



VIVEKANANDA COLLEGE

College with Potential for Excellence

Residential & Autonomous – A Gurukula Institute of Life Training,
Re-accredited (3rd Cycle) with 'A' Grade (3.59 out of 4.00) by NAAC
DBT Star College Scheme Funded

Affiliated to Madurai Kamaraj University

(Managed by Sri Ramakrishna Tapovanam, Tirupparaiturai, Trichy)

TIRUVEDAKAM WEST, MADURAI DISTRICT, TAMIL NADU – 625 234.

Website: www.vivekanandacollege.ac.in

Phone: 04543-258234, 75400 60257



Swami Chidbhavananda

Department of Mathematics

Vivekananda College, Tiruvedakam West, Madurai

&

Mangayarkarasi College of Arts and Science College for Women, Paravai, Madurai

Jointly organized Guest lecture programming under Letter of Collaborations

Date	Time	Year	Staff	Topics
25.10.21	2-3 PM	III	Mr. M. Nagaraj Assistant Professor Dept. of Mathematics Vivekananda College Tiruvedakam west	Real Analysis
26.10.21	2-3 PM	III	Dr.G.Sanjeevi Assistant Professor Dept. of Mathematics Vivekananda College Tiruvedakam west	Graph Theory
27.10.21	2-3 PM	III	Dr. C.Rajan Assistant Professor Dept. of Mathematics Vivekananda College Tiruvedakam west	Modern Algebra
28.10.21	2-3 PM	III	Mr. C. Velmurugan Assistant Professor Dept. of Mathematics Vivekananda College Tiruvedakam west	Linear Programming
29.10.21	2-3 PM	III	Dr.R.Kalaivanan Assistant Professor Dept. of Mathematics Vivekananda College Tiruvedakam west	Statistics

Participant – 40 Students – III MATHS

Mangayarkarasi College of Arts and Science College for Women

Date	Time	Year	Staff	Topics	Staff Incharge
25.10.21	3-4 PM	III	Mrs.R.ELIZABETH RANI Assistant Professor and Department of Mathematics, Mangayarkarasi College of Arts and Science for Women, Paravai, Madurai	Modern Algebra	Mr. C. Velmurugan
26.10.21	3-4 PM	II	Dr.M.SUBHA Assistant Professor and Department of Mathematics, Mangayarkarasi College of Arts and Science for Women, Madurai	Numerical Methods	Mr. M. Nagaraj
27.10.21	3-4 PM	III	Mrs.P.GOWTHAMI Assistant Professor and Department of Mathematics, Mangayarkarasi College of Arts and Science for Women, Madurai	Linear Programming	Mr. C. Velmurugan
28.10.21	3-4 PM	II	Mrs.J.NAGAPRIYA Assistant Professor and Department of Mathematics, Mangayarkarasi College of Arts and Science for Women, Madurai	Differential equations	Dr.R. Kalaivanan
29.10.21	3-4 PM	III	Mrs.K.LOGASUTHA Assistant Professor and Department of Mathematics, Mangayarkarasi College of Arts and Science for Women, Madurai	Statistics	Dr. C. Rajan

Participant – 35 Students – III MATHS

Vivekananda College

Division of Event : Collaborative Activities
 Date : 25-10-2021
 Jointly organized by : Department of Mathematics Vivekananda College &
 Department of Mathematics, Mangayarkarasi College.
 Title of the Event : Online Class – Real Analysis
 Time : 02.00 p.m. to 3.00 p.m.
 To whom : Students of Mangayarkarasi College.
 Who took the Class : Mr. M. Nagaraj, Assistant professor of Mathematics, Vivekananda College.

The screenshot shows a Google Meet interface during an online class. The top portion displays a presentation slide from Adobe Acrobat Reader DC. The slide has a light blue background with the title "Brief Introduction to METRIC SPACES" in large, bold, black letters. Below the title, it states "Presented By Mr. M. NAGARAJ M.SC, M.PHIL, MBA, SLET., ASSISTANT PROFESSOR DEPARTMENT OF MATHEMATICS VIVEKANANDA COLLEGE TIRUVEDAKAM WEST, MADURAI – 625 234".

Below the presentation, the Google Meet window is visible. The address bar shows the URL "meet.google.com/zea-bahu-egs". The bottom of the screen shows the Meet controls and a list of participants on the right. The participants listed are:

- jansirani math2 (blue icon with 'j')
- gowthami math7 (orange icon with 'g')
- gowthami math7 (orange icon with 'g')

The bottom status bar indicates the time is 2:58 PM and the session is titled "zea-bahu-egs".

Metric Spaces_Introduction.pdf - Adobe Acrobat Reader DC (32-bit)

File Edit View Sign Window Help

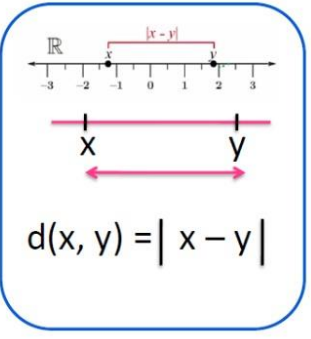
Home Tools Metric Spaces_Intro... x Sign In

METRIC SPACES

For,

- (i) $|x - y| \geq 0$
- (ii) $|x - y| = 0 \Leftrightarrow x = y$
- (iii) $|x - y| = |y - x|$
- (iv) $|x - z| = |x - y + y - z| \leq |x - y| + |y - z|$

So d is a **Metric** on \mathbb{R} .



