Online

5 Day National level Faculty Development Programme

on

" RECENT TRENDS IN MATHEMATICS "

14th to 18th February, 2022

Organized by

Department of Mathematics &Statistics

(Under DBT-Star College Scheme)

Organizing Committee

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Coordinator, DBT-Star College Scheme, BVC
Head, Department of Microbiology,
Bhavan's Vivekananda College,
Secunderabad, Telangana.

About Workshop

The main aim of this FDP on "**Recent Trends in Mathematics**" is to bring the experts together to share their knowledge and novel ideas on different aspects of Mathematics. This program is intended to update existing knowledge and create a deeper interest in Mathematics. This FDP will give an insight into Number Theory, Mathematical Modelling, Numerical methods for solving Differential Equations, Real-life Applications of Linear Algebra and some Numerical Methods. This Faculty development program will provide an opportunity for teachers and researchers to learn the current state of research & techniques in Mathematical Sciences.

Expected Outcome

The programme is expected to provide motivation and encouragement to the faculty members and researchers working in the field of Mathematical sciences.

Target Participant

Faculty from any UG and PG colleges, Research scholars, PG students

Request all of you to kindly join the Telegram link provided in the Registration Form

Speakers

Prof. J V Ramanamurthy
NIT Warangal, Telangana
Topic1: Finite Differences and matrix methods for ODEs
Topic2: Homotopy Analysis Method

Prof. Natesan Srinivasan
IIT, Guwahati
Topic1: Numerical Methods for First - Order ODEs (IVPs)
Topic2: Numerical Stability and Error Analysis

Prof. Srinivasa Rao Ch
IITM, Tamilnadu
Topic: Solutions of Systems of Linear Ordinary Differential Equations and Exponential of a Matrix

Prof. K.Raghava Rao
KL University, AP
Topic: Innovation and Intellectual property rights for the academic community

Prof. Kasi Viswanathan
NIT Warangal, Telangana
Topic: Numerical solutions of some two-point Boundary value problems by finite element method with cubic splines

Dr .P. Anuradha Kameswari
Associate Professor, Andhra University, Andhra Pradesh
Topic1: Modular Arithmetic and Finite field Arithmetic
Topic2: Cryptosystems and Cryptanalysis

Dr. B S R V Prasad
Assistant Professor Senior (Grade-II)
Vellore Institute of Technology, Vellore, Tamilnadu
Topic1: Modelling the role of supplementary Food Resources in Enhancing the Biocontrol Efficiency of Natural Enemies
Topic2: Modelling Biogeochemical Cycles of Lagoon Ecosystems: A case for Chilka Lake, India

Dr. Phani Kumar
Assistant Professor (Sr.Grade-I)VIT - AP University
Topic: Mathematical Modelling and its Applications

Dr. P.Aparna
Associate Professor, VNRVJIET, Telangana
Topic: Linear Algebra - Real life applications

Mr. Srikanth Bandi(Alumni)
Director, SB Art Studio, Hyderabad, Telangana
Topic: Art Fusion-Drawing a Stress Reliever

DAY1: 14-02-2022

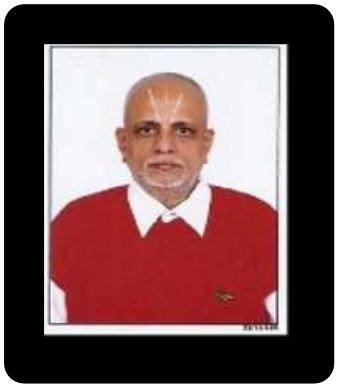
SESSION 1: (10:00 AM TO 11:30 AM)

Inaugural Session

Date: 14/02/2022

Mrs G Santhi Priya, faculty from Department of Mathematics and Statistics started the Inaugural session by welcoming the dignitaries and the participants. Mrs P Krishnaveni, Coordinator of the FDP has given a brief introduction about the FDP. Mrs G S Mini, Head, Department of Mathematics and Statistics addressed the gathering and expressed about the main objective of the FDP. Prof Y Ashok, Principal, BVC, Air Commodore (Retd) J.L.N. Sastry, VSM Vice Chairman, BVB , Dr K Anuradha, Co-ordinator DBT-STAR college scheme, Prof N Kishan, Head Department of Mathematics, OU,Guest of honour and Prof. V. Kannan, Head, Department of Mathematics, SRM University AP, Chief guest, addressed the gathering.

SESSION 2 (11:30 AM TO 1:00 PM)



