RAAK ARTS AND SCIENCE COLLEGE
Affiliated to Annamalai University, Annamalai Nagar, Chidambaram, Tamil Nadu, India
A Unit of Farouk Educational Trust

# PROBLEM SOLVING METHODOLOGIES

## RAAK ARTS AND SCIENCE COLLEGE

## DEPARTMENT OF MATHEMATICS

## APTITUDE TEST

Our College conducted aptitude test to develop the mathematical knowledge and logical reasoning to the Students.

1. **Question:** If x+y=12x + y = 12x+y=12 and x−y=4x - y = 4x−y=4, what is the value of xxx?
   a) 8
   b) 6
   c) 10
   d) 4
   **Answer:** a) 8
2. **Question:** A man spends 75% of his income. If his income increases by 20% and his expenditure increases by 10%, what is the percentage increase in his savings?
   a) 50%
   b) 45%
   c) 40%
   d) 35%
   **Answer:** a) 50%
3. **Question:** The average of four consecutive even numbers is 27. What is the largest of these numbers?
   a) 28
   b) 30
   c) 32
   d) 34
   **Answer:** b) 30
4. **Question:** What is the value of 23×242^3 \times 2^423×24?
   a) 64
   b) 128
   c) 256
   d) 32
   **Answer:** b) 128
5. **Question:** A sum of money amounts to ₹1260 in 2 years at simple interest. If the rate of interest is 5% per annum, what is the principal amount?
   a) ₹1200
   b) ₹1100
   c) ₹1000
   d) ₹1050
   **Answer:** c) ₹1000

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6. **Question:** A can do a piece of work in 10 days and B can do it in 15 days. How many days will it take to complete the work if they work together?
   a) 6 days
   b) 5 days
   c) 4 days
   d) 7 days
   **Answer:** b) 6 days
7. **Question:** If the ratio of two numbers is 3:5 and their sum is 40, what is the larger number?
   a) 15
   b) 25
   c) 20
   d) 10
   **Answer:** b) 25
8. **Question:** A shopkeeper offers a 20% discount on the marked price of an article and still makes a profit of 25%. If the marked price is ₹500, what is the cost price?
   a) ₹320
   b) ₹300
   c) ₹350
   d) ₹400
   **Answer:** b) ₹300
9. **Question:** The perimeter of a rectangle is 50 meters, and its length is 15 meters. What is its breadth?
   a) 10 meters
   b) 12 meters
   c) 15 meters
   d) 20 meters
   **Answer:** a) 10 meters
10. **Question:** If a certain number is multiplied by 7, the result is 84. What is the number?
    a) 10
    b) 11
    c) 12
    d) 14
    **Answer:** c) 12

## Logical Reasoning Objective Questions with Answers

11. **Question:** If 'MANGO' is coded as 'OLNGQ', how will 'APPLE' be coded?
    a) CPQMG
    b) BQQMF
    c) CQQNG
    d) BRPMF
    **Answer:** c) CQQNG
12. **Question:** Find the odd one out:
    a) 81

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b) 49
c) 36
d) 27
**Answer:** d) 27 (All others are perfect squares.)

13. **Question:** Complete the series: 3, 6, 9, 15, 24, ___
    a) 30
    b) 33
    c) 36
    d) 39
    **Answer:** b) 33
14. **Question:** If 'A' is coded as 1, 'B' as 2, and so on, what is the code for 'FACE'?
    a) 6135
    b) 6136
    c) 6137
    d) 6138
    **Answer:** a) 6135
15. **Question:** Pointing to a man, a woman said, "His mother is the only daughter of my mother." How is the woman related to the man?
    a) Mother
    b) Aunt
    c) Grandmother
    d) Sister
    **Answer:** a) Mother
16. **Question:** Choose the figure that is different from the rest:
    a) Square
    b) Circle
    c) Triangle
    d) Rectangle
    **Answer:** b) Circle (All others have straight sides.)
17. **Question:** If 'SUN' is coded as 'RTO', what is the code for 'MOON'?
    a) LNNM
    b) NMPP
    c) LPPN
    d) LNNP
    **Answer:** d) LNNP
18. **Question:** Arrange the following words in a meaningful order:
    1. College
    2. Job
    3. School
    4. Post Graduation
    5. Primary School

    a) 5, 3, 1, 4, 2
    b) 3, 5, 1, 4, 2
    c) 5, 3, 4, 1, 2

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d) 5, 3, 4, 2, 1
**Answer:** a) 5, 3, 1, 4, 2

19. **Question:** Choose the word that is most nearly the same in meaning as the word 'ABHOR'.
    a) Love
    b) Hate
    c) Create
    d) Endure
    **Answer:** b) Hate
20. **Question:** Identify the correctly spelled word:
    a) Maintenence
    b) Maintenance
    c) Maintainance
    d) Maintainence
    **Answer:** b) Maintenance

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**DEPARTMENT OF COMPUTER SCIENCE**

**APTITUDE TEST**

**NAME:** Hema. R. **YEAR:** II

1 **Question:** If $x+y=12$, $x-y=12$, $x+y=12$ and $x-y=4x-y=4$, what is the value of $xxx$?
a) 17
b) 6
c) 10
d) 4

2 **Question:** A man spends 75% of his income. If his income increases by 20% and his expenditure increases by 10%, what is the percentage increase in his savings?
a) 30%
b) 45%
c) 40%
d) 35%

3 **Question:** The average of four consecutive even numbers is 27. What is the largest of these numbers?
a) 28
b) 31
c) 32
d) 34

4 **Question:** What is the value of $2^3 \times 2^2 \times 3 \times 2^4 \times 2^3 \times 2^4$?
a) 64
b) 128
c) 256
d) 32

5 **Question:** A sum of money amounts to ₹1260 in 2 years at simple interest. If the rate of interest is 5% per annum, what is the principal amount?
a) ₹1200
b) ₹1100
c) ₹1000
d) ₹1050

6 **Question:** A can do a piece of work in 10 days and B can do it in 15 days. How many days will it take to complete the work if they work together?
a) 6 days
b) 9 days

