ACE Engineering College (with a Difference in Excellence)

An AUTONOMOUS Institution

Question Paper Code: MA101BS

ACE-R20

Semester End Examination

I B. Tech- I Semester- JULY- 2021

MATHEMATICS-I

(Common to All Branches)

Time: 3 Hours **Max. Marks: 70**

H. T. No										

Answer any five full questions from the following. All Questions carry equal marks.

M=Marks; CO=Course Outcomes; PO= Program Outcomes

Q.No	Question	M	CO	PO
1. a)	Find the rank of the Matrix $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 2 \\ 2 & 6 & 5 \end{bmatrix}$	7	1	1,12
b)	Test for consistency and solve the equations $3x+3y+2z=1$, $x+2y=4$, $10y+3z=-2$, $2x-3y-z = 5$	7	1	1,12
2. a)	Solve the system of equation $x_1+3x_2+x_3=2$, $3x_1+x_2+x_3=2$, $x_1+x_2+3x_3=2$ using Gauss – Siedal iterative method	7	1	2
b)	For what values of λ and μ do the system of equations $x+y+z=6$, $x+2y+3z=10$, $x+2y+\lambda z=\mu$ have (i) No solution (ii) Unique solution.	7	1	1,2
3. a)	Find the Eigen values and Eigen vectors of the matrix $\begin{bmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$	7	2	1,2
b)	Reduce the quadratic form $8x^2+7y^2+3z^2-12xy+4xz-8yz$ to canonical form and find its nature.	7	2	1,2,3
4. a)	Reduce the matrix A = $\begin{bmatrix} -1 & 2 & -2 \\ 1 & 2 & 1 \\ -1 & -1 & 0 \end{bmatrix}$ into diagonal form and obtain modal matrix.	7	2	2,12
b)	Verify Cayley-Hamilton theorem for the matrix and find its inverse $\begin{bmatrix} 7 & -1 & 3 \\ 6 & 1 & 4 \\ 2 & 4 & 8 \end{bmatrix}$	7	2	1,12
5. a)	Examine the convergence of the series $1+\frac{1}{4^{2/3}}+\frac{1}{9^{2/3}}+\frac{1}{16^{2/3}}+\cdots$	7	3	1,3

b)	Discuss the convergence of the series $\sum_{2}^{\infty} \frac{1}{(logn)^n}$	7	3	1,2
6. a)	Verify Rolle's theorem for f(x) = $e^x\,(\,sinx - cosx)\ in\ (\frac{\pi}{4}, \frac{5\pi}{4})$	7	4	1,3
b)	Evaluate $\int_0^{\infty} x^{2n-1}e^{-ax^2}$dx	7	4	1,3
7. a)	Find the volume of the ellipsoid $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$	7	4	1,12
b)	Evaluate $\int_0^{1} x^3(1-x)^{4/3})$ dx	7	4	1,2
8. a)	If u= $x^2-2y, v=x+y\quad prove\ that\ \frac{\partial(u,v)}{\partial(x,y)}=2x+2$	7	5	1,3
b)	Examine the function x^3+y^3-3axy for $maxima\ and\ minima.$	7	5	1,3