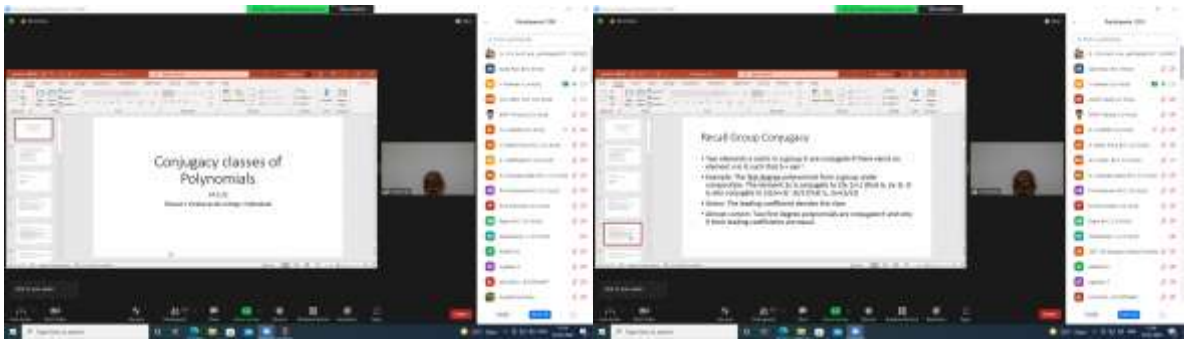
Resource person: Prof. V. Kannan

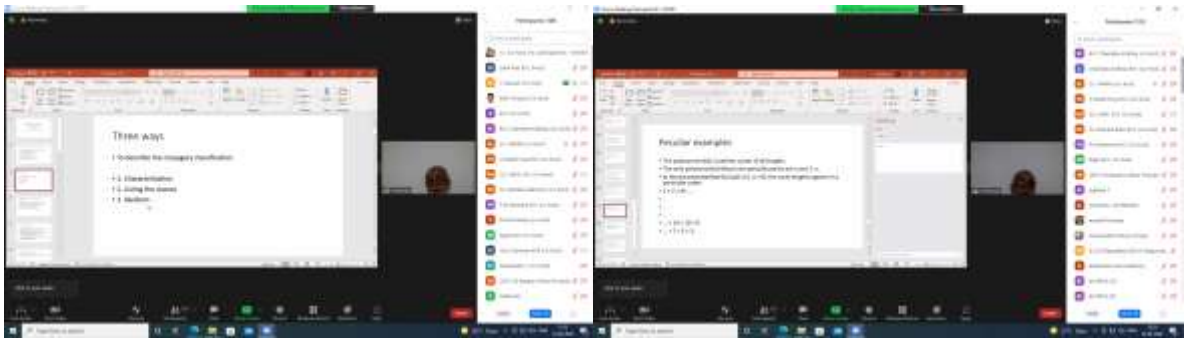
Designation: Head, Department of Mathematics, SRM University AP

Topic of the Session: **Keynote address**

Number of Participants: 189

Report: Prof. V. Kannan, Head, Department of Mathematics, SRM University AP , has given the Keynote address for the FDP. He spoke on Conjugacy classes of Polynomials. Starting with the explanation of studying polynomials in 2 different kinds such as Algebraic and Analytic, he explained in detail about considering Polynomials as functions in an analytic way and how conjugacy preserves properties of functions. The 3 ways of classification of conjugacy of Polynomials, Group conjugacy, Linear conjugacy classes, and properties of conjugacy were explained in detail. Overall the Keynote address has enhanced the enthusiasm to learn more about Conjugacy of polynomials.





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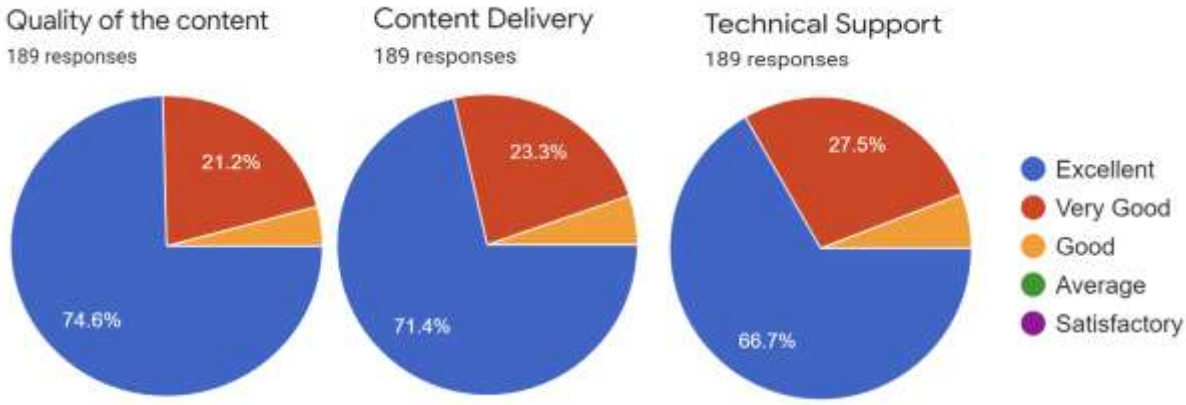
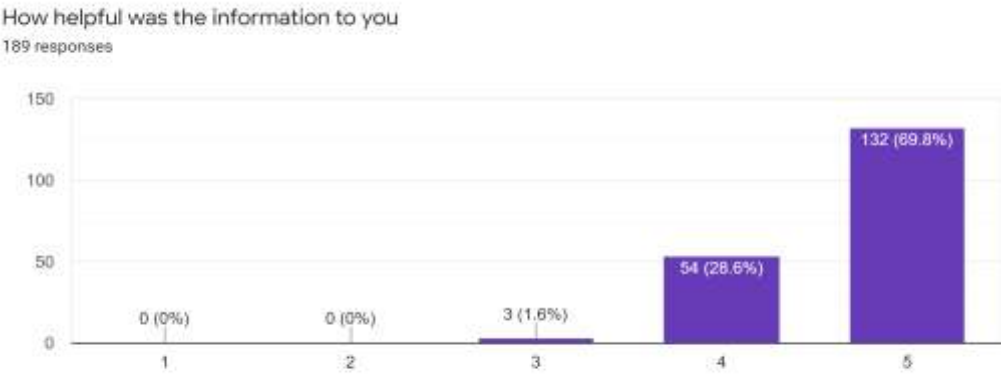




SESSION 3 (1:30 PM TO 3:00 PM)

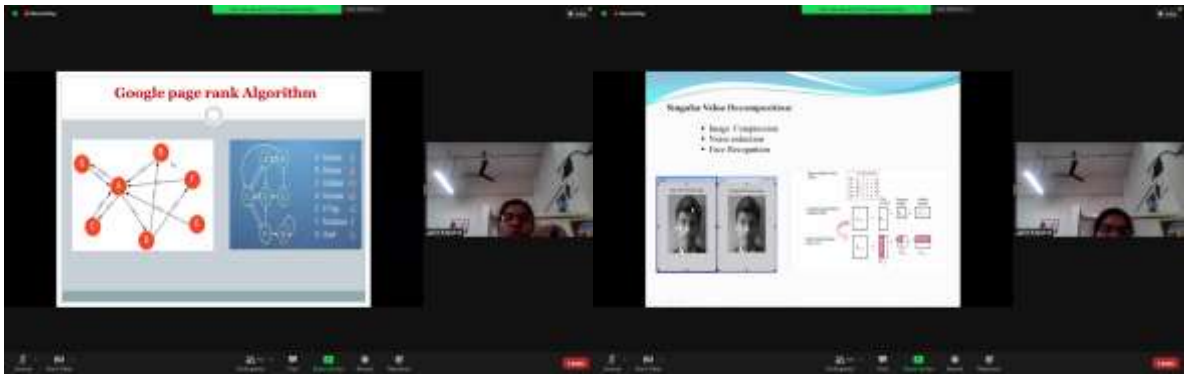
Resource person: Dr. P. Aparna

Designation: Associate Professor, Humanities & Sciences, VNRVJIET, Telangana

Topic of the Session: **Linear Algebra - Real life applications**

Number of Participants: 143

Report: Dr. P. Aparna, Associate Professor, Humanities & Sciences, VNRVJIET, Telangana has given a talk in the 3rd session of day-1. She spoke about the real life applications of Linear Algebra. She has introduced the idea of cryptography and spoke on how public key encryption works. She has explained in detail the role of matrix operations in encoding and decoding messages along with examples. She has also explained Google's page rank algorithm. She has briefly discussed the singular value decomposition (SVD) and its applications in image compression, noise reduction and facial recognition.



