R17 Regulation *Subject code: 1B1AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech I Year I Semester Supplementary Examinations, June 2024

MATHEMATICS-I

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

Maximum Marks: 70 Date:25.06.2024 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 which carries 10M.
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)	CO	Bloom Tx
1	Find the values of a and b, so that the rank of $\begin{bmatrix}1 & -2 & 3 & -1\\ 2 & 1 & -1 & 2\\ 0 & -2 & a & b\end{bmatrix}$ is 3.	1	L1
2	Show that the matrix is A unitary where $A = \frac{1}{2}\begin{bmatrix}1+i & -1+i\\ 1+i & 1-i\end{bmatrix}$	1	L1
3	Prove that the Eigen values of a real symmetric matrix are real.	2	L1
4	If '2' is an Eigen value of the matrix $A = \begin{bmatrix}2 & -2 & 2\\ 1 & 1 & 1\\ 1 & 3 & -1\end{bmatrix}$, find the other two Eigen values.	2	L1
5	State Newton's law of cooling.	3	L1
6	Find the particular integral of $(D^2+4)y = cos3x$.	3	L1
7	Check whether the Rolle's theorem conditions hold for $f(x) = (x-1)(x-2)(x-3)$ in [0,3].	4	L1
8	Write the Taylor's series for one dimensional variable.	4	L1
9	State Euler's theorem.	5	L1
10	Find $\frac{dy}{dx}$ at (1,1) for $2xy - \log xy = 2$.	5	L1

Part-B

	Answer All the following questions. (5X10M=50Marks)		
11	Determine whether the following equations will have a non – trivial solution If so, solve them; [10M] $3x + 4y - z - 6w = 0$; $2x + 3y + 2z = 3w = 0$ $2x + y - 14z - 9w = 0$; $x + 3y + 13z + 3w = 0$	1	L2

	OR		
12	Reduce the following matrix in to normal form and also find its rank: [10M] $A=\begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$	1	L2
13	Verify Cayley – Hamilton theorem for $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and find A^{-1} and A^4 [10M]	2	L2
	OR		
14	Reduce the quadratic form $2x^2 + 2y^2 + 2z^2 - 2xy - 2yz + 2xz$ to canonical form. [10M]	2	L2
15	The number 'N' of bacteria in a culture grew at a rate proportional to 'N'. The value of 'N' was initially 100 and increased to 332 in 1 hour. What was the value of 'N' after 1.5 hours? [10M]	3	L2
	OR		
16	A condenser of capacity of 'C' discharged through an inductance 'L' and Resistance 'R' in series and the charge 'q' at time 't' satisfies the equation $L\frac{d^2q}{dt^2} + R\frac{dq}{dt} + \frac{q}{c} = 0$. Given that 'L,' = 0.25 henries, R =250 ohms, $c = 2 \times 10^{-6}$ farads , and that when t = 0, charge q is 0.002 coulombs and the current $\frac{dq}{dt} = 0$, obtain the values of 'q' in terms of 't'. [10M]	3	L2
17	Find the minimum value of $x^2 + y^2 + z^2$ with the constraint $xy + yz + zx = 3a^2$ Using Lagrange's method of multiplies. [10M]	4	L2
	OR		
18	Find the value 'C' by using Cauchy's mean value theorem if f (x) = x (x-1) (x-2) and g(x) = x (x-2) (x-3) in [0, ½] [10M]	4	L2
19	Find the volume of the greatest rectangular parallelepiped that can be inscribed in the Ellipsoid whose equation is $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1.$ [10M]	5	L2
	OR		
20	Verify the chain rule for Jacobians for $x = e^u \cos v$; $y = e^u \sin v$ [10M]	5	L2