\mathbb{R}

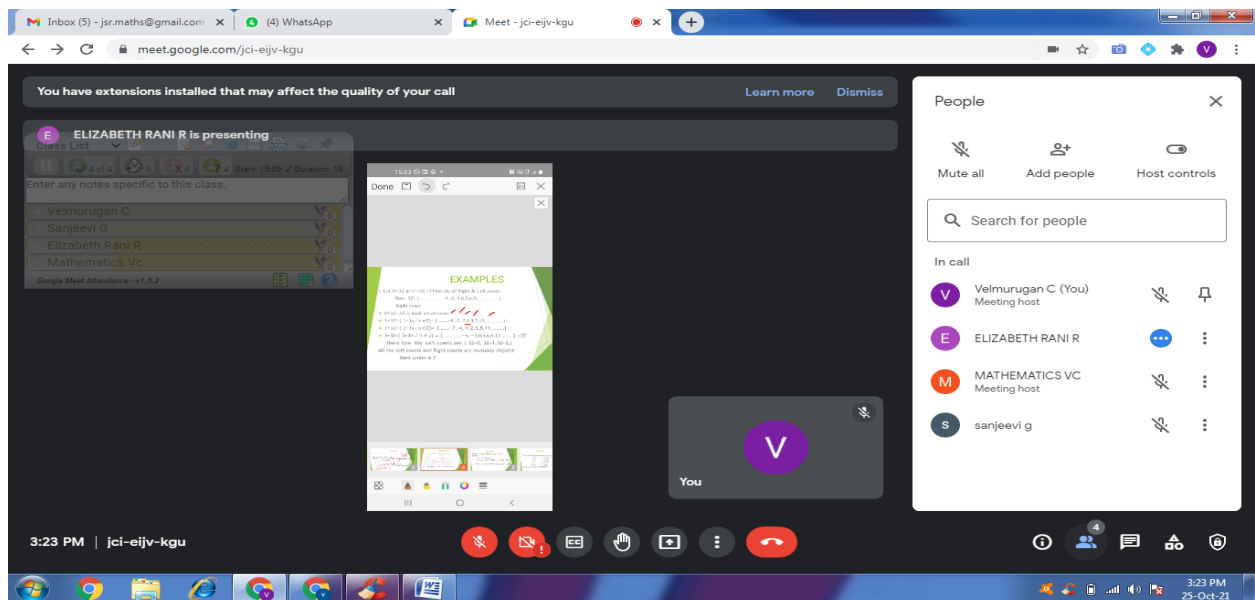
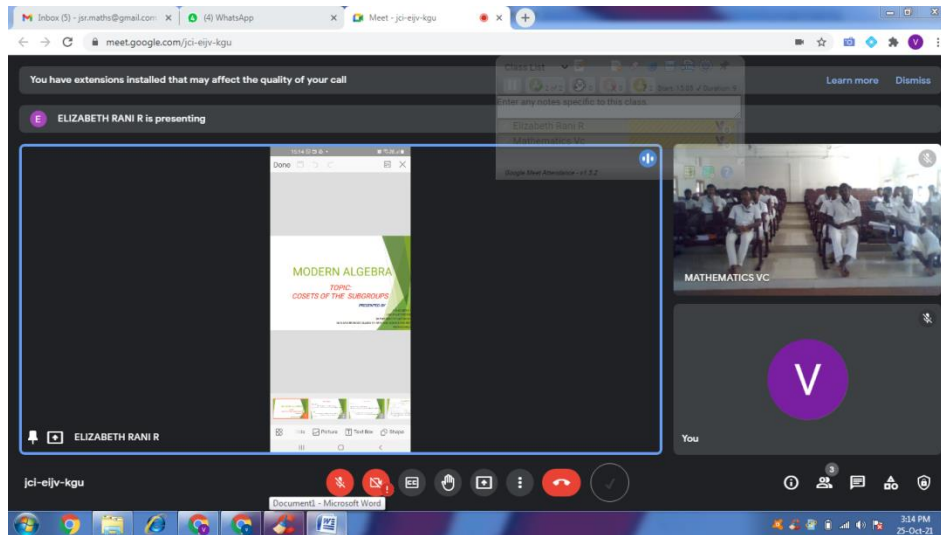
$|x - y|$

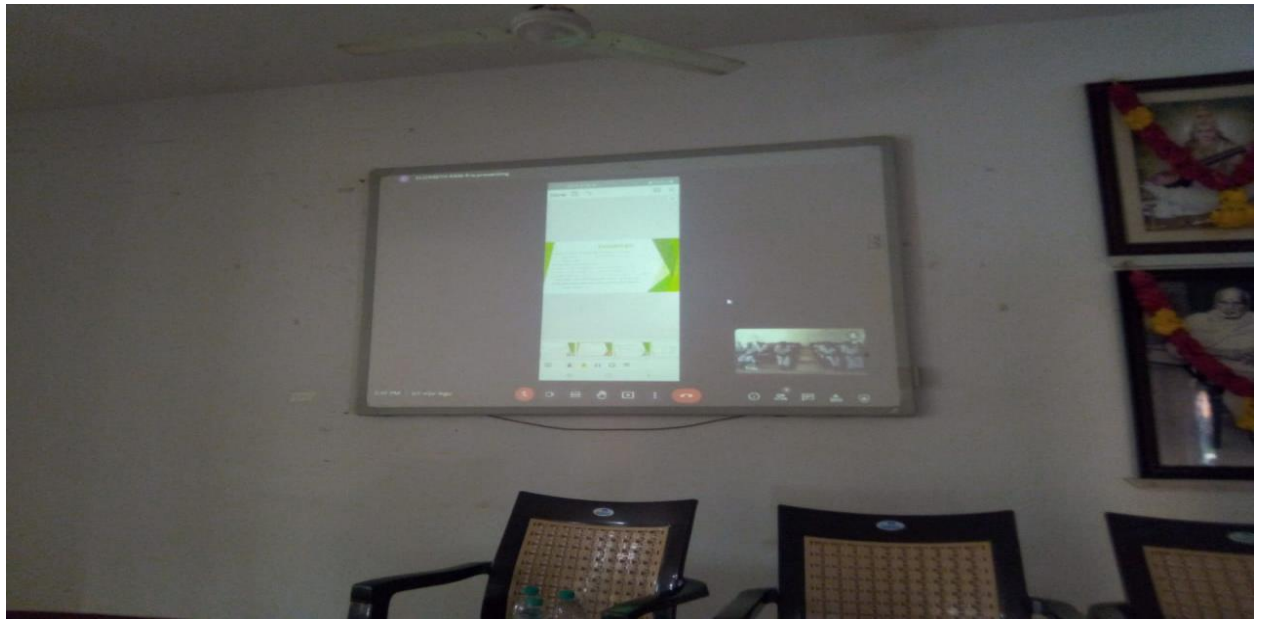
x y

$d(x, y) = |x - y|$

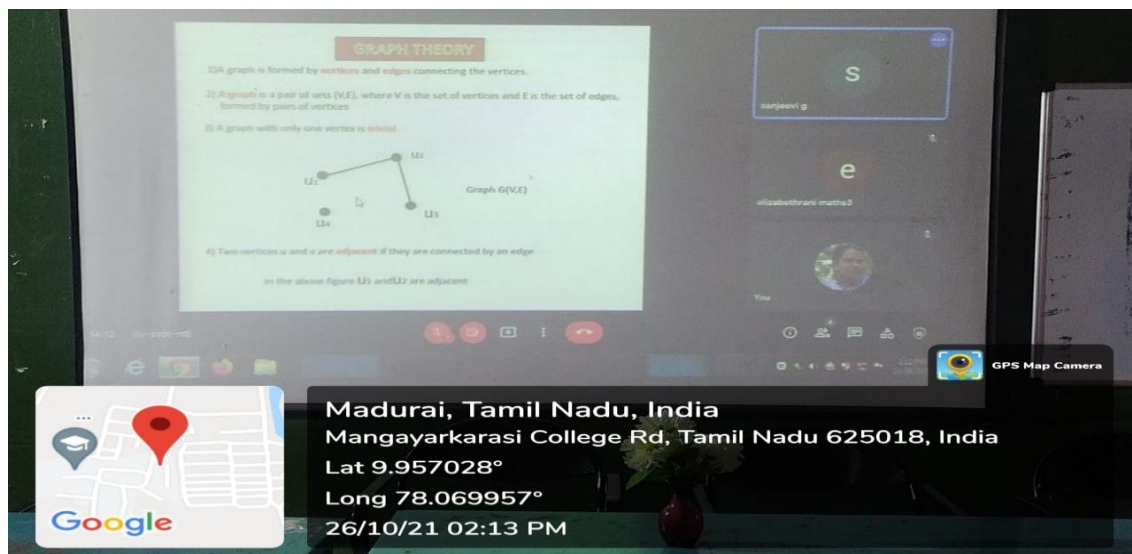
3:09 PM 10/25/2021

Division of Event : Collaborative Activities
 Date : 25-10-2021
 Jointly organized by : Department of Mathematics Vivekananda College &
 Department of Mathematics, Mangayarkarasi College.
 Title of the Event : Online Class – Modern Algebra
 Time : 03.00 p.m. to 4.00 p.m.
 To whom : Students of Vivekananda College
 Who took the Class : Mrs.R.ELIZABETH RANI, Assistant professor of Mathematics,
 Mangayarkarasi College.