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c) 6137
d) 6138

15. **Question:** Pointing to a man, a woman said, "His mother is the only daughter of my mother." How is the woman related to the man?
a) Mother
b) Aunt
c) Grandmother
d) Sister

16. **Question:** Choose the figure that is different from the rest.
a) Square
b) Circle
c) Triangle
d) Rectangle

17. **Question:** If 'SUN' is coded as 'RTO', what is the code for 'MOON'?
a) LNNM
b) NMPP
c) LPPN
d) NNNP

18. **Question:** Arrange the following words in a meaningful order
a College
b Job
c School
d Post Graduation
e Primary School
a) 5, 3, 1, 4, 2
b) 3, 5, 1, 4, 2
c) 5, 3, 4, 1, 2
d) 5, 3, 4, 2, 1

19. **Question:** Choose the word that is most nearly the same in meaning as the word 'ABHOR'
a) Love
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c) Create
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**Answer:** b) Hate

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b) Maintenance
c) Maintainance
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DEPARTMENT OF MATHEMATICS

APTITUDE TEST

NAME: Kamali. S. YEAR: II.

1. **Question:** If x + y = 12x + y = 12x + y = 12 and x + y = 4x + y = 4x + y = 4, what is the value of xxx?
   a) 8
   b) 6
   c) 10
   d) 4

2. **Question:** A man spends 75% of his income. If his income increases by 20% and his expenditure increases by 10%, what is the percentage increase in his savings?
   a) 30%
   b) 45%
   c) 40%
   d) 35%

3. **Question:** The average of four consecutive even numbers is 27. What is the largest of these numbers?
   a) 28
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   d) 34

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   a) 6 days
   b) 7 days

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c) 4 days
d) 7 days

7 **Question:** If the ratio of two numbers is 3:5 and their sum is 40, what is the larger number?
a) 15
b) 25
c) 20
d) 10

8 **Question:** A shopkeeper offers a 20% discount on the marked price of an article and still makes a profit of 25%. If the marked price is ₹500, what is the cost price?
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11. **Question:** If 'MANGO' is coded as 'OLNGQ', how will 'APPLE' be coded?
a) CPQMG
b) BQQMF
c) CQQNG
d) BRPMF

12 **Question:** Find the odd one out
a) 81
b) 49
c) 36
d) 71

13 **Question:** Complete the series: 3, 6, 9, 15, 24, ...
a) 30
b) 33
c) 36
d) 39

14. **Question:** If 'A' is coded as 1, 'B' as 2, and so on, what is the code for 'FACE'?
a) 1135

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b) 6136
c) 6137
d) 6138

15 **Question:** Pointing to a man, a woman said, "His mother is the only daughter of my mother." How is the woman related to the man?
a) Mother
b) Aunt
c) Grandmother
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b) NMPP
c) LPPN
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2 Job
3 School
4 Post Graduation
5 Primary School
a) 5, 3, 1, 4, 2
b) 3, 5, 1, 4, 2
c) 5, 3, 4, 1, 2
d) 5, 3, 4, 2, 1

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NAME : YAMUNAVATHI.E

REG NO : 214219120008

CLASS : II nd MBC

SUBJECT : Fundamentals of Business Statistics

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# Bayes Theorem

* Bayes Theorem describes the probability of occurrence of an event related to any condition. It is also considered for the case of the conditional probability.

Bayes theorem is also known as the formula for the probability of causes.

Conditional Probability : Bayes Theorem

$$P(A|B) = \frac{P(B|A)(P(A))}{P(B)}$$

Bayes Theorem Statement

* Let $E_1, E_2 \ldots E_n$ be a set of events associated with a sample space S, where all the events $E_1, E_2 \ldots E_n$ have non zero probability of occurance and they form a partition of S. Let A be any event associated with S, then according to Bayes theorem