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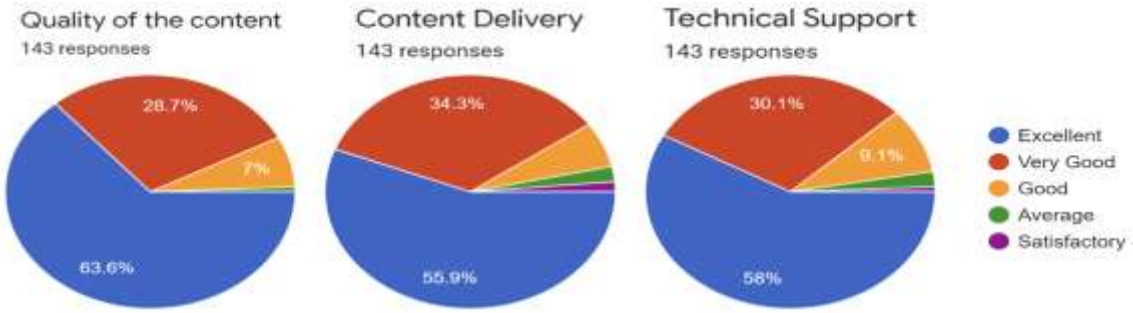
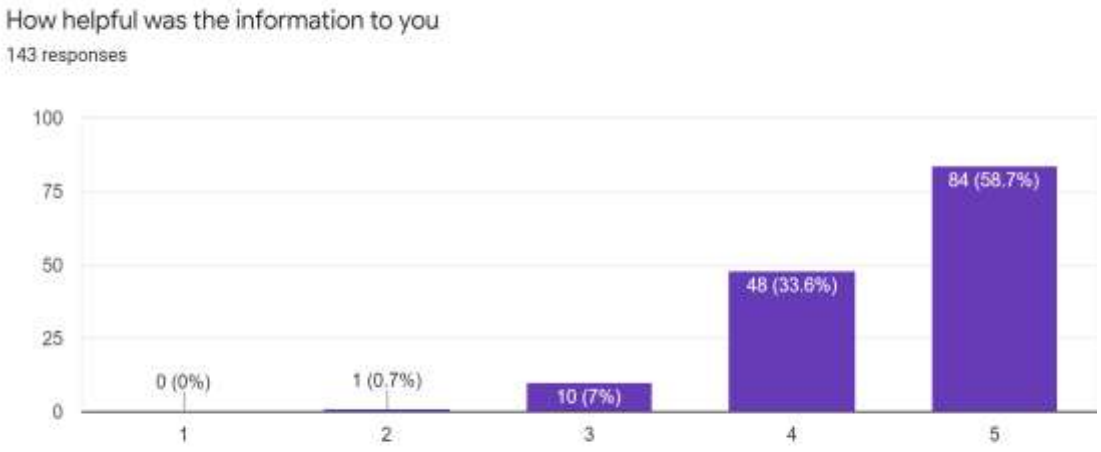




SESSION 4 (3:00 PM TO 4:30 PM)

Resource person: Prof. J V Ramanamurthy

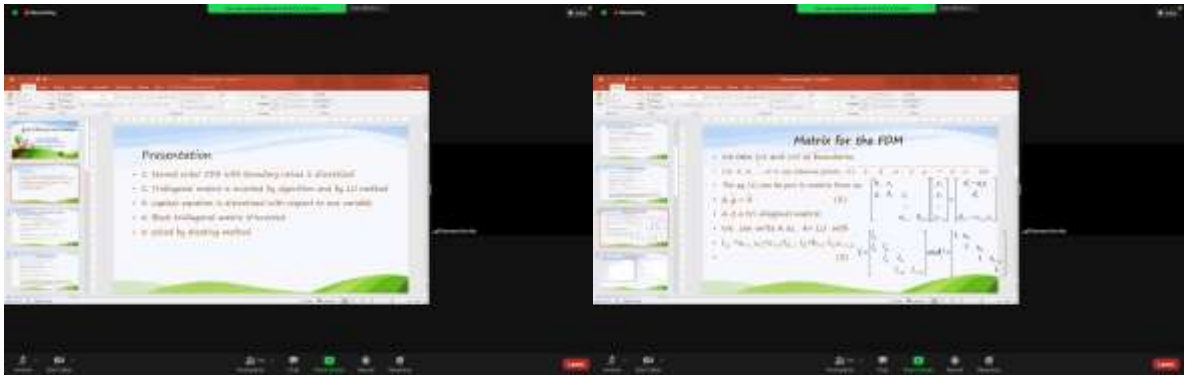
Designation: Professor, Department of Mathematics, NIT, Warangal, Telangana

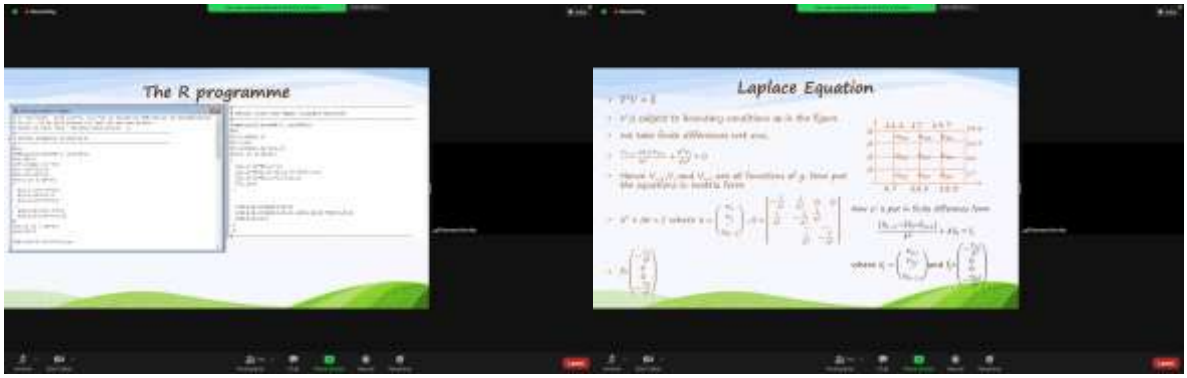
Topic of the Session: **Finite Differences and Matrix Methods for ODEs**

