

**Day and Date Monday, 17/01/2022**

**Time: 11am to 12.30 pm**

Seat No:

**Max. Marks- 50**

**Instructions:**

- Attempt the following questions.
- Figure to the right indicate full marks.
- Q.1 is compulsory. Attempt any three from Q.2 & Q.3 each.

BT	CO's	Q. No.		Marks
		<b>Q.1</b>	<b>Attempt the following</b>	<b>20M</b>
L3	CO1	<b>a</b>	Show that the vectors (2,1,4),(1,-1,2),(3,1,-2) form basis for Vector Space $R^3$ .	6 M
L3	CO2	<b>b</b>	Find the dimensions of row space and column space for the matrix A where $A = \begin{bmatrix} 1 & -1 & 3 \\ 5 & -4 & -4 \\ 7 & -6 & 2 \end{bmatrix}$	7M
L3	CO3	<b>c</b>	Let $T: R^3 \rightarrow R^3$ be a linear transformation defined by $T(x, y, z) = (x + y + 2z, x + z, 2x + y + 3z)$ Find basis for null space of T and range of T.	7M
		<b>Q.2</b>	<b>Attempt any three of the following</b>	<b>15M</b>
L3	CO4	<b>a</b>	Test the convergence of the series $\sum_1^\infty \frac{n}{n^2+1}$ by Integral test	5M
L3	CO5	<b>b</b>	If fuzzy set $A(x) = \frac{x}{x+4}$ , $x \in X = \{0, 1, 2, \dots, 5\}$ then find, (i) Crossover point of fuzzy set A      (ii) Scalar Cardinality of fuzzy set A (iii) $0.5_{\bar{A}}$ (iii) Support of fuzzy set A	5M
L3	CO5	<b>c</b>	Consider fuzzy sets $A(x) = \frac{x+2}{x+5}$ and $B(x) = \frac{1}{1+10(x-1)^2}$ for $x \in \{0,1,2,3\}$ Find (i) $A \cup \bar{B}$ (ii) $\overline{A \cap B}$	5M
L3	CO6	<b>d</b>	Find fuzzy cardinality for the fuzzy set $A(x) = \frac{x+5}{4x+9}$ for $x \in \{0,1,2,3,4\}$	5M
		<b>Q.3</b>	<b>Attempt any three of the following</b>	<b>15M</b>
L3	CO4	<b>a</b>	By Cauchy's root test, test the convergence of the series $\sum_1^\infty \frac{1}{n \cdot 2^n}$	5M
L3	CO4	<b>b</b>	By D'Alembert's ratio test, discuss the convergence of the series $\sum_1^\infty \frac{n^2}{3^n}$	5M
L3	CO5	<b>c</b>	Find $\alpha$ - cuts for distinct values of $\alpha$ of the fuzzy set A and hence find special fuzzy set where, $A(x) = \left\{ \frac{0.1}{5} + \frac{0.3}{6} + \frac{0.5}{7} + \frac{1}{8} + \frac{0.8}{9} \right\}$	5M
L3	CO6	<b>d</b>	$A(x) = \begin{cases} \frac{x-1}{2}, & 1 < x \leq 3 \\ \frac{5-x}{2}, & 3 < x \leq 5 \\ 0, & \text{Otherwise} \end{cases} \quad B(x) = \begin{cases} \frac{x-3}{2}, & 3 < x \leq 5 \\ \frac{7-x}{2}, & 5 < x \leq 7 \\ 0, & \text{Otherwise} \end{cases}$ Find (i) A+B    (ii) A-B	5M