$$P(E_i|A) = \frac{P(E_i)P(A|E_i)}{\sum_{K=1}^{n} P(E_K)P(A|E_K)}$$

for any $K = 1, 2, 3, \ldots, n$

Bayes Theorem Proof

According to the conditional Probability formula,

$$P(E_i/A) = \frac{P(E_i \cap A)}{P(A)} \quad \ldots (1)$$

Using the multiplication rules of probability

$$P(E_i \cap A) = P(E_i) P(A/E_i) \quad \ldots (2)$$

Using total probability theorem,

$$P(A) = \sum_{k=1}^{n} P(E_k) P(A/E_k) \quad \ldots (3)$$

Putting the values from equations (2) and (3) in equation 1, we get

$$P(E_i/A) = \frac{P(E_i) P(A/E_i)}{\sum_{k=1}^{n} P(E_k) P(A/E_k)}$$

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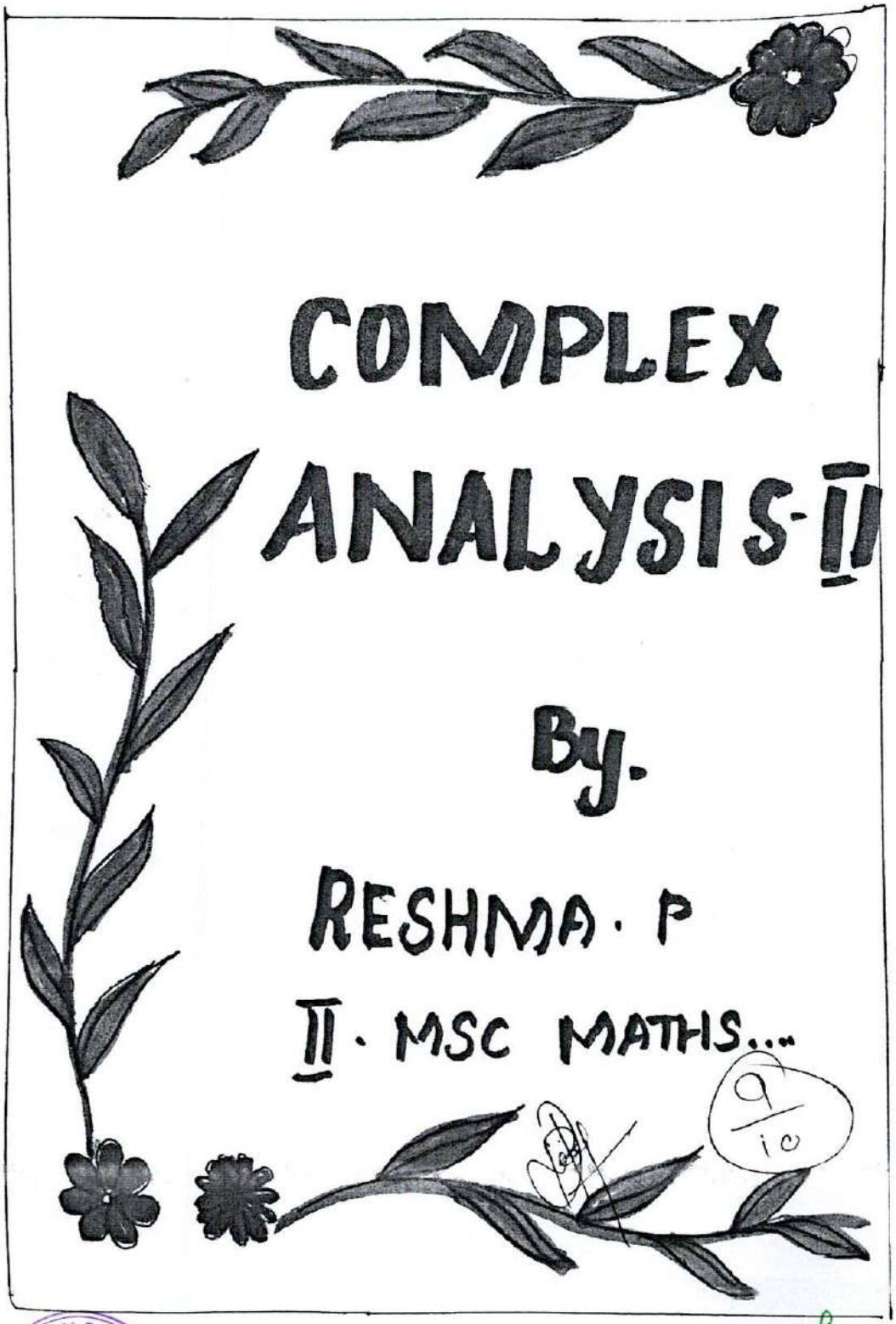

# HARNACK'S INEQUALITY FOR THE UNIT DISK.

Theorm :

Let $U = U(z)$ be harmonic on $S$ and continuous on $\overline{\Delta}$. If $U(e^{i\theta}) \geq 0 \ \forall \ \theta$, Then for $z = re^{i\theta} \in \Delta$ we have.

$$U(0)\ \frac{1-r}{1+r} \leq U(re^{i\theta}) \leq U(0)\ \frac{1+r}{1-r} \quad (r<1)$$

Proof :

By the poisson Intral formula

$$P_r(\theta) = \frac{1-r^2}{1-2r\cos\theta + r^2} \rightarrow (1)$$

If $R > 0$, Then sub $\frac{r}{R}$ for $r$ in (1)

If and denoting $P_{r/R}(\theta)$ by $P(R, r, \theta)$

$$P(R, r, \theta) = \frac{1 - \left(\frac{r}{R}\right)^2}{1 - 2\frac{r}{R}\cos\theta + \left(\frac{r}{R}\right)^2}$$

$$= \frac{1 - \frac{r^2}{R^2}}{1 - \frac{2r}{R}\cos\theta + \frac{r^2}{R^2}} = \frac{\frac{R^2 - r^2}{R^2}}{\frac{R^2 - 2rR\cos\theta + r^2}{R^2}}$$

$$P(R, r, \theta) = \frac{R^2 - r^2}{R^2 - 2Rr\cos\theta + r^2} \rightarrow (2)$$

For $0 \leq r \leq R \quad \forall \ \theta$

Hence if $u$ is continuous on $\bar{\Delta}$ and Harmonic is $\Delta$ then

$$u(re^{i\theta}) = \frac{1}{2\pi}\int_{-\pi}^{\pi} \left[\frac{R^2 - r^2}{R^2 - 2rR\cos(\theta - t) + r^2}\right] u(Re^{it})\,dt \rightarrow (3)$$

The poisson kernel formula is more useful when (2) is modified as

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$$P(R, r, \theta, t) = \frac{R^2 - r^2}{R^2 - 2rR\cos(\theta - t) + r^2}$$

$$P(R, r, \theta - t) = \frac{R^2 - r^2}{|Re^{i\theta} - re^{i\theta}|^2} \rightarrow (4)$$

Moreover, $R - r \leq |Re^{i\theta} - re^{i\theta}| \leq R + r$

$$\therefore \frac{R - r}{R + r} \leq \frac{R^2 - r^2}{R^2 - 2rR\cos(\theta t) + r^2} \leq \frac{R + r}{R - r}$$

if $U(e^{i\theta}) \geq 0$ then eq (5)

$\therefore (r < 1) \therefore R = 1$

$$\frac{1 - r}{1 + r} \cdot \frac{1}{2\pi} \int_{-\pi}^{\pi} U(e^{i\theta})\, d\theta \leq \frac{1}{2\pi} \int_{-\pi}^{\pi} \left[ \frac{1 - r^2}{1 - 2r\cos(\theta - t) + r^2} \right] U(e^{i\theta})\, d\theta$$

$$\leq \frac{1 + r}{1 - r} \cdot \frac{1}{2\pi} \int_{-\pi}^{\pi} U(e^{i\theta})\, d\theta$$

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Hence.,

$$\frac{1-r}{1+r} \quad \frac{1}{2\pi} \int_0^{2\pi} U\left(r e^{i\theta}\right) d\theta$$

$$\leq \frac{1}{2\pi} \int_{-\pi}^{\pi} \left[ \frac{1-r^2}{1-2r\cos(\theta-t)+r^2} \right] U\left(e^{i\theta}\right) d\theta$$

$$\leq \frac{1+R}{1-r} \quad \frac{1}{2\pi} \int_0^{2\pi} U\left(e^{i\theta}\right) d\theta$$

By (3)

$$U(0) \quad \frac{1-r}{1+r} \leq U\left(r e^{i\theta}\right) \leq U(0) \frac{1+r}{1-r}$$

$[\because r = 0]$

Hence proved.