Number of Participants: 191

Report: Prof. J V Ramanamurthy, Professor, Department of Mathematics, NIT, Warangal, Telangana has talked about the finite differences and matrix methods for ODEs. He spoke about the discretization scheme for a second order ODE using central differences and solved the resultant tridiagonal matrix using three methods, namely, LU decomposition, Thomas algorithm and Lindzen method. For LU decomposition and Thomas algorithm, he has also displayed the code used in R programming to solve the problem. He has also explained the usage of the five point formula for discretizing the Laplace equation and solved the resultant system using Gauss-Seidel iteration with R programming.

Photos—





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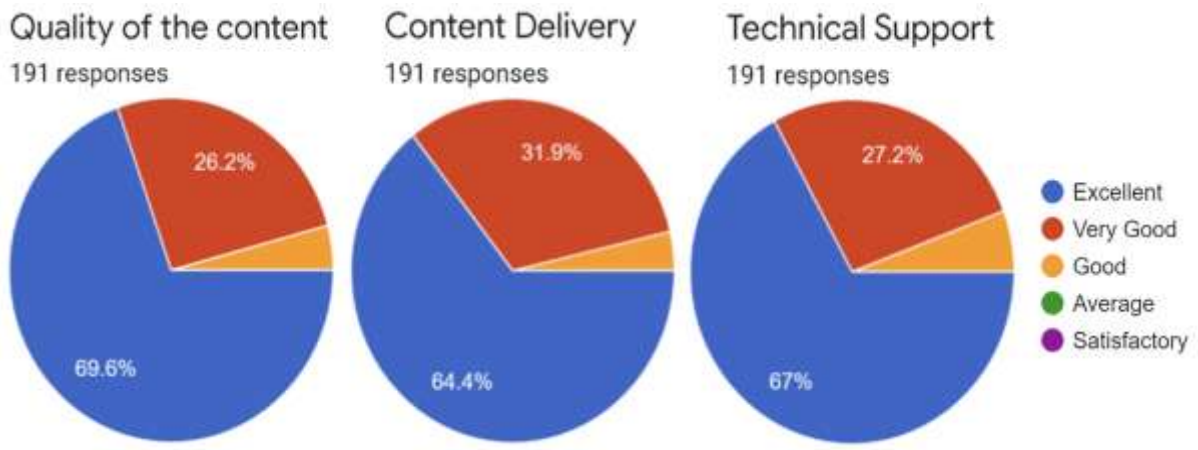

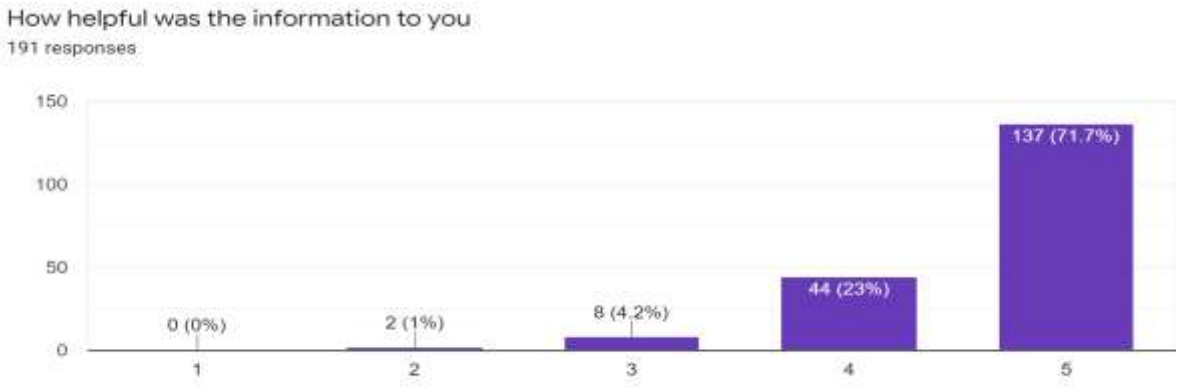

DAY2: 15-02-2022

SESSION 1: (10:00 AM TO 11:30 AM)

Resource person: Dr .P. Anuradha Kameswari
Designation: Associate Professor, Andhra University, Andhra Pradesh
Topic of the Session: Modular Arithmetic and Finite field Arithmetic

Number of Participants: 249

Report: Dr P Anuradha Kameshwari, Associate Professor, Andhra University, has started her presentation initially by explaining most of the basic concepts of Number Theory such as Prime number, GCD, Relatively Prime Numbers, Distribution function of $\Pi(x)$, Congruence etc. She highlighted the importance and application of the concepts like: Prime Number Theorem that states "$\Pi(x) \approx \frac{x}{\log x}$ as $x \to \infty$" Prime Factorization Theorem, Euclidean Algorithm, Properties of Congruences with a quite good number of examples. She has wonderfully explained how congruences lead to Residue classes of Integers which make up the construction of the group Z_n . She introduced Modular Arithmetic as an Arithmetic on Z_n. She extended the topics to: Euler's ϕfunction in Modular Computations and properties, Little Fermat's Theorem along with Chinese Remainder Theorem speed up Modulo Computations. She briefed about the Finite Field of Arithmetic by explaining about the Algebraic field. Finally it was concluded by explaining the importance of the Finite Field of Arithmetic that plays a vital role in the efficiency of Cryptosystem.