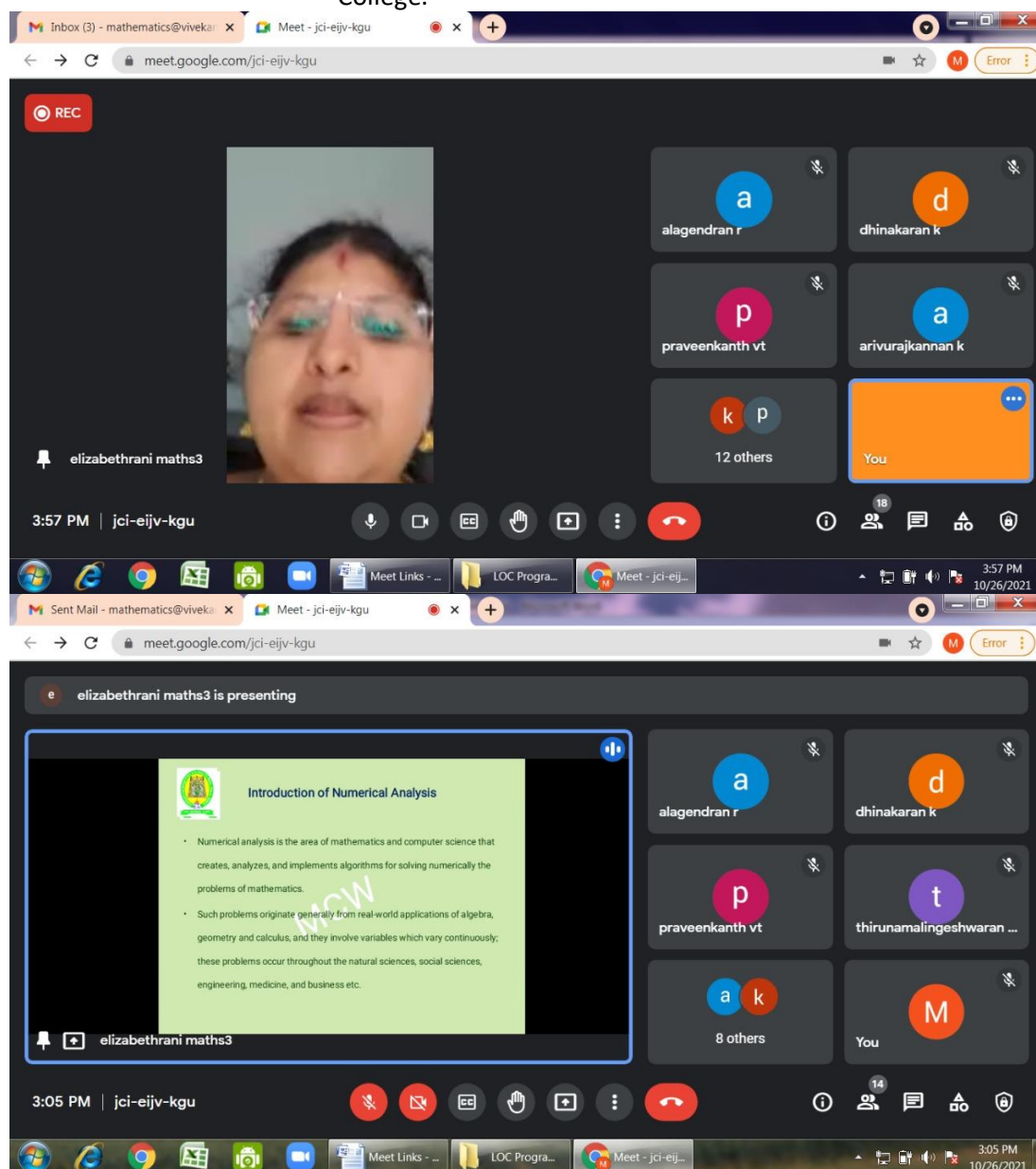


Division of Event : Collaborative Activities
 Date : 26-10-2021
 Jointly organized by : Department of Mathematics Vivekananda College &
 Department of Mathematics, Mangayarkarasi College.
 Title of the Event : Online Class – Graph Theory
 Time : 02.00 p.m. to 3.00 p.m.
 To whom : Students of Mangayarkarasi College.
 Who took the Class : Dr.G. Sanjeevi, Assistant professor of Mathematics, Vivekananda College.





Division of Event : Collaborative Activities
 Date : 26-10-2021
 Jointly organized by : Department of Mathematics Vivekananda College &
 Department of Mathematics, Mangayarkarasi College.
 Title of the Event : Online Class – Numerical Method
 Time : 03.00 p.m. to 4.00 p.m.
 To whom : Students of Vivekananda College
 Who took the Class : Dr.M.SUBHA Assistant professor of Mathematics, Mangayarkarasi College.



Sent Mail - mathematics@viveka x Meet - jci-eijv-kgu

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REC elizabethrani maths3 is presenting

alagendran r dhinakaran k praveenkanth vt thirunamalingeshw... arivurajkannan k

pavishkumar r prakash k karthikeyan g chellapandi m murali m marivignesh v

manikandan d pavithiran p vellaisamy m madhavan m You

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Types of solutions

- An analytical solution involves framing the problem in a well-understood form and calculating the exact solution.
- A numerical solution means making guesses at the solution and testing whether the problem is solved well enough to stop.

alagendran r dhinakaran k

praveenkanth vt thirunamalingeshwaran ...