COROLLARY :

Let $U = U(x)$ be harmonic on $s(a; R)$ & continuous on $\bar{A}(A; R)$. If $u[a + Re^{i\theta}] \geq 0 \; \forall \; \theta$ Then for $x \in s(a; R)$ we have

$$U(a)\frac{R-r}{R+r} \leq U(x) \leq U(a)\frac{R+r}{R-r} \quad [0 \leq r \leq R)$$

Proof :

By the poisson Integral formula

$$P_r(\theta) = \frac{1-r^2}{1-2r\cos\theta + r^2} \rightarrow (1)$$

If $R > 0$, then Sub $\frac{r}{R}$ for $r$ in (1) and sending $P_{r/R}(\theta)$ By $P(R, r, \theta)$ we find,

$$P(R, r, \theta) = \frac{1 - r^2/\theta^2}{1 - 2r/R\cos\theta + r^2/R^2}$$

$$= \frac{R^2 - r^2}{R^2 - 2rR\cos\theta + r^2} \rightarrow (2)$$

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For $0 \le r \le R$ and all $\theta$

Hence if $U$ is continuous on $\bar{\Delta}(a, R)$ and Harmonic in $\Delta$ then

$$U(a + re^{i\theta}) = \frac{1}{2\pi} \int_{-\pi}^{\pi} \left[ \frac{R^2 - r^2}{R^2 - 2rR\cos(\theta - t) + r^2} \right] U(a + Re^{it})\, dt \to (3)$$

The Poisson Kernel formula is more useful when (2) is modified as $P(R, r, \theta - t) = \frac{R^2 - r^2}{R^2 - 2rR\cos(\theta - t) + r^2}$

$$P(R, r, \theta - t) = \frac{R^2 - r^2}{|Re^{it} - re^{i\theta}|^2} \to (4)$$

Moreover: $R - r \le |Re^{it} - re^{i\theta}| \le R + r$

$$\therefore \frac{R - r}{R + r} \le \frac{R^2 - r^2}{R^2 - 2rR\cos(\theta - t) + r^2} = \frac{R + r}{R - r} \to (5)$$

if $U \ge 0$ then eq (5)

$$\frac{R - r}{R + r} = \frac{1}{2\pi} \int_{-\pi}^{\pi} U(a + Re^{it})\, d\theta$$

$$< \frac{1}{2\pi} \int_{-\pi}^{\pi} \left[ \frac{R^2 - r^2}{R^2 - 2r\cos(\theta - t) + r^2} \right] U(a + re^{it})\, d\theta$$

$$\frac{R - r}{R + r} U(a) \le U(a + re^{it}) \le \frac{R + r}{R - r} U(a)$$

Hence proved.

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# COMPLEX ANALYSIS-II

## III-BSC MATHS

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## Rouche theorem :

If $f(z)$ and $g(z)$ are analytic fns inside and on a simple closed curve $C$ and if $|g(z)| < |f(z)|$ on $C$ (or) $\frac{|g(z)|}{f(z)} < 1$, then $f(z) + g(z)$ and $f(z)$ have the same no. of Zeros inside $C$.

## Proof :

Let $f(z)$ & $g(z)$ be any two functions.

Let $f(z) + g(z) = f(z)\left[\frac{1+g(z)}{f(z)}\right]$

$= f(z) \cdot \phi(z)$ where $\phi(z) = 1 + \frac{g(z)}{f(z)}$

$[f(z) + g(z)] = [f(z)\,\phi(z)]'$

$f'(z) + g'(z) = f'(z)\,\phi(z) + f(z)\,\phi'(z)$

$$\frac{f'(z) + g'(z)}{f(z) + g(z)} = \frac{f'(z)\,\phi(z) + f(z)\,\phi'(z)}{f(z)\,\phi(z)}$$

$$= \frac{f'(z)}{p(z)} + \frac{\phi'(z)}{\phi(z)}$$

Multiply the above equn by $\frac{1}{2\pi i}$ and $\int$ on b.s we get,

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$$\frac{1}{2\pi i}\int\left[\frac{f'(z)+g'(z)}{f(z)+g(z)}\right]dz = \frac{1}{2\pi i}\int\frac{f'(z)}{f(z)}dz + \frac{1}{2\pi i}\int\phi'(z)/\phi(z)\,dz \quad \text{---} (1)$$

we have $|g(z)| < |f(z)|$ on $c$

i.e) $\dfrac{|g(z)|}{|f(z)|} < 1$ on $c$

i.e) $\left|\dfrac{g(z)}{f(z)}\right| < 1$ on $c$

i.e) $|\phi(z) - 1| < 1$ on $c$

By maximum modulus theorem,

$|\phi(z) - 1| < 1$ ; $\forall$ pt $z$ in $c$.

(i.e) $\phi(z) \neq 0$, $\forall z$ inside

Hence $\int\dfrac{\phi'(z)}{\phi(z)}dz = N - P$

where $N$ is the no. of Zeroes

$P$ is the no. of Poles.

Here $\phi(z)$ has no Zero inside $c$

$\therefore N = 0$ & $P = 0$

$\therefore \frac{1}{2\pi i}\int\dfrac{\phi'(z)}{\phi(z)}dz = 0.$

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$$\frac{1}{2\pi i}\int \frac{f'(z)+g'(z)}{f(z)+g(z)}\,dz = \frac{1}{2\pi i}\int_C \frac{f'(z)}{f(z)}\,dz$$

$$N_1 - P_1 = N_2 - P_2$$

Where $N_1 = N_2$,

$N_1$ is the no. of Zeros of $f(z)$

$f+g(z)$ & $N_2$ is the no. of Zeros

## Argument Principle theorem:

Let $f$ be a function which is analytic inside and on a simple closed curve C except for a finite no. of poles inside C also $f(z)$ has non Zero on C, then $\frac{1}{2\pi i}\int_C \frac{f'(z)}{f(z)}\,dz = N - P$, where N is the no. of Zeros of $f(z)$ inside C & P is the no. of Poles of $f(z)$ inside C

## Proof:

Let $f(z)$ be a function which is analytic, inside and on a simple

closed curve, except for a finite no. of poles inside C.