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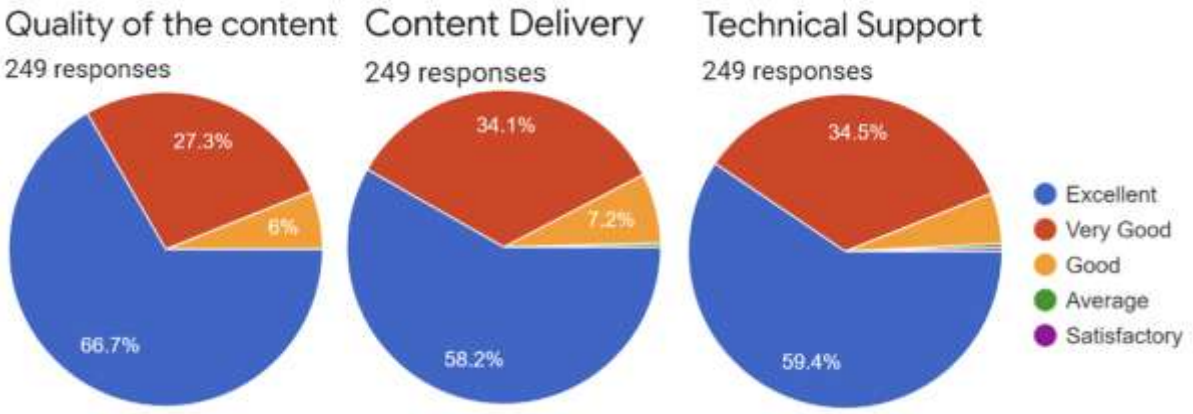
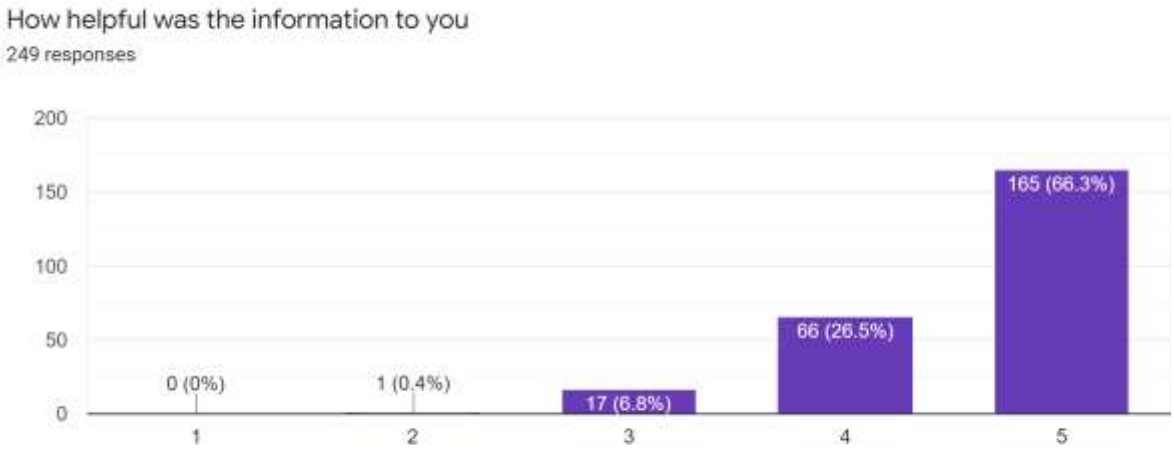


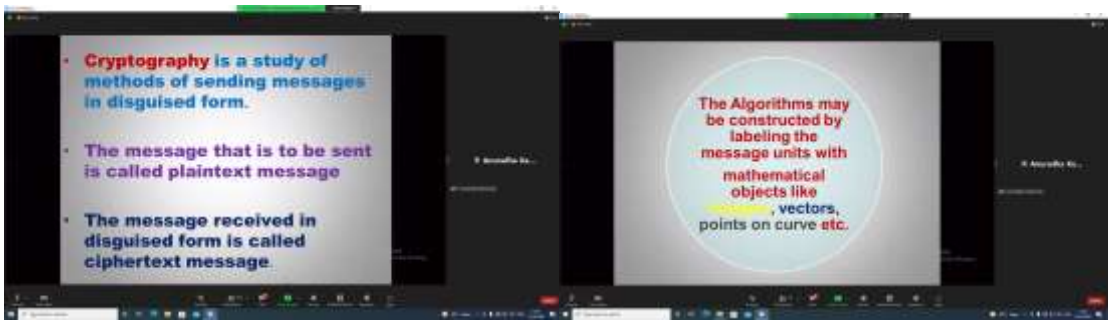


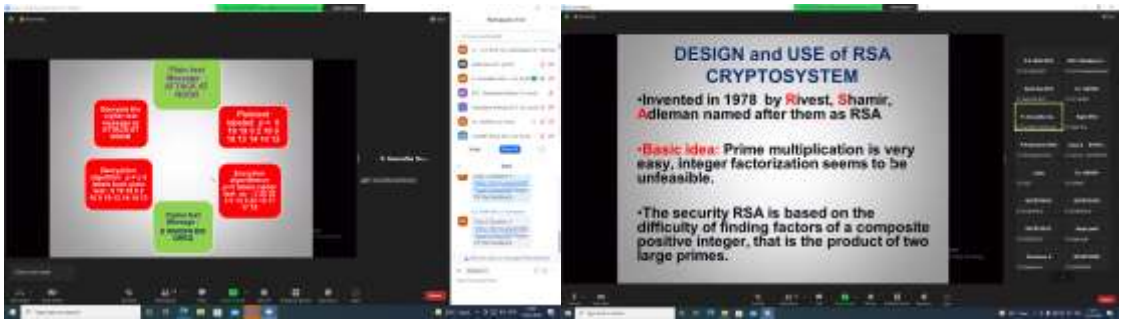
SESSION 2: (11:30 AM TO 1:00 PM)