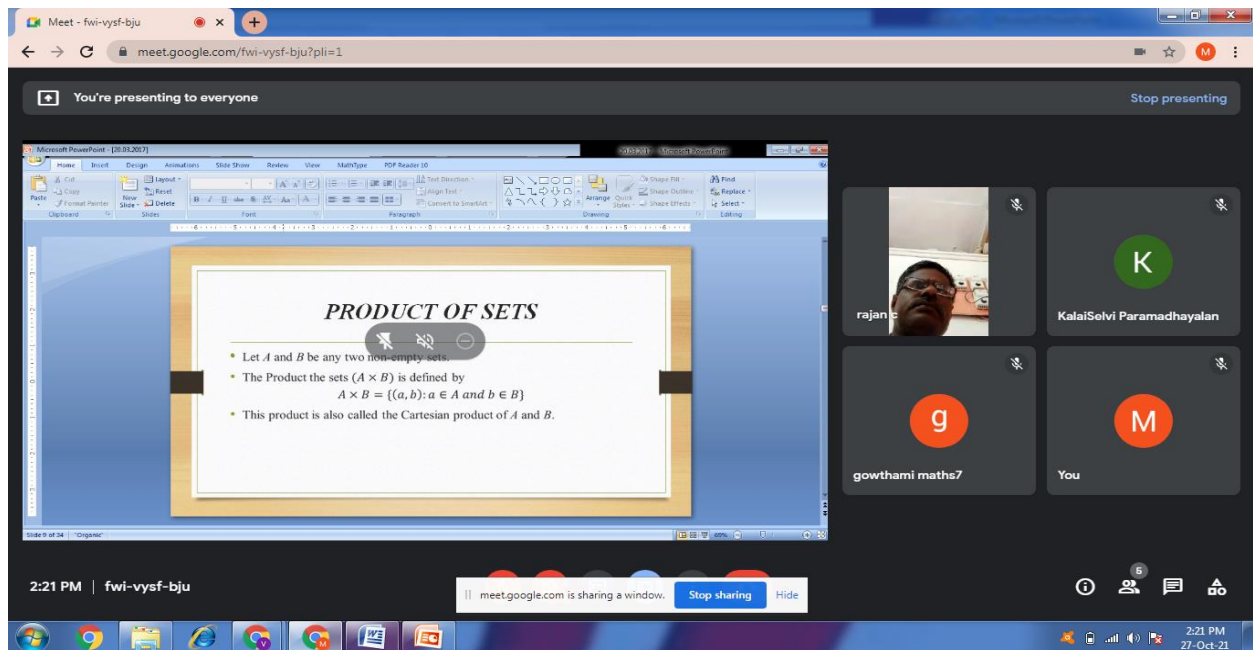
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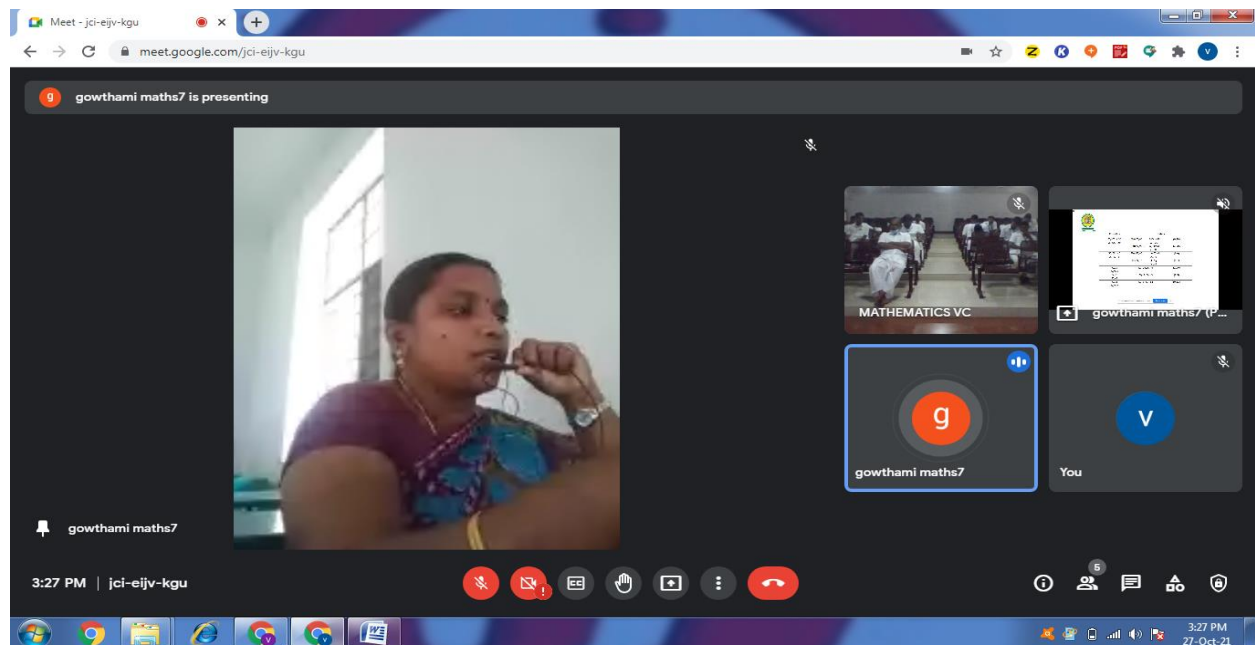
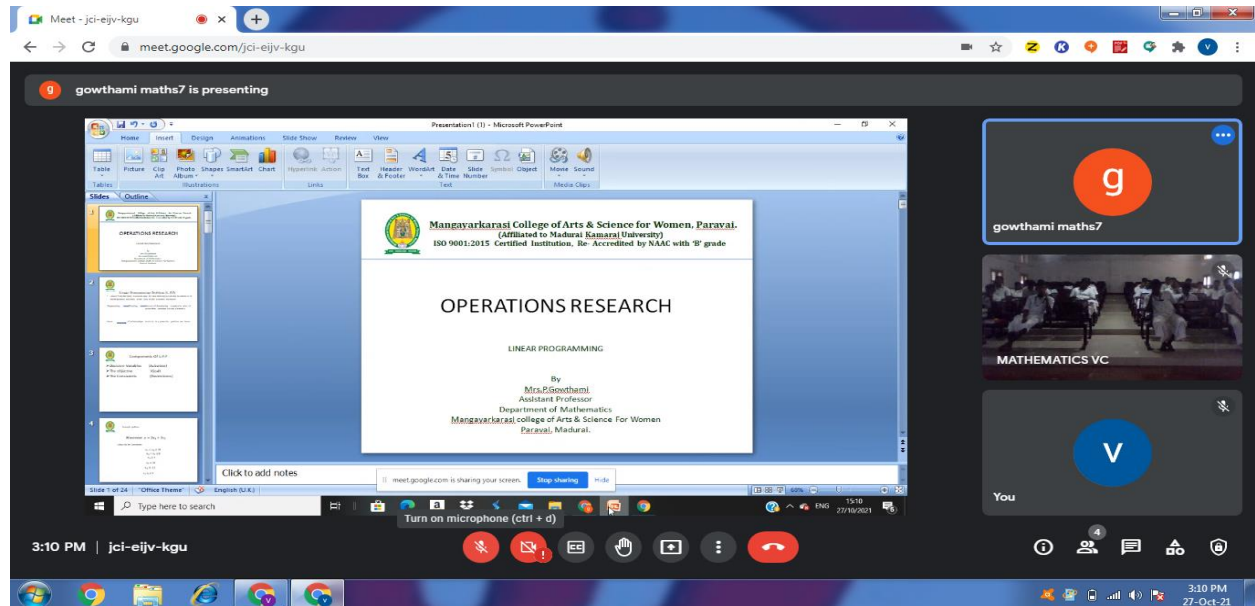
3:10 PM 10/26/2021

Division of Event : Collaborative Activities
 Date : 27-10-2021
 Jointly organized by : Department of Mathematics Vivekananda College &
 Department of Mathematics, Mangayarkarasi College.
 Title of the Event : Online Class – Modern Algebra
 Time : 02.00 p.m. to 3.00 p.m.
 To whom : Students of Mangayarkarasi College.
 Who took the Class : Dr.C.Rajan, Assistant professor of Mathematics, Vivekananda College.






