



**D.Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY**  
**KASABA BAWADA KOLHAPUR-416006**  
 (An Autonomous Institute)  
**S. Y. B. Tech-DS (Semester-III)**

Q. Paper Code:  
23SYDS201301

**Set:- I**

**END SEMESTER EXAMINATION, Dec- 2022**

**COURSE NAME: Linear Algebra, COURSE CODE: 201DSL201**

**Day and Date: Monday, 16.01.2023**

**Time: 2.00 pm to 4.00 pm**

Seat No :

**Max. Marks- 50**

**Instructions:**

- i. Attempt the following questions.
- ii. Figure to the right indicate full marks.

BT	CO's	Q. No.		Marks
		<b>Q.1</b>	<b>Attempt the following</b>	<b>20</b>
L3	CO1	<b>a</b>	Show that the set $W=\{(a,b,c) : a+2b+3c=0\}$ is a subspace of vector space $R^3$	6
L3	CO2	<b>b</b>	Find the row space and column space for the matrix A  where $A = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 7 & 4 \\ 1 & 5 & 2 \end{bmatrix}$	7
L3	CO3	<b>c</b>	Let $T: R^3 \rightarrow R^3$ be a linear transformation such that $T(x, y, z) = (x + y - z, x - 2y + z, -2x - 2y + 2z)$ . Find basis for null space of T.	7
		<b>Q.2</b>	<b>Attempt the following questions</b>	<b>10</b>
L3	CO4	<b>a</b>	Test the convergence of the series $\sum_1^\infty \left(\frac{n^2}{n^4+4}\right)$ by comparison test	4
L3	CO4	<b>b</b>	Test the convergence of the series $\sum_1^\infty \frac{n!}{4^n}$ by D'Alembert's ratio test <b>OR</b> Test the convergence of the series $\sum_1^\infty \left(\frac{3n+2}{2n-1}\right)^n$ by Cauchy's root test	6  6
		<b>Q.3</b>	<b>Attempt the following questions</b>	<b>10</b>
L3	CO5	<b>a</b>	If fuzzy set $A(x) = \frac{x}{x+4}$ , $x \in X = \{0, 1, 2, 3, 4\}$ then find $\alpha$ -cut of A for $\alpha=0.2$	3
L3	CO5	<b>b</b>	Consider fuzzy sets $A(x) = \frac{1}{x+4}$ and $B(x) = \frac{x}{x+2}$ For $x \in X = \{0, 1, 2, 3, 4, 5\}$ Find (i) $\bar{A}$ (ii) $\bar{A} \cup B$ (iii) $A \cap B$ (iv) $0.2 +_A$ (v) Support A <b>OR</b> Let A be a fuzzy set on R, given by	7

			$A(x) = \frac{3x-1}{2}, \quad \frac{1}{3} \leq x \leq 1$ $= \frac{5-3x}{2}, \quad 1 \leq x \leq \frac{5}{3}$ $= 0, \quad \text{Otherwise}$ <p>Find <math>\alpha</math>-cut of A for <math>\alpha=0.5</math> and strong <math>\alpha</math>-cut for <math>\alpha=0.7</math></p>	7
		<b>Q.4</b>	<b>Attempt any two following questions</b>	10
L3	CO6	<b>a</b>	<p>Determine whether the following fuzzy set is a fuzzy number or not</p> $A(x) = \sin x, \quad 0 \leq x \leq \pi$ $= 0, \quad \text{Otherwise}$	5
	CO6	<b>b</b>	<p>Find fuzzy cardinality for the fuzzy set</p> $A(x) = 3^{-x} \text{ for } x \in \{0,1,2,3,4,5\}$	5
	CO6	<b>c</b>	$A(x) = \begin{cases} \frac{x-1}{2}, & 1 < x \leq 3 \\ \frac{5-x}{2}, & 3 < x \leq 5 \\ 0, & \text{Otherwise} \end{cases}$ $B(x) = \begin{cases} \frac{x-3}{2}, & 3 < x \leq 5 \\ \frac{7-x}{2}, & 5 < x \leq 7 \\ 0, & \text{Otherwise} \end{cases}$ <p>Find <math>\alpha_{A+B}</math> i.e., <math>\alpha</math>-cut of A+B</p>	5

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