1M))

OR

- b) Solve using Gauss-Seidal iterative method: 6 3 1
- $$2x + 10y + z = 51, \quad 10x + y + 2z = 44, \quad x + 2y + 10z = 61$$
- (Applicability (1M), Formation of variables (1M), Each Iteration(1M))

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