Division of Event : Collaborative Activities
 Date : 27-10-2021
 Jointly organized by : Department of Mathematics Vivekananda College &
 Department of Mathematics, Mangayarkarasi College.
 Title of the Event : Online Class – Operations Research
 Time : 03.00 p.m. to 4.00 p.m.
 To whom : Students of Vivekananda College
 Who took the Class : Mrs.P.GOWTHAMI, Assistant professor of Mathematics, Mangayarkarasi College.



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gowthami maths7 is presenting



Linear Programming Problem (L.P.P)

- Linear Programming is a technique for determining an optimum schedule of interdependent activities in the view of the available resources.

Programming → Planning → Process of determining a particular plan of action from amongst several alternative

Linear → All relationships involved in a particular problem are linear

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You

People

Mute all Add people Host controls

Search for people


In call

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- gowthami maths7
- gowthami maths7
- gowthami maths7 Presentation
- MATHEMATICS VC Meeting host

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Equation	Points	
$X_1 + X_2 \leq 30$ $X_1 + X_2 = 30$	Put $X_1 = 0$, $X_2 = 30$	$(0, 30)$
	Put $X_2 = 0$, $X_1 = 30$	$(30, 0)$
$X_1, X_2 \geq 0$ $X_1 - X_2 = 0$	Put $X_1 = 0$, $X_2 = 0$	$(0, 0)$
	Put $X_1 = 1$, $X_2 = 1$	$(1, 1)$
$X_1 \leq 20$ $X_1 = 20$	$X_1 = 20, X_2 = 0$	$(20, 0)$
$X_2 \leq 3$ $X_2 = 3$	$X_1 = 0, X_2 = 3$	$(0, 3)$
$X_2 \leq 12$ $X_2 = 12$	$X_1 = 0, X_2 = 12$	$(0, 12)$

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First Constraint equation

\leq type constraint \rightarrow Towards to the origin
 \geq type constraint \rightarrow Outwards from the origin

$x_1 + x_2 \leq 30$
 (0,30) (10,10) (30,0)

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Components Of L.P.P

- Decision Variables (Activities)
- The objective (Goal)
- The Constraints (Restrictions)


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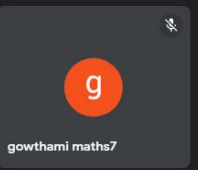

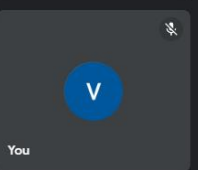
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gowthami maths7 is presenting



Equation	Points	
$X_1 + X_2 \leq 30$ $X_1 + X_2 = 30$	Put $X_1 = 0$, $X_2 = 30$	$(0, 30)$
	Put $X_2 = 0$, $X_1 = 30$	$(30, 0)$
$X_1 - X_2 \geq 0$ $X_1 - X_2 = 0$	Put $X_1 = 0$, $X_2 = 0$	$(0, 0)$
	Put $X_1 = 1$, $X_2 = 1$	$(1, 1)$
$X_1 \geq 20$ $X_1 = 20$	$X_1 = 20, X_2 = 0$	$(20, 0)$
$X_2 \leq 3$ $X_2 = 3$	$X_1 = 0, X_2 = 3$	$(0, 3)$
$X_2 \leq 12$ $X_2 = 12$	$X_1 = 0, X_2 = 12$	$(0, 12)$

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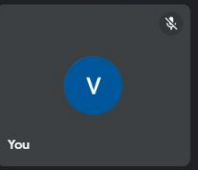
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Equation	Points	
$X_1 + X_2 \leq 30$ $X_1 + X_2 = 30$	Put $X_1 = 0$, $X_2 = 30$	$(0, 30)$
	Put $X_2 = 0$, $X_1 = 30$	$(30, 0)$
$X_1 - X_2 \geq 0$ $X_1 - X_2 = 0$	Put $X_1 = 0$, $X_2 = 0$	$(0, 0)$
	Put $X_1 = 1$, $X_2 = 1$	$(1, 1)$
$X_1 \geq 20$ $X_1 = 20$	$X_1 = 20, X_2 = 0$	$(20, 0)$
$X_2 \leq 3$ $X_2 = 3$	$X_1 = 0, X_2 = 3$	$(0, 3)$
$X_2 \leq 12$ $X_2 = 12$	$X_1 = 0, X_2 = 12$	$(0, 12)$

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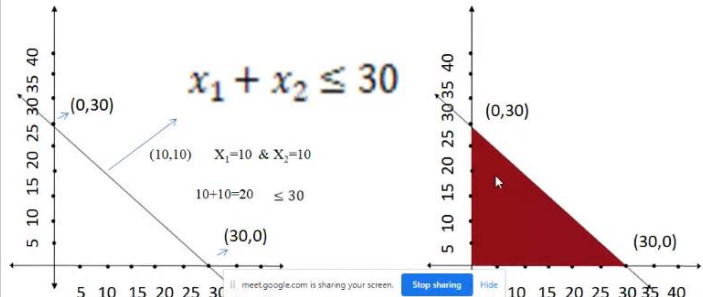
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First Constraint equation

\leq type constraint \rightarrow Towards to the origin
 \geq type constraint \rightarrow Outwards from the origin



$x_1 + x_2 \leq 30$

(0,30)

(10,10) $X_1=10$ & $X_2=10$
 $10+10=20 \leq 30$

(30,0)

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First Constraint equation

\leq type constraint \rightarrow Towards to the origin
 \geq type constraint \rightarrow Outwards from the origin

$x_1 + x_2 \leq 30$
 $(0,30)$
 $(10,10)$ $X_1=10 \text{ \& } X_2=10$
 $10+10=20 \leq 30$
 $(30,0)$

3:29 PM | jci-eijv-kgu

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First Constraint equation

\leq type constraint \rightarrow Towards to the origin
 \geq type constraint \rightarrow Outwards from the origin

$x_1 + x_2 \leq 30$
 $(0,30)$
 $(10,10)$ $X_1=10 \text{ \& } X_2=10$
 $10+10=20 \leq 30$
 $(30,0)$

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Third Constraint equation

\leq type constraint \rightarrow Below of the line

\geq type constraint \rightarrow Above of the line

$x_2 \geq 3$

Are you talking? Your mic is off. Click the mic to turn it on.

