10-07-2021

Course Code: 1910001 Roll No: **MLRS- R19**

MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section2(f) & 12(B)of the UGC act,1956

I B.TECH I Sem Supply End Examination, July 2021
MATHEMATICS-I
(CE, EEE, ME, ECE, CSE & INF)

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

Note: 1. Answer any FIVE questions.
2. Each question carries 14 marks and may have a, b as sub questions.

1	a)	Find the values of k for which the system of equations $(3k-8)x+3y+3z=0;\ 3x+(3k-8)y+3z=0;$ $3x+3y+(3k-8)z=0$ has a non-trivial solution.	7M	CO	BL
	b)	Find the rank of the matrix $\begin{bmatrix}1 & 3 & 4 & 3\\ 3 & 9 & 12 & 9\\ 1 & 3 & 4 & 1\end{bmatrix}$	7M	CO	BL
2		Solve the equations $5x+2y+z=12;\ x+4y+2z=15;$ $x+2y+5z=20$ by Gauss-Seidel method	14M	CO	BL
3	a)	Show that the two matrices A, A^T have the same latent roots.	7M	CO	BL
	b)	For a matrix $A=\begin{bmatrix}1 & 2 & -3\\ 0 & 3 & 2\\ 0 & 0 & -2\end{bmatrix}$ find the eigen values of $3A^3+5A^2-6A+2I$.	7M	CO	BL
4	a)	Show by Cauchy integral test that the series $\sum_{n=2}^{\infty}\frac{1}{n(\log n)^p}$ converges if $p>1$ and diverges if $0<p<1$.	7M	CO	BL
	b)	Discuss the convergence for $1+\frac{1}{2}+\frac{1.3}{2.4}+\frac{1.3.5}{2.4.6}+\cdots$	7M	CO	BL
5		Find a modal matrix that will diagonalize the real symmetric matrix $A=\begin{bmatrix}1 & 2 & 3\\ 2 & 4 & 6\\ 3 & 6 & 9\end{bmatrix}$. Also write the resulting diagonal matrix.	14M	CO	BL
6	a)	Evaluate $\iiint xyz\,dx\,dy\,dz$ over the positive octant of the sphere $x^2+y^2+z^2=a^2$.	7M	CO	BL
	b)	Find the volume of solid of revolution obtained by revolving the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ about x –axis.	7M	CO	BL
7	a)	Prove that $\frac{\pi}{6}+\frac{1}{5\sqrt{3}}<\sin^{-1}\left(\frac{3}{5}\right)<\frac{\pi}{6}+\frac{1}{8}$.	7M	CO	BL
	b)	Verify Euler's theorem for the function $u=\frac{x^{1/2}+y^{1/2}}{x^n+y^n}$	7M	CO	BL
8	a)	Find the shortest distance from origin to the surface $xyz^2=2$.	7M	CO	BL
	b)	If $u=e^{a\theta}\cos(a\log r)$ then show that $\frac{\partial^2 u}{\partial r^2}+\frac{1}{r}\frac{\partial u}{\partial r}+\frac{1}{r^2}\frac{\partial^2 u}{\partial \theta^2}=0$.	7M	CO	BL

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