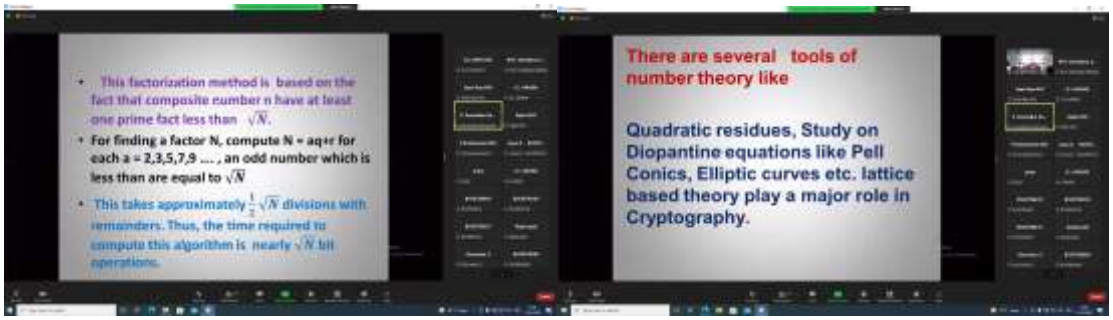
Resource person: Dr .P. Anuradha Kameswari
Designation: Associate Professor, Andhra University, Andhra Pradesh
Topic of the Session: Cryptosystems and Cryptanalysis
Number of Participants: **147**
Report:

Dr P Anuradha Kameshwari, Associate Professor, Andhra University, has started her second topic by introducing Cryptography She explained Mathematical Algorithms to Encipher and Decipher using Mathematical objects like Integers, Vectors , Point on Curves. She explained the concepts such as Cryptosystem given by the tuple (P, C, E_k , D_k) . She explained about Caesar Cipher, the earliest known crypto system, The classification of Cryptosystems as Symmetric Vs Asymmetric. She briefly explained the Design and use of RSA Cryptosystem. The ideas of Prime multiplication and Integer factorisation and the relevant theorems used to create Public key in RSA Algorithms were explained in detail. The factorising concepts and algorithms for securing cryptosystem by Cryptanalysis, The Pollard (p-1) Algorithm for a composite integer N with a prime factor p , Pollard's rho method of factoring were explained in brief. It was continued to explain about one of the fastest known factoring algorithms i.e Quadratic Sieve was explained. She emphasized on the study of different tools such as Elliptic curves, Lattice based theory which play a major role in Cryptography.

Photos—







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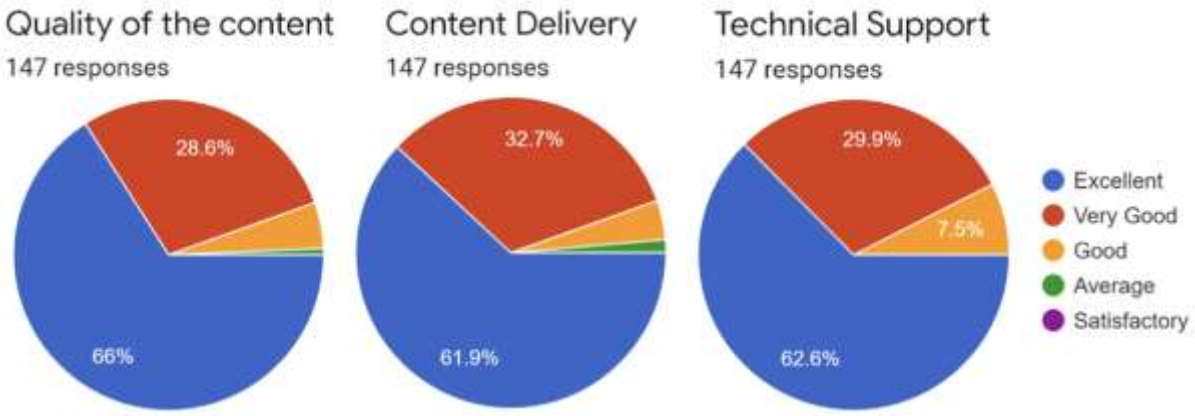
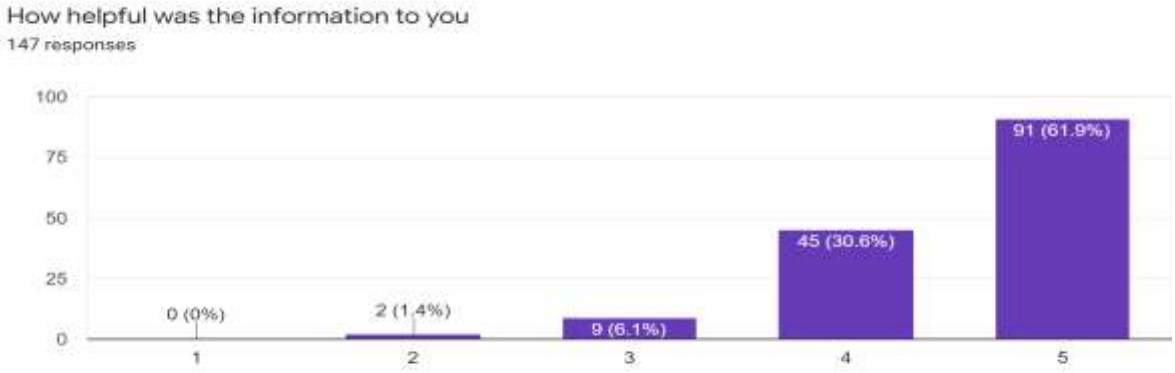




SESSION 3 (1:30 PM TO 3:00 PM)