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The co ordinates of the extreme points of the feasible region are:
 $A=(3,3), B=(20,3), C(20,10), D(18,12), E(12,12)$
 The Z- Values corresponding to extreme points are:

Extreme Point	(X_1, X_2)	$Z=2X_1+3X_2$
A	(3,3)	15
B	(20,3)	49
C	(20,10)	70
D	(18,12)	72
E	(12,12)	60

The Maximum value of Z occurs at the extreme point D(18,12). Hence the optimum solution is

$\frac{v}{10} \frac{v}{12} \rightarrow \text{Maximum } Z = 72$

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Extreme Point	(X_1, X_2)	$Z = 2X_1 + 4X_2$
A	(0,0)	0
B	(4,0)	8
C	(3,1)	10
D	(0,2.5)	10

Since, any point on the line segment BC gives the maximum value of ($Z=10$) of the objective function, there exists an alternative optima

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Unbounded solution

- When the values of the decision variables may be increased indefinitely without violating any of the constraints, the solution space is unbounded
- The value of objective function, in such cases, may increase (For Maximization) or decrease (for minimization) indefinitely

Example

Maximize $Z = 6x_1 + x_2$

subject to the constraints

$2x_1 + x_2 \geq 3, \quad x_1 - x_2 \geq 0 \quad \text{and} \quad x_1, x_2 \geq 0$

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You

3:47 PM 27-Oct-21

Division of Event : Collaborative Activities
Date : 28-10-2021
Jointly organized by : Department of Mathematics Vivekananda College &
Department of Mathematics, Mangayarkarasi College.
Title of the Event : Online Class – Linear Programming
Time : 02.00 p.m. to 3.00 p.m.
To whom : Students of Mangayarkarasi College.
Who took the Class : Mr.C.Velmurugan, Assistant professor of Mathematics, Vivekananda College.

The image consists of two screenshots from a Google Meet session, showing a presentation on Linear Programming.

Top Screenshot (1:57 PM): The presentation slide is titled "Solving LPP by using Graphical Method". It features the logo of Vivekananda College and the name of the presenter, Mr. C. Velmurugan, M.Phil., Ph.D., M.Sc., B.Ed., (Th.D.), Assistant Professor, Dept. of Maths, Vivekananda College, Tiruvallur West. The slide also includes a small portrait of a man. The Google Meet interface shows three participants: ilakkiya PR, jansirani maths2, and You (V). The status bar at the bottom indicates the time is 1:57 PM on 28-Oct-21.

Bottom Screenshot (2:03 PM): The presentation slide is titled "Solving LPP by using Graphical Method" and "Linear Programming". It defines linear programming as an optimization method to maximize (or minimize) an objective function in a given mathematical model with a set of requirements represented as linear relationships. The slide also mentions "A general representation of L.P. model is given as follows:". The Google Meet interface shows the same three participants. The status bar at the bottom indicates the time is 2:03 PM on 28-Oct-21.

Meet - wzh-fbyr-bsx

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You're presenting to everyone

Stop presenting

Unbounded Solution: If the value of the objective function can be increased or decreased indefinitely, Such solutions are called Unbounded solution.

Example

Max $z = 3x_1 + 4x_2$
 s.t. $x_1 + x_2 \geq 5$
 $3x_1 + x_2 \geq 8$
 $x_1, x_2 \geq 0$

Feasible Region

This feasible region is unbounded, hence, it can be increased indefinitely. So this problem is having a unbounded solution.

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2:51 PM | wzh-fbyr-bsx

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Participants: jansirani maths2, ilakkiya PR, You

Graphical Method - Microsoft Word

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Procedure

- Step I: Convert each inequality as equation
- Step II: Plot each equation on the graph
- Step III: Shade the 'Feasible Region'. Highlight the common Feasible region.
 - **Feasible Region**: Set of all possible solutions.
- Step IV: Compute the coordinates of the corner points (of the feasible region). These corner points will represent the 'Feasible Solution'.
 - **Feasible Solution**: If it satisfies all the constraints and non negativity restrictions.
- Step V: Substitute the coordinates of the corner points into the objective function to see which gives the 'Optimal Solution'.

Page: 4 of 13 | Words: 961

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2:11 PM 28-Oct-21

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Solve the following equations, we get

$$\begin{aligned}x_1 + x_2 &= 800 \\x_2 &= 700 \\ \Rightarrow x_1 + 700 &= 800 \\x_1 &= 100 \\ \mathbf{E(100, 700)}\end{aligned}$$

Extreme points	(x_1, x_2)	$Z = 4x_1 + 3x_2$
A	(0,0)	$Z = 4(0) + 3(0) = 0$
B	(400,0)	$Z = 4(400) + 3(0) = 1600$
C	(400,200)	$Z = 4(400) + 3(200) = 2200$
D	(200,600)	$Z = 4(200) + 3(600) = 2600$
E	(100,700)	$Z = 4(100) + 3(700) = 2500$
F	(0,700)	$Z = 4(0) + 3(700) = 2100$

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ilakkiya PR

jansirani maths2

You

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Unbounded Solution: If the value of the objective function can be increased or decreased indefinitely, Such solutions are called Unbounded solution.

Example

Max $Z = 3x_1 + 4x_2$

s.t. $x_1 + x_2 \geq 5$

$2x_1 + x_2 \geq 6$

$x_1, x_2 \geq 0$

Feasible Region

This feasible region is unbounded, hence Z can be increased infinitely. So this problem is having a Unbounded solution.