We assume that the singularities of the function $f'(z)/f(z)$ inside C all the poles and zeros of $f(z)$ lying inside C

Let $z_0$ be a Zero of Order n for $f(z)$ Let $C_1$ be the circle with centre $z_0$, show that it is the only Zero of $f(z)$ inside $C_1$.

Then $f(z) = (z-z_0)^n g(z)$, $(g(z_0) \neq 0$ where $g(z)$ is analytic & non-Zero inside $C_1$

$$f'(z) = n(z-z_0)^{n-1} g(z) + (z-z_0)^n g'(z).$$

$$\frac{f'(z)}{g(z)} = \frac{n(z-z_0)^{n-1} g(z) + (z-z_0)^n g'(z)}{(z-z_0)^n g(z)}$$

$$\frac{f'(z)}{f(z)} = n/(z-z_0)^n + \frac{g'(z)}{g(z)} \quad \text{— (1)}$$

Since $g(z)$ is analytic and no-zero inside,

$\therefore \frac{g'(z)}{g(z)}$ is analytic

Hence $\frac{g'(z)}{g(z)}$ can be expressed as a Taylor's series about $z_0$

(i) $\frac{g'(z)}{g(z)} = \frac{g'(z_0)}{g(z_0)} + \frac{(z-z_0)}{1!}\left(\frac{g'(z_0)}{g(z_0)}\right) + \frac{(z-z_0)^2}{2!}\left(\frac{g'(z_0)}{g(z_0)}\right) + \cdots$

(1) $\Rightarrow \frac{f'(z)}{f(z)} = \frac{n}{z-z_0} + \frac{g'(z_0)}{g(z_0)} + \frac{(z-z_0)}{1!}\frac{g'(z_0)}{g(z_0)} + \cdots$

Res $\left\{\frac{f'(z)}{f(z)}, z_0\right\}$ = co-eff $\frac{1}{z-z_0} = n$

(ii) Let $z_1$ be a pole of order $p$ for $f(z)$ Then,

$f(z)$ Then,

$f(z) = \frac{g(z)}{(z-z_1)^p}$

$f(z) = (z-z_1)^{-p} g(z)$.

$f'(z) = -p(z-z_1)^{-p-1} g(z) + (z-z_1)^{-p} g'(z)$

$\frac{f'(z)}{f(z)} = \frac{-p(z-z_1)^{-p-1} g(z)}{(z-z_1)^{-p} g(z)} + \frac{(z-z_1)^{-p} g'(z)}{(z-z_1)^{-p} g(z)}$

$$\frac{f'(z)}{f(z)} = \frac{-P}{(z-z_1)} + \frac{g'(z)}{g(z)} \quad -(2)$$

Since $\frac{g'(z)}{g(z)}$ is analytic at $z_1$, it can be expressed as Taylor series about the point $z_0$.

$$\frac{g'(z)}{g(z)} = \frac{g'(z_1)}{g(z_1)} + \frac{(z-z_1)}{1!}\left(\frac{g'(z_1)}{g(z_1)}\right)' + \frac{(z-z_1)^2}{2!}\left(\frac{g'(z_1)}{g(z_1)}\right)' + \cdots$$

$$(2) \Rightarrow \frac{f'(z)}{f(z)} = \frac{-P}{(z-z_1)} + \frac{g'(z)}{g(z_1)} + \frac{(z-z_1)}{1!} + \cdots$$

$\text{Res}\left\{\frac{f'(z)}{f(z)} : z_1\right\}$ = coeff of $\frac{1}{z-z_0} = -P$

$$\therefore \int_C \frac{f'(z)}{f(z)}\, dz = 2\pi i \left[(m_1 + m_2 + \cdots m_n) - [(p_1 p_2 + \cdots + p_k)\right]$$

$$= 2\pi i [N-P]$$

$$\therefore \frac{1}{2\pi i} \int_C \frac{f'(z)}{f(z)}\, dz = N - P$$

where N is the no of Zeros
Dis the no. of poles.

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| 1 | 43220U25002 | MONISHA G | AN APPLICATION OF SOFT SETS IN A DECISION MAKING PROBLEM |
| 2 | 43220U25003 | RADHIKA H | A STUDY ON SMOKING PROBLEM USING FUZZY MATRIX METHOD |

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# AN APPLICATION OF SOFT SETS IN A DECISION MAKING PROBLEM

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**In Partial Fulfillment ofthe Requirement forthe Award ofthe Degree**

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## CONCLUSION

With the knowledge in set theory, one can use the rough set theory to predict the possibility of business crash

Soft set theory is used for data analysis and also decision making in Bioinformatics domain.

Using adequate parameters membership is decided in soft set theory.

Equivalent classes concept is used by rough set theory while the grade of membership is used by fuzzy set theory.

A soft set is a parameterized family of sets - intuitively, this is "soft" because the boundary of the set depends on the parameters.

In this present project, here using the theory of soft sets to solve a decision making problem using rough mathematics.



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# A STUDY ON SMOKING PROBLEM USING FUZZY MATRIX METHOD

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## CONCLUSION:

It is observed that the CETD graph that most of silk weavers become bonded labourer at the age group of 21-40 followed by41-50. From the above analysis, we observe that the maximum age group of people become bonded has not changed with the change in the value in the value of the parameter from 0 to 1. Poverty and modernization are found to be the main causes for these two groups to become bonded labourers. The ATD matrix shows that, agriculture failure does not contribute to make them bonded labourers. Bonded labourers are doubly affected people for the advent of globalization (modern textile machinery) has denied they small or paltry amount which they are earning in peace as none of them had knowledge of any other trade. It is high time government takes steps to revive the life of weavers who work as bonded labourers by training and giving them some job opportunities.