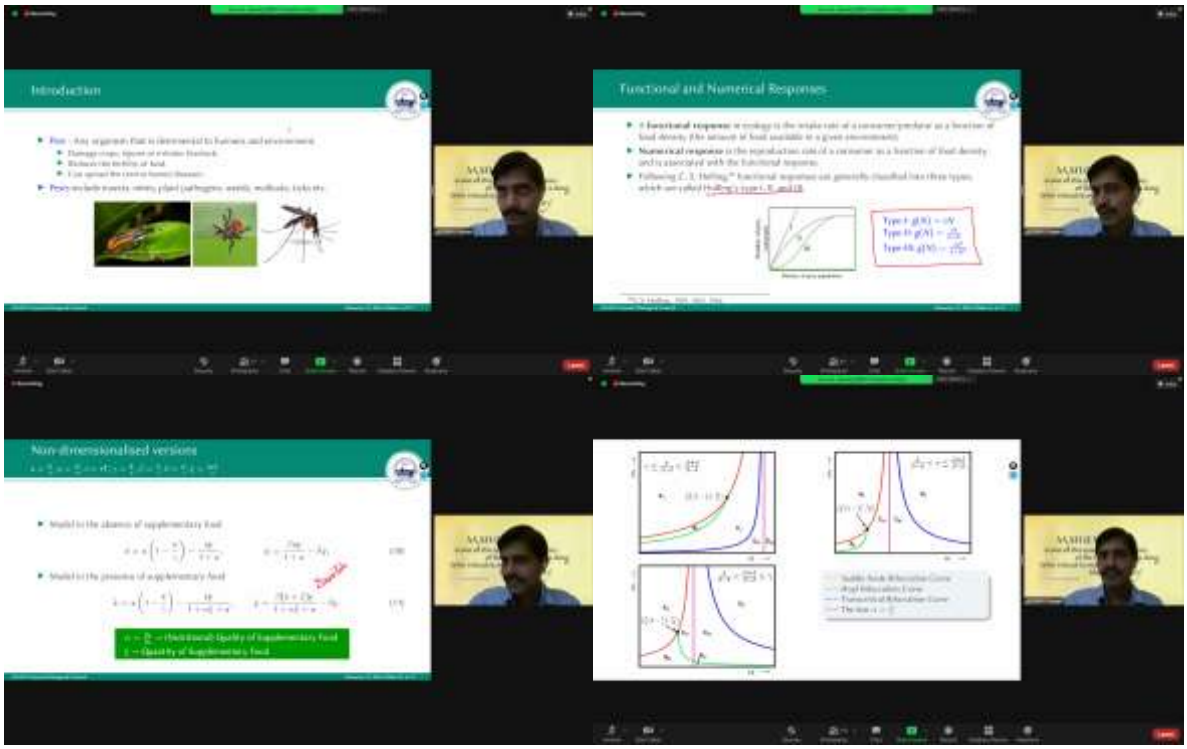
Resource person: Dr. B.S.R.V. Prasad

Designation: Assistant Professor Senior (Grade II), Department of Mathematics, School of Advanced Sciences, Vellore Institute of Technology, Vellore

Topic of the Session: Modelling the role of supplementary Food Resources in Enhancing the Biocontrol Efficiency of Natural Enemies

Number of Participants: 156

Report: Dr. B.S.R.V. Prasad, Assistant Professor Senior (Grade II), Department of Mathematics, School of Advanced Sciences, Vellore Institute of Technology, Vellore has talked about Modelling the role of supplementary Food Resources in Enhancing the Biocontrol Efficiency of Natural Enemies. Sir has started the talk by explaining the adverse effects of pests on humans and the environment. The speaker has talked about various ways of traditional pest control and their disadvantages. One such control that Sir has focused on is biological control where a suitable natural enemy of the pest is identified. Sir has also explained ways in which the predation effect on the pest can be enhanced. In the rest of the talk, the speaker has shown how this can be achieved using mathematical modelling. Sir has explained the terms Functional and numerical responses which are defined as the intake rate and reproduction rate of the consumer/predator respectively. Both are functions of food density which is the amount of food available in a given environment. Sir has briefly discussed various functional responses namely, Holling's type I, II and III, Beddington-DeAngelis and Ratio-Dependent. Sir has explained the modelling of the Prey-Predator system both in presence and absence of supplementary food; displayed the numerical simulations using plots in variation with the quality and quantity of supplementary food available in the environment. The speaker has also discussed the case when the predator has weak and high cannibalistic natures.



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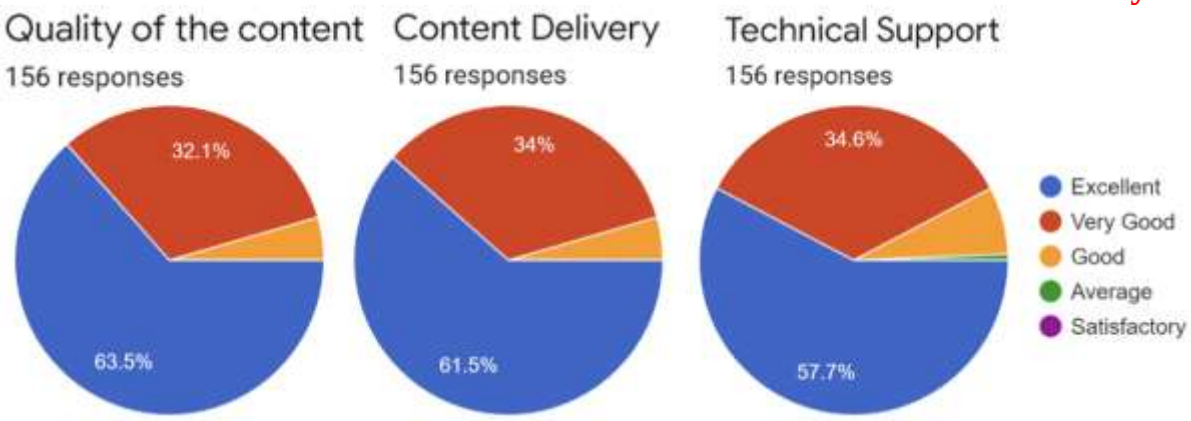
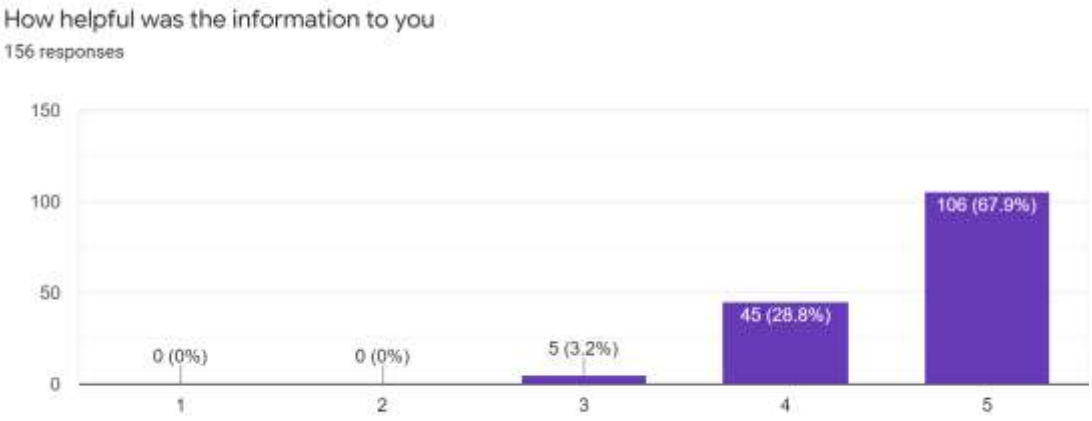