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Thank You

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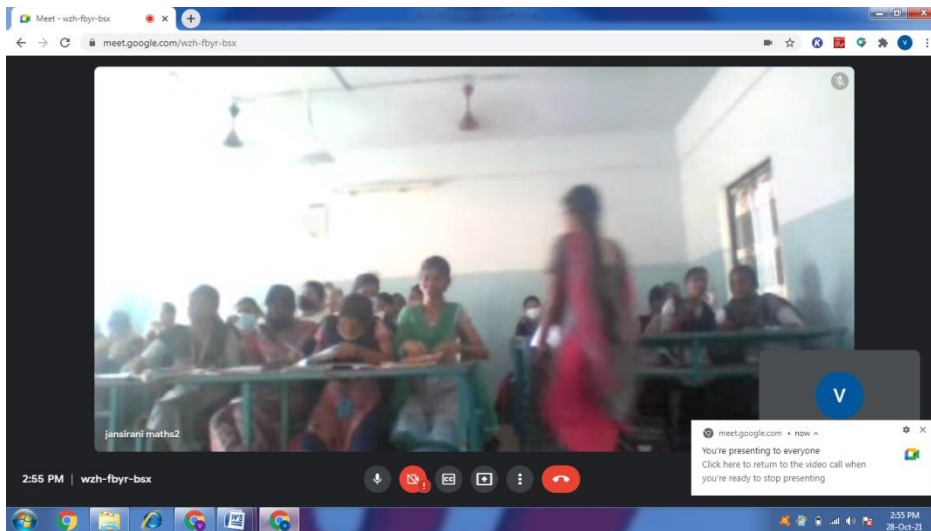
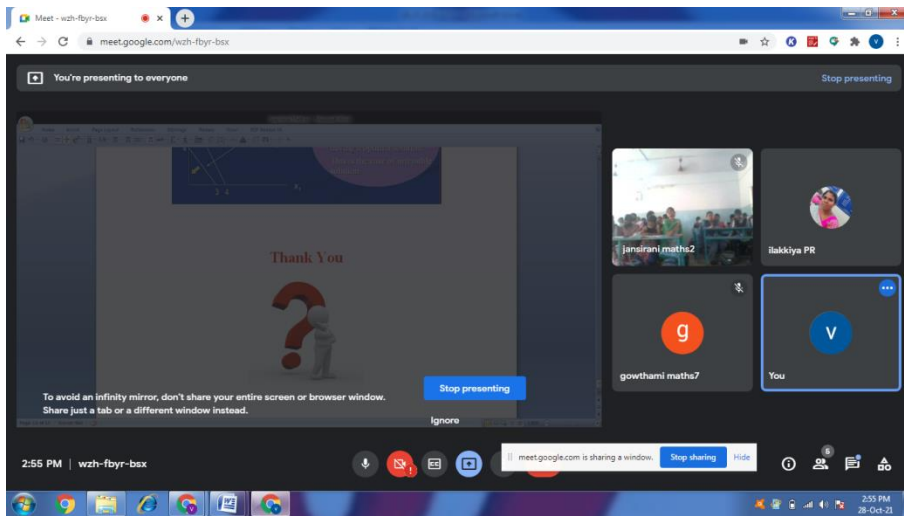
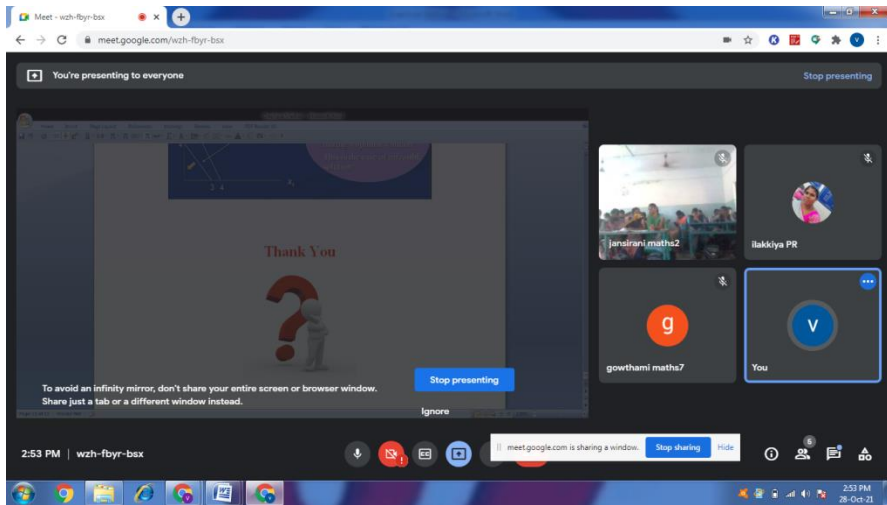
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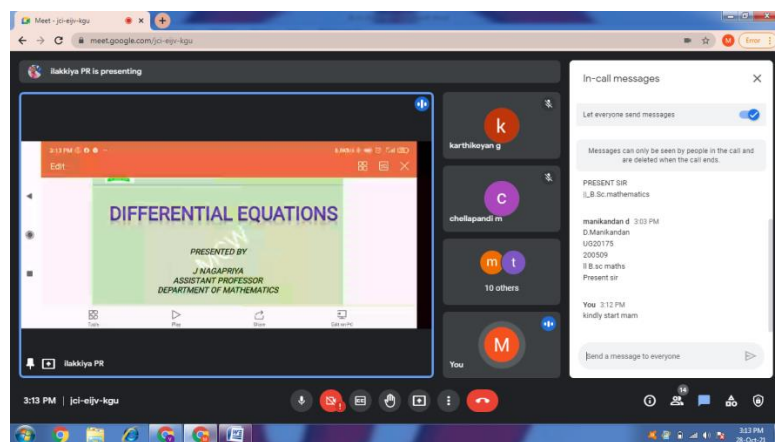
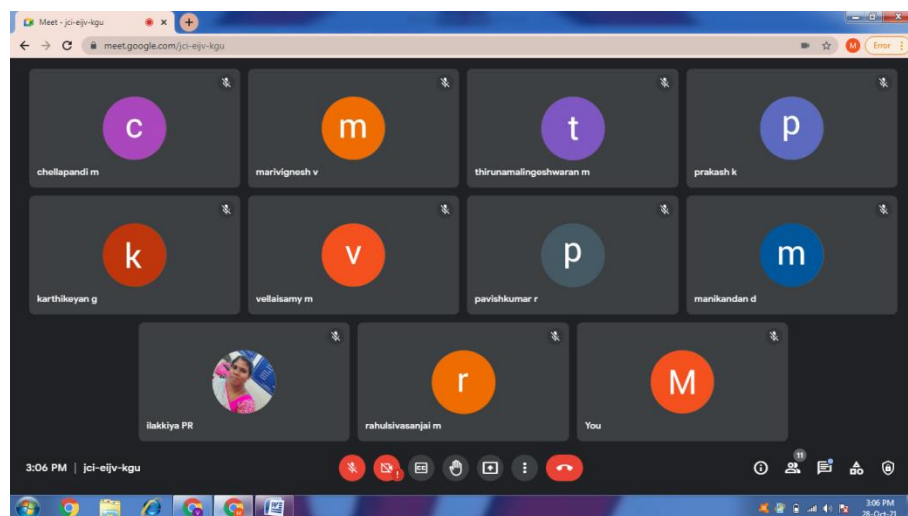
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Division of Event	: Collaborative Activities
Date	: 28-10-2021
Jointly organized by	: Department of Mathematics Vivekananda College & Department of Mathematics, Mangayarkarasi College.
Title of the Event	: Online Class – Differential equations
Time	: 03.00 p.m. to 4.00 p.m.
To whom	: Students of , Vivekananda College.
Who took the Class	: Mrs.J.NAGAPRIYA, Assistant professor of Mathematics, Mangayarkarasi College.



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CLASSIFICATIONS

Differential equations are of two types:
(i) Ordinary and (ii) Partial

Ordinary Differential Equation:
An equation contains only ordinary derivatives of one or more dependent variables of a single independent variable.

Example: (i) $\frac{dy}{dx} + y = e^x$ (ii) $\frac{dy}{dx} + \frac{dy}{dy} = 2x + 1$

Partial Differential Equation:
An equation contains partial derivatives of one or more dependent variables of two or more independent variables.

Example: (i) $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = 0$ (ii) $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = 2x + 1$

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Method 2:
Let X be of the form $\cos ax$ (or) $\sin ax$

Put $D^2 = -a^2$

Case (i): If $f(-a^2) \neq 0$, then $P.I = \frac{1}{f(-a^2)} \cos ax$
If $f(-a^2) = 0$, then $P.I = \frac{1}{f(-a^2)} \sin ax$

Case (ii): If $f(-a^2) = 0$, then $D^2 + a^2$ is a factor of $f(D^2)$.

