R18 Regulation *Subject code:2B1AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech I Semester Supplementary Examinations, January 2026

MATHEMATICS-I

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

Maximum Marks: 70 Date: 05.01.2026 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	Defination 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	Find the Eigen values of the matrix $A = \begin{bmatrix} 2 & -3 \\ 4 & -2 \end{bmatrix}$	2M	2	L1
4	Express the following quadratic form matrix notation $2x^2 + 3y^2 - 5z^2 - 2xy + 6xz - 10yz$	2M	2	L1
5	Definition of sequence with example.	2M	3	L1
6	Write comparism 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 $\int_0^1 \int_0^{1-x} \int_0^{x+y} dx\, dy\, dz$	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 $2x + 3y + z = 9$, $x + 2y + 3z = 6$, $3x + y + 2z = 8$ by factorization method.	10M	1	L2

13	Find the orthogonal Eigen vector 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 $\frac{2}{1^2}x+\frac{3^2}{2^3}x^2+\ldots\ldots+\frac{(n+1)^n}{n^{n+1}}x^n+\ldots\ldots$ x> 0 b) Show that the series $s=1-\frac{1}{3!}+\frac{1}{5!}-\frac{1}{7!}+\ldots\ldots$ Converges.	5M 5M	3	L2
17	Verify that $J.J^*=1$ for the following function x = u (1-v), y = uv	10M	4	L2
	OR			
18	Find the extreme values of $f(x,y)=sinx+siny+\sin(x+y)$.	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