R18 Regulation *Subject code:2B1AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech I Semester Supplementary Examinations, June 2026

MATHEMATICS-I

(Common to CE, EEE, ME, ECE, CSE & IT)

Maximum Marks: 70 Date: 16.06.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X2M=20 Marks)		Marks	CO	BTL
1	Define Skew-symmetric matrix with example.	2M	1	L1
2	Prove that matrix A is unitary $A = \begin{bmatrix} \frac{1+i}{2} & \frac{-1+i}{2} \\ \frac{1+i}{2} & \frac{1-i}{2} \end{bmatrix}$	2M	1	L1
3	If 'λ' is an Eigen value of the matrix A then 'λ' is also an Eigen value of A^T	2M	2	L1
4	Determine the nature, index, and signature of the quadratic form $x^2 - 6xy + y^2$	2M	2	L1
5	Definition of sequence with example.	2M	3	L1
6	Write comparision test.	2M	3	L1
7	Verify that $\frac{\partial^2 u}{\partial x\, \partial y} = \frac{\partial^2 u}{\partial y\, \partial x}$ when u = log (y sinx + x siny)	2M	4	L1
8	Find the Jacobiann $u = x^2 - y^2$, $v = 2xy$	2M	4	L1
9	Evaluate $\int_0^1 \int_x^{x^2} xy\, dy\, dx$	2M	5	L1
10	Evaluate $\int_1^2 \int_1^3 \int_1^2 xy^2 z\, dz\, dy\, dx$	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Find the rank of the following matrix by reducing it to normal form $A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$	10M	1	L2
	OR			
12	Solve the equations $2x + 3y + z = 9$, $x + 2y + 3z = 6$, $3x + y + 2z = 8$	10M	1	L2
13	Find the Eigen values and Eigen vectors for the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 3 & 6 & 9 \end{bmatrix}$	10M	2	L2

	OR			
14	Verify Cayley – Hamilton theorem for the following matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$	10M	2	L2
15	a) Test for convergence of the series $\sum \frac{n+1}{n^p}$ b) Test for convergence of $\sum \frac{n^p}{n!}$	5M 5M	3	L2
	OR			
16	a) Test for convergence of the series $\sum \frac{x^n}{n^n-1}$ b) Test for convergence of the series $x > 0$ $\sum \frac{(-1)^{n-1}}{\sqrt{n(n+1)(n+2)}}$	5M 5M	3	L2
17	Determine whether the following function are functionally dependent or not. If functionally dependent, find the relation between them. $u = sin^{-1}x + sin^{-1}y,\ V = x\sqrt{1-y^2} + y\sqrt{1-x^2}$	10M	4	L2
	OR			
18	Find the extreme values of sin x + sin y + sin(x+y)	10M	4	L2
19	Evaluate $\int\int (x+y)dx\,dy$, over the region in the positive quadrant bounded by the Ellipse $\frac{x^2}{a^2} + \frac{b^2}{b^2} = 1$	10M	5	L2
	OR			
20	Evaluate $\int_0^2 \int_0^{\sqrt{2x-x^2}} (x^2+y^2)dxdy$ by changing into polar co ordinates.	10M	5	L2