

No Preview  
Available

Total No. of Question : [4]

Registration No. : 

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**Programme Name : Computer Science & Engineering(DS)**  
**Regular S.Y.B.Tech. ESE ( A.Y. 2023-24) Sem. III Nov.2023**  
**III SEMESTER ( 2022 BATCH)**  
**201DSL201-Linear Algebra-TH**

Duration : [ 11:00 AM - 01:00 PM ]

Date : 21 Nov, 2023

Day : Tuesday

Marks : 50

**Instructions :**

**(Q1) Attempt the following questions.**

[20.0]

(1.1)

[6.0]

Examine whether the following vectors are dependent or independent

$$v_1 = (3, 1, 1), v_2 = (2, 0, -1), v_3 = (4, 2, 1)$$

**CO :- C201.1**

**Blooms Taxonomy :- Understand, Apply**

(1.2)

[7.0]

Find the row space and column space for the matrix A

$$\text{where } A = \begin{bmatrix} 1 & 2 & -1 \\ 3 & -2 & 2 \\ 7 & -2 & 3 \end{bmatrix}$$

**CO :- C201.2**

**Blooms Taxonomy :- Apply**

(1.3)

[7.0]

Let  $T: R^3 \rightarrow R^3$  be a linear transformation such that  $T(x, y, z) = (x + z, x - z, y)$ .

Show that T is invertible transformation.

**CO :- C201.3**

**Blooms Taxonomy :- Apply**

**(Q2) Attempt the following questions.**

[10.0]

(2.1)

[4.0]

Test the convergence of the series  $\sum_{n=1}^{\infty} \frac{n}{2^n}$  by D'Alembert's ratio test

**CO :- C201.4**

**Blooms Taxonomy :- Apply**

(2.2)

[6.0]

Test the convergence of the series  $\sum_1^{\infty} \left( \frac{1}{\sqrt{n+2} + \sqrt{n}} \right)$  by comparison test

**OR**

Test the convergence of the series  $\sum_1^{\infty} \frac{n^2}{(2n^3-1)}$  by Integral test

**CO :- C201.4**

**Blooms Taxonomy :- Apply**

(Q3) Attempt the following questions.

[10.0]

(3.1)

If fuzzy set  $A(x) = 2^{-x}$ ,  $x \in X = [0, 1, 2, \dots, 10]$  then find scalar cardinality of fuzzy set A.

[4.0]

**CO :- C201.5**

**Blooms Taxonomy :- Understand, Apply**

(3.2)

If a fuzzy set  $A(x) = \frac{x}{x+3}$  for  $x \in X = [0, 1, 2, 3, 4, 5]$  then find

[6.0]

(i)  $0.4_A$  (ii)  $0.5 +_A$  (iii) Support A (iv) Crossover point of A

**OR**

Two fuzzy sets A and B defined on the Universal set are,

$$A(x) = \left\{ \frac{0.1}{0} + \frac{0.6}{1} + \frac{0.8}{2} + \frac{0.9}{3} + \frac{0.7}{4} + \frac{0.1}{5} \right\}$$

$$B(x) = \left\{ \frac{0.9}{0} + \frac{0.7}{1} + \frac{0.5}{2} + \frac{0.2}{3} + \frac{0.1}{4} + \frac{0}{5} \right\}$$

Find (i)  $A \cap B$  (ii)  $0.5 \overline{A \cap B}$  (iii)  $S(A, B)$

**CO :- C201.5**

**Blooms Taxonomy :- Understand, Apply**

(Q4) Attempt any two of the following questions.

[10.0]

(4.1) Determine whether the following fuzzy set is a fuzzy number or not

[5.0]

$$A(x) = \begin{cases} \tan x & , 0 \leq x \leq \pi/4 \\ 0 & , \text{Otherwise} \end{cases}$$

**CO :- C201.6**

**Blooms Taxonomy :- Apply**

(4.2)

Find fuzzy cardinality for the fuzzy set

[5.0]

$$A(x) = \frac{x}{x+2} \text{ for } x \in \{6, 7, 8, 9, 10\}$$

**CO :- C201.6**

**Blooms Taxonomy :- Apply**

(4.3)

[5.0]

For following fuzzy sets

$$A(x) = \begin{cases} \frac{x-1}{3} & 1 < x \leq 4 \\ \frac{7-x}{3} & 4 < x \leq 7 \\ 0 & \text{Otherwise} \end{cases} \quad B(x) = \begin{cases} \frac{x-7}{3} & 7 < x \leq 10 \\ \frac{13-x}{3} & 10 < x \leq 13 \\ 0 & \text{Otherwise} \end{cases}$$

Find  $\alpha_{A+B}$  i.e.,  $\alpha$ -cut of A+B

CO :- C201.6

Blooms Taxonomy :- Apply

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