From the above figure 3.1 – 3.5, it is clear that maximum age group of cigarette smokers has not changed with the change in the parameter $\alpha$, $0 \leq \alpha \leq 1$. In the above figures, it can be easily seen that maximum age-group when people start smoking lie between age of 22 to 28, because of stress, misinformation, self meditation, advertising etc., The group for CETD matrix also gives the same result. Also it can be seen that at the age-group 30 to 35 the row sum matrix gives negative value; it means that very few peoples start smoking at this age due to said attributes. The main motivation to work on this problem is that by knowing the maximum age group at which people start smoking, the government at least can take steps to resolve this problem.



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| 2 | 43220P20003 | GOWSIKA I | A STUDY ON GENERALIZED REGULAR INTERVAL VALUED FUZZY SOFT MATRIX THEORY IN AGRICULTURAL FIELD |
| 3 | 43220P20004 | JOSEPH LOURDURAJ S | A STUDY ON NUMERICAL EXAMPLE OF FUZZY TRAVELLING SALESMAN PROBLEM |
| 4 | 43220P20005 | LAKSHMI S | A STUDY ON APPLICATION OF FUZZY BAIRE SPACE IN SELECTION PROCESS |
| 5 | 43220P20006 | LOGESWARI N | APPLICATION OF TRANSPORTATION MODEL FOR OPTIMAL PRODRCT DISTRIBUTION CHAIN MANAGEMENT |
| 6 | 43220P20007 | RILWANA A | A STUDY ON THE APPLICATION OF OPERATION RESEARCH IN THE AIRLINE INDUSTRY |
| 7 | 43220P20008 | SANTHOSH KUMAR P | A OPERATIONS ON HEXAGONAL FUZZY NUMBERS WITH USING α- CUT |
| 8 | 43220P20009 | SIVASANKARI S | A STUDY ON A POSITION BASED ACCESS TO NUMEROUS STRAIN SYNAMICS IN MATHEMATICAL BIOLOGY |
| 9 | 43220P20010 | SOWMYA S | A METHOD FOR SOLVING A PENTAGONAL FUZZY TRANSPORTATION PROBLEM VIA RANKING TECHNIQUE AND ATM |
| 10 | 43220P20011 | SUBHALAKSHMI E | A STUDY ON MATHEMATICS IN AGRICULTURE |
| 11 | 43220P20012 | VIJAYAGANAPATHI U | A STUDY ON LINGUISTIC INTUITIONISTIC FUZZY SOFT MATRIX AND ITS APPLICATION OF MULTI CRITERIA DICISION MAKING IN |

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# A STUDY ON PENTAGONAL FUZZY NUMBER AND NON-NORMALIZED PENTAGONAL FUZZY NUMBER

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## 7. CONCLUSION

In this paper, a refined form of non-normalized (generalized) Pentagonal Fuzzy Number has been introduced along with its properties. This paper also presents certain operational properties of Generalized Pentagonal Fuzzy Number. Centroid of a Pentagonal Fuzzy Number has been derived and extended for the non-normalized form. The Median of a Pentagonal Fuzzy Number is calculated. We also introduced a new type of fuzzy number called Sequential Fuzzy Number which could be applied to real life events.

Generalized Pentagonal Fuzzy Number can improve a decision making system by taking subjective expert opinion into account. Therefore with the help of Generalized Pentagonal Fuzzy number, we can capture impreciseness or vagueness existing in any decision making system.

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# A STUDY ON GENERALIZED REGULAR INTERVAL VALUED FUZZY SOFT MATRIX THEORY IN AGRICULTURAL FIELD

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## CONCLUSION

In this project first we have defined different types of soft matrices and then introduced some operations on them.

Moreover we have proposed the concept of choice matrix which represents the choice parameters of the decision makers.

Finally we have presented a new algorithm using these choice matrices and newly proposed operations of soft matrices to solve soft set based decision making problems.

The speciality of this new method is that it may solve any soft set based decision making problem involving huge number of decision makers very easily along with a simple computational procedure.

we define soft matrices which are a matrix representation of the soft sets.

Then we introduced some operations of the soft matrix. Such as, And product, And-Not product, Or product, Or-Not product and then presented a decision making method using these products.

We give an application for a real estate agent to choose an optimal house. We think these methods will present a new perspective to handle the decision making problems.

# A STUDY ON NUMERICAL EXAMPLE OF FUZZY TRAVELLING SALESMAN PROBLEM

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## CONCLUSION AND FUTURE ENHANCEMENT

In this project , a new fuzzy number is developed for solving optimization problem with Hendecagonal fuzzy cost and fuzzy distance. The optimal solution to FAP and FTSP obtained by the proposed method is same as that of the optimal solution obtained by the existing methods. However the proposed method is simpler, easy to understand and it takes few steps for obtaining the fuzzy optimal solution. Numerical example shows that the proposed method offers an effective tool for handling the fuzzy assignment problem. In future, the generalization of Hendecagonal fuzzy number is developed to solve optimization problems.

Same fuzzy optimization problem has been modeled by considering different fuzzy linear programming problems, shown in Table 4, by using triangular fuzzy numbers with different widths and solved them with the help of fuzzy version of simplex algorithm. From Table 4, it is observed that more acceptable, that is, good enough solutions yield if triangular fuzzy numbers of the form $\tilde{A} = (a_1, a_2, a_3)$ with equal widths, that is, $a_1 = a_3$ are used. So, the triangular fuzzy numbers with equal widths need to be used in the fuzzy linear programming problem to obtain a good enough solution of a production planning problem.

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# A STUDY ON APPLICATION OF FUZZY BAIRE SPACE IN SELECTION PROCESS

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## CONCLUSION

Here, we have discussed, by using basic definitions of fuzzy topology, the relations of fuzzy simply Lindelöf space and fuzzy Baire space, fuzzy simply α- Lindelöf space and fuzzy α- Baire space, fuzzy simply pre-Lindelöf space and fuzzy pre-Baire space, fuzzy simply semi-Lindelöf space and fuzzy semi-Baire spaces. Various examples are explained using these relations.

Also, the idea of fuzzy simply $\ddot{g}$-Lindelöf space are introduced. The connection between fuzzy simply $\ddot{g}$-Lindelöf space and $\ddot{g}$-Baire space are discussed. Various samples are explained using these ideas. For further work, we will develope in this ideas to construct various fuzzy topological games and various Decision Making Problems.