$P.I \Rightarrow \frac{1}{D^2 + a^2} \cos ax = \frac{x}{2a} \sin ax$
 $P.I \Rightarrow \frac{1}{D^2 + a^2} \sin ax = -\frac{x}{2a} \cos ax$

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$(D^2 + 16)y = e^{-ix} + \cos 4x$

The auxiliary equation is $m^2 + 16 = 0$
 $(m + 4)(m - 4) = 0$
 $m = \pm 4i$

$C.F = c_1 \cos 4x + c_2 \sin 4x$

$P.I_1 = \frac{1}{D^2 + 16} e^{-ix} = \frac{1}{(-1)^2 + 16} e^{-ix} = \frac{1}{25} e^{-ix}$

$P.I_2 = \frac{1}{D^2 + 16} \cos 4x = \text{Re} \left(\frac{1}{D^2 + 16} e^{ix} \right) = \text{Re} \left(\frac{1}{(D + 4i)(D - 4i)} e^{ix} \right)$
 $= \text{Re} \left(\frac{x}{-16 - 16} e^{ix} \right) = \text{Re} \left(-\frac{x}{32} (\cos 4x + i \sin 4x) \right)$

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marivignesh v has left the meeting

ilakkiya PR

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Participants:

- Jansi Rani
- chellapandi m
- vellaisamy m
- thirunamalingesha...
- madhavan m
- karthikeyan g
- 2 others
- You

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Slide Content:

LINEAR EQUATIONS WITH CONSTANT COEFFICIENTS

DEFINITION:
A linear equation is one in which the dependent variable y and its *derivatives of any order occur only in the first degree* and are not multiplied together, their coefficients being constants or functions of the independent variable x .

The form of the equation is
$$P_n \frac{d^n y}{dx^n} + P_{n-1} \frac{d^{n-1} y}{dx^{n-1}} + \dots + P_1 \frac{dy}{dx} + P_0 y = X \quad \dots (1)$$

Where P_1, P_2, \dots, P_n and X are functions of x or constants.

The solution of (1) is **$y = C.F + P.I$**

Participants:

- karthikeyan g
- chellapandi m
- dhinakaran k
- marivignesh v
- thirunamalinge...
- madhavan m
- rahulsivasanai ...
- vellaisamy m
- murali m
- manikandan d
- 3 others
- You

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Slide Content:

EXAMPLE:

$(D^2 - 5D + 4)y = x^2$

The auxiliary equation is $m^2 - 5m + 4 = 0$.

$(m-1)(m-4) = 0$

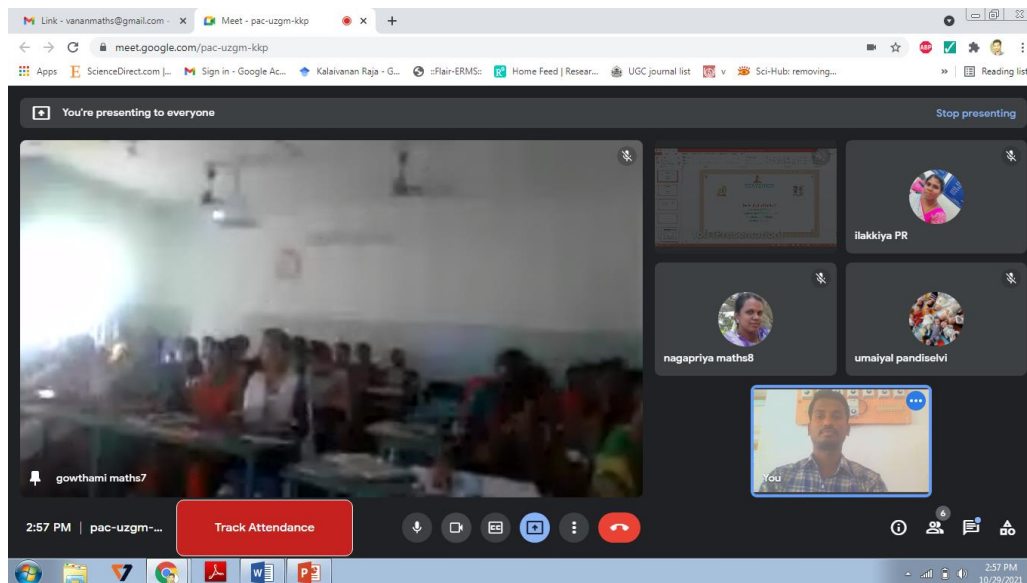
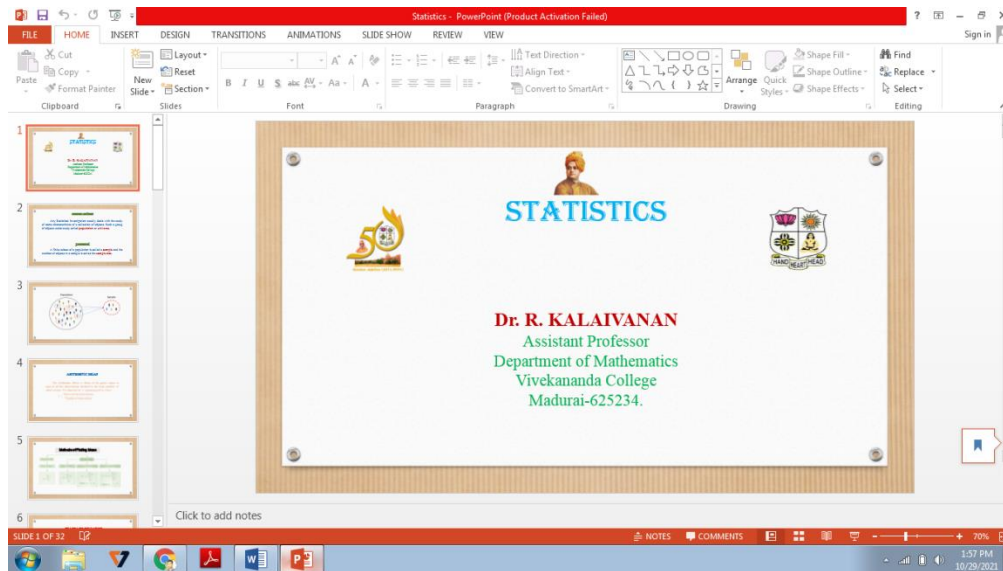
$m=1$ and 4 (Two real and distinct roots)

$C.F = c_1 e^x + c_2 e^{4x}$

Participants:

- Jansi Rani
- karthikeyan g
- chellapandi m
- marivignesh v
- thirunamalinge...
- madhavan m
- rahulsivasanai ...
- vellaisamy m
- murali m
- manikandan d
- 3 others
- You

Division of Event	: Collaborative Activities
Date	: 29-10-2021
Jointly organized by	: Department of Mathematics Vivekananda College & Department of Mathematics, Mangayarkarasi College.
Title of the Event	: Online Class – Statistics
Time	: 02.00 p.m. to 3.00 p.m.
To whom	: Students of Mangayarkarasi College.
Who took the Class	: Dr.R.Kalaivanan, Assistant professor of Mathematics, Vivekananda College.



Link - vananmaths@gmail.com - x Meet - pac-uzgm-kkp x +

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Problem 2. It was found that a machine has produced pipes having a thickness .50 mm. To determine whether the machine is in proper working order a sample of 10 pipes is chosen for which the mean thickness is .53mm and s.d is .03 mm. Test the hypothesis that the machine is in proper working order using a level of significance of (i) .05 (ii) .01

Solution. Given $\mu = .50$; $\bar{x} = .53$; $s = .03$; $n = 10$.

Set the null hypothesis H_0 : $\mu = .50$ (the machine is in proper working order).

Under the null hypothesis the test statistic is $z = \frac{\bar{x} - \mu}{s / \sqrt{n-1}}$

$$= \frac{.53 - .50}{.03 / \sqrt{9}} = \frac{.03}{.03} = 1$$

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