In this paper we have discussed a basic definition of fuzzy dense set and fuzzy nowhere dense set and fuzzy Baire space and also we develop an application of Fuzzy Baire space by using product for the customer to purchase the best one.

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# APPLICATION OF TRANSPORTATION MODEL FOR OPTIMAL PRODUCT DISTRIBUTION CHAIN MANAGEMENT

**PROJECT REPORT**

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**In Partial Fulfilment of the Requirement for the Award of the Degree**
of
**MASTER OF SCIENCE IN MATHEMATICS**

A Project Report Submitted to the
**THIRUVALLUVAR UNIVERSITY**
**VELLORE**

MAY-2022



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## CONCLUSIONS :

Transportation algorithm has remained an essential tool of linear programming analysis which has availed modern organizations with quality scientific and objective decision making especially in product and inventory shipment. Most transportation problems are concerned with minimization of total cost. In few cases, the objective function could be to maximize profit and other benefits.

A typical solution to a transportation problem proceeds from the determination of an initial basic feasible solution, systematically progresses through successive improved revisions and terminates at the optimal solution.

Ani (2002) notes that practical application of transportation models have been visible in the areas of distribution and supply chain management, e.g. of inventories of raw-materials or finished products or parts from sources to demand points. It is also most applicable in demand and profit contribution management decisions. According to the author, it is essentially distribution, logistics and supply tool.

A balanced transportation algorithm which satisfies the rim requirement for a basic feasible solution ultimately culminates in an optimal solution. Thus, the number of occupied cells in a basic feasible solution equals the sum of the total number of rows (m) and columns (n), minus one (i.e. $m + n - 1$),Efficient resource utilization is the bedrock of successful modern business organizations.

Linear programming is the hallmark of operations research which guides effective business decisions. Effective inventory management must carefully reflect cost considerations in both procurement, supply, distribution and consumption. Decisions which minimizes costs and maximizes benefits, while simultaneously satisfying all constraints of the linear programming problem is imperative (Baron 2005).

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# A STUDY ON THE APPLICATION OF OPERATION RESEARCH IN THE AIRLINE INDUSTRY

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## CONCLUSION

Operations Research techniques can be very helpful in route optimization and improvement of resource utilization. It provides easy and convenient solution for better decision-making, saving time, resources and cost for organizations. In this study, we applied Hungarian method of assignment algorithm to optimize rest time of the crew for a certain flight operator for flights between Mumbai and Delhi, by re-routing the flights. Thus OR techniques can be extremely helpful in scheduling flight times and routes in order to improve cost of operations. After analyzing the Aircraft maintenance activities of Deutsche Lufthansa through Critical Path Analysis it can be concluded that CPM is a valuable tool to reduce time elapsed and increase flying hours of the airline, which ultimately boosts the profits of the airline.

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# A OPERATIONS ON HEXAGONAL FUZZY NUMBERS WITH USING $\alpha$ – CUT

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## 6. CONCLUSIONS:

In this paper Hexagonal Fuzzy number has been newly introduced and the alpha cut operations of arithmetic function principles using addition, subtraction and multiplication has been fully modified with some conditions and has been explained with numerical examples. In a particular case of the growth rate in bacteria which consists of six points is difficult to solve using trapezoidal or triangular fuzzy numbers, therfore hexagonal fuzzy numbers plays a vital role in solving the problem. It also helps us to solve many optimization problems in future which has six parameters as in the above case

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# A STUDY ON A POSITION BASED ACCESS TO NUMEROUS STRAIN DYNAMICS IN MATHEMATICAL BIOLOGY

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## CONCLUSION

This status-based approach has been used to present an alternative form of cross- immunity, and much analysis has been made possible in this model structure. Our analytic results show that even in a highly symmetric simple case, polarized im-munity generates qualitatively different dynamics to previously studied models.

The immunological mechanisms of cross-immunity are being increasingly well characterized, although their implications at the epidemiological level remain un- clear. Biologically, the exact mechanism of cross-immunity may be different for different pathogens and different scenarios. Currently, the appropriate model form is not clear for many situations, yet this paper has shown that the dynamics are sensitive to this form. Much further work is needed in understanding the effects of different models of cross-immunity, and in understanding the mechanisms behind the differences. Concerns with regard to the effects of the choice of cross-immunity will hold in numerical work, stochastic models and agent-based models involving cross-immunity in any form.

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# A METHOD FOR SOLVING A PENTAGONAL FUZZY TRANPORTATION PROBLEM VIA RANKING TECHNIQUE AND ATM

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## 5. CONCLUSION

The pentagonal fuzzy transportation problem, that we discussed in the section 4 will definitely reduce the computational burden. The table 4.2 says that the pentagonal fuzzy value that we got is equal to the existing methods. Using ranking techniques for the representative value of the pentagonal fuzzy number based on the both demand and availability are real numbers. This method will serve as a key for decision makers while handling various types of situations and in real life.

The recently proposed Ranking technique is regularized practice, simple to relate to, and to be operated for the entire types of transportation problems either to capitalize on or play down an intended function. This approach could be broadening to resolve transportation problems by way of an additional fuzzy algorithm.

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## CONCLUSION

Mathematics plays a very large role in agriculture. Mathematics has enabled farming to be more economically efficient and has increased productivity. Farmers use mathematics as a system of organization to effectively utilize their time and manage their money. Farmers use numbers everyday for a variety of tasks, from measuring and weighing, to land marking, predict crop yield, expenditure, income and much more with the basic knowledge of mathematics.

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# A STUDY ON LINGUISTIC INTUITIONISTIC FUZZY SOFT MATRIX AND ITS APPLICATION OF MULTI CRITERIA DECISION MAKING IN AGRICULTURE

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# CONCLUSION

Agriculture plays a vital role in our country. In this project the best preferable crop and major problems are studied with the help of incorporating the Linguistic Intuitionistic fuzzy soft matrix theory.

Also, first discuss the preferrable alternatives with the help of Linguistic Intuitionistic fuzzy soft matrix theory and the result produced the food crop is suitable selected by the former

In this project, We have developed an algorithm which is a new approach in agriculture field by implementing Linguistic Intuitionistic fuzzy soft matrices. This algorithm is more flexible and adjust able solution is obtained looking for the maximum score in the score matrix

As for as future directions are concerned there would be required to study whether the notion put forward in this project yield a fruitful result.

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## M.Sc., MATHEMATICS (2021-2023)

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|---|---|---|---|
| 1 | 21421401001 | JAYASRI R | APPLYING THE FS AGGREGATION, WEIGHTED FS-AGGREGATION, INTERVAL VALUED FS-AGGREGATION FOR SEVICES OF VARIOUS BANKING SECTORS |
| 2 | 21421401002 | KAMALI S | PROFIT MAXIMIZATION OF BALANCED FUZZY TRANSPORTATION PROBLEM USING RANKING METHOD |
| 3 | 21421401003 | NANMATHI V | APPLICATION OF TOPSIS METHOD FOR DECISION MAKING |
| 4 | 21421401004 | POOVARASAN J | A STUDY ON LINGUISTIC INTUITIONISTIC FUZZY SOFT MATRIX AND ITS APPLICATION OF MULTI CRITERIA DECISION MAKING IN AGRICULTURE |
| 5 | 21421401005 | RESHMA P | A NEW ALGORITHM FOR SOLVING FUZZY TRANSPORTATION PROBLEMS WITH PENTAGONAL FUZZY NUMBERS |

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# *APPLYING THE FS-AGGREGATION, WEIGHTED FS-AGGREGATION, INTERVAL VALUED FS-AGGREAGTION FOR SERVICES OF VARIOUS BANKING SECTORS:*

***A Dissertation submitted in partial fulfillment of the requirements for the award of the degree of***

***MASTER OF SCIENCE***

***Submitted***

***by***

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## CONCLUSION:

In this project we have recalled some basic definitions, concept of fuzzy soft matrix and the FS-Aggregation, weighted aggregation, fuzzy soft matrix ,Interval valued aggregation on fuzzy soft matrix and its suitable applications problem based on services of various banking sectors. We then proposed a fuzzy multiple decision making approach for banking performance evolution.

By using FS-Aggregation method, obtain the optimum logical results in an easier way. In weighted fuzzy soft matrix based system for targeting specific customer is taken to consideration. The weighted arithmetic mean has been used to desire the decision factors on the fuzzy soft matrix. The three MCDM analytical tools such as FS-Aggregate, Weighted FS-Aggregate, Interval valued FS-Aggregate were adopted to evaluate the banking performance. The proposed FMCDM evaluation model of banking performance using the FS-Aggregation can be useful and effective tool.

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# PROFIT MAXIMIZATION OF BALANCED FUZZY TRANSPORTATION PROBLEM USING RANKING METHOD

*A Dissertation submitted in partial fulfillment of the requirementsfor the award of the degree of*

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# CHAPTER V

## CONCLUSION

In this project, the transportation costs are considered as imprecise numbers by fuzzy number which are more realistic and general in nature. Numerical examples are solved to illustrate the fuzzy transportation problem with trapezoidal fuzzy number to find the maximizing the profit with three methods (North west corner method, Least cost method, Vogel's approximation method). More over fuzzy transportation problem of trapezoidal numbers has been transformed into crisp transportation problem for some commodities through a capital network, when the supply and demand of nodes and the capacity and the cost of nodes are represented as trapezoidal fuzzy numbers using Yager's ranking indices. Generally, In operations research, the cost of the initial basic feasible solution through VAM will be the least among all the three techniques (North west corner method, Least cost method, Vogel's approximation method). Here done with the fuzzy transportation problem with trapezoidal fuzzy number by using Yager's ranking with those three methods at last the result will be Least cost method has the maximum profit. In future, my research work will be extend this idea in Pentagonal, hexagonal Fuzzy numbers and etc.

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# APPLICATION OF TOPSIS METHOD FOR DECISION MAKING

*A Dissertation submitted in partial fulfillment of the requirementsfor the award of the degree of*

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# CHAPTER – 5

## CONCLUSION

In this project, we discuss the TOPSIS method in detail and constructed a graphical model for the TOPSIS method. Numerical example are solved to illustrate the decision making problem by using TOPSIS Algorithm. We used the TOPSIS method for the selection of the best automotive mobile by using hypothetical data and examined that oppo is the best mobile according to the above selected parameters. In future , my research will be extend this idea to solve various numerical example by using decision making algorithm in various methods.

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# A STUDY ON LINGUISTIC INTUITIONISTIC FUZZY SOFT MATRIX AND ITS APPLICATION OF MULTI CRITERIA DECISION MAKING IN AGRICULTURE

*A Dissertation submitted in partial fulfillment of the requirements for the award of the degree of*

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# CONCLUSION

Agriculture plays a vital role in our country. In this project the best preferable crop and major problems are studied with the help of incorporating the Linguistic Intuitionistic fuzzy soft matrix theory.

Also, first discuss the preferrable alternatives with the help of Linguistic Intuitionistic fuzzy soft matrix theory and the result produced the food crop is suitable selected by the former

In this project, We have developed an algorithm which is a hew approach in agriculture field by implementing Linguistic Intuitionistic fuzzy soft matrices. This algorithm is more flexible and adjust able solution is obtained looking for the maximum score in the score matrix

As for as future directions are concerned there would be required to study whether the notion put forward in this project yield a fruitful result.

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# A NEW ALGORITHM FOR SOLVING FUZZY TRANSPORTATION PROBLEMS WITH PENTAGONAL FUZZY NUMBERS

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# CHAPTER V

## CONCULSION:

In this paper, the transportation costs are considered as imprecise numbers described by fuzzy numbers which are more realistic and general in nature. Moreover, the fuzzy transportation problem of trapezoidal fuzzy numbers has been transformed into crisp transportation problem using ranking indices. Numerical examples show that by this method we can have the optimal solution as well as the crisp and fuzzy optimal total cost. By using ranking method we have shown that the total cost obtained is optimal. Moreover, one can conclude that the solution of fuzzy problems can be obtained by our proposed method effectively. This technique can also be used in solving other types of problems like, project schedules, assignment problems and network flow problems.

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