SESSION 4 (3:00 PM TO 4:30 PM)

Resource person: Prof. J V Ramanamurthy

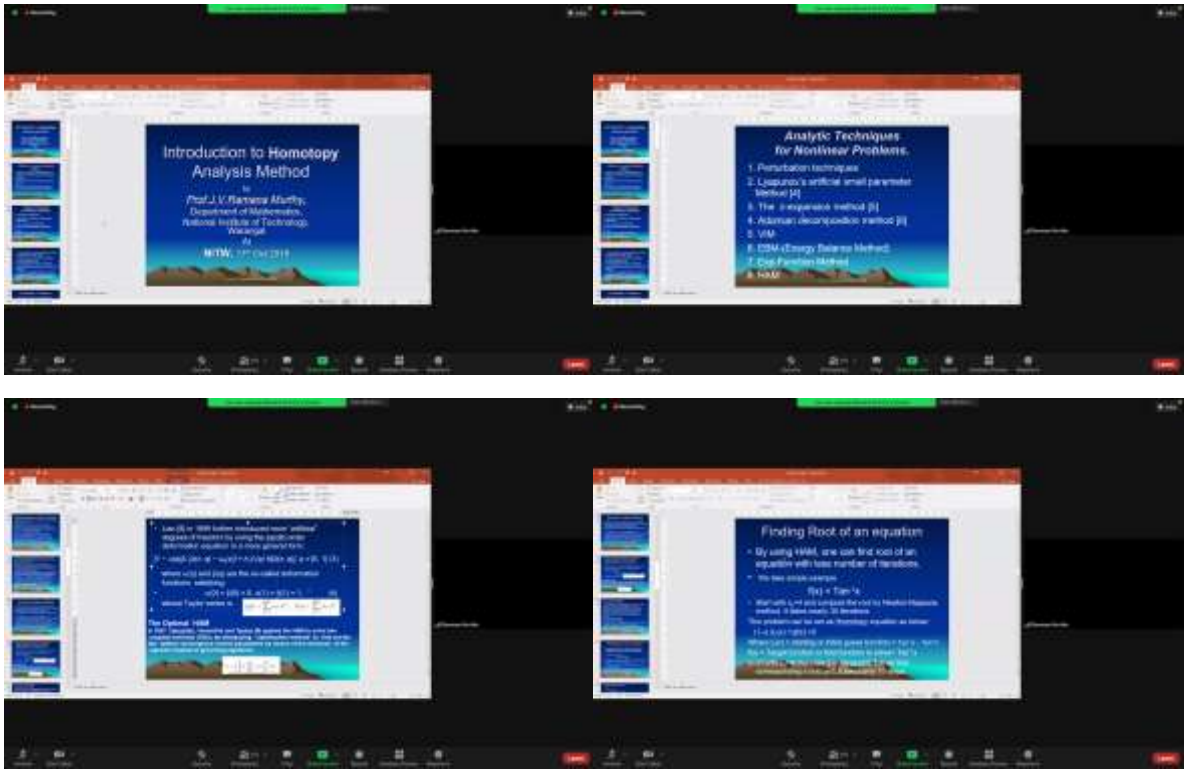
Designation: Professor, Department of Mathematics, NIT, Warangal, Telangana

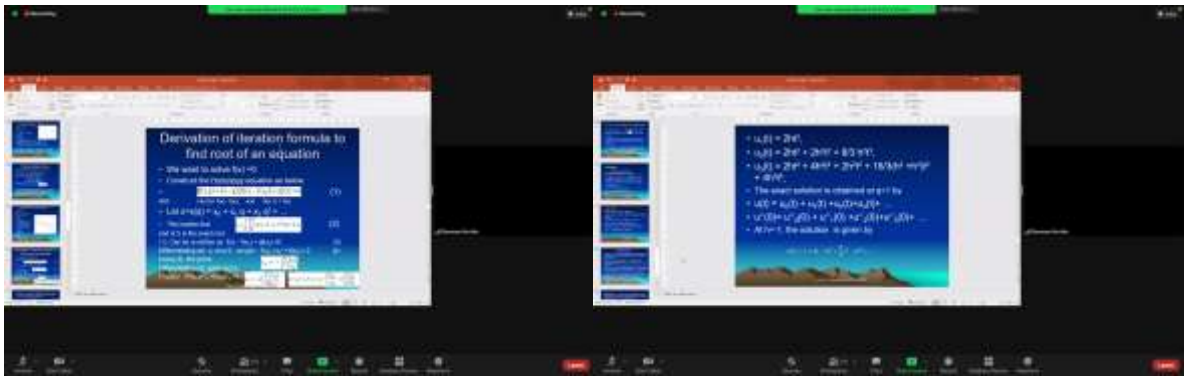
Topic of the Session: **Homotopy Analysis Method**

Number of Participants: 181

Report: Prof. J V Ramanamurthy, Professor, Department of Mathematics, NIT, Warangal, Telangana has talked about Homotopy Analysis Method (HAM). The standards for a good analytical method were discussed and some of the popular analytical techniques used for solving nonlinear problems were introduced while pointing out the disadvantages of the rest of them in comparison to HAM. The variations of HAM like the spectral, predictor and optimal HAM that are derived by several researchers were briefly discussed. Later, the root of the equation $f(x) = \tan^{-1} x$ has been calculated using HAM and has been compared with the iterations given by Newton-Raphson's method where a clear observation has been made that HAM is better than Newton-Raphson's method.The Mathematica code used for solving the problem using both these methods has also been presented. After that, an algorithm to find multiple roots of the quadratic equation $f(x) = x^2 + 3x + 2$ using HAM along with Runge-Kutta 4th order method has been presented. Next, a step-by-step procedure for solving the nonlinear differential equation $u'' + (u')^2 = 0$ with $u(0) = 1, u'(0) = 2$ using HAM has been elaborately explained.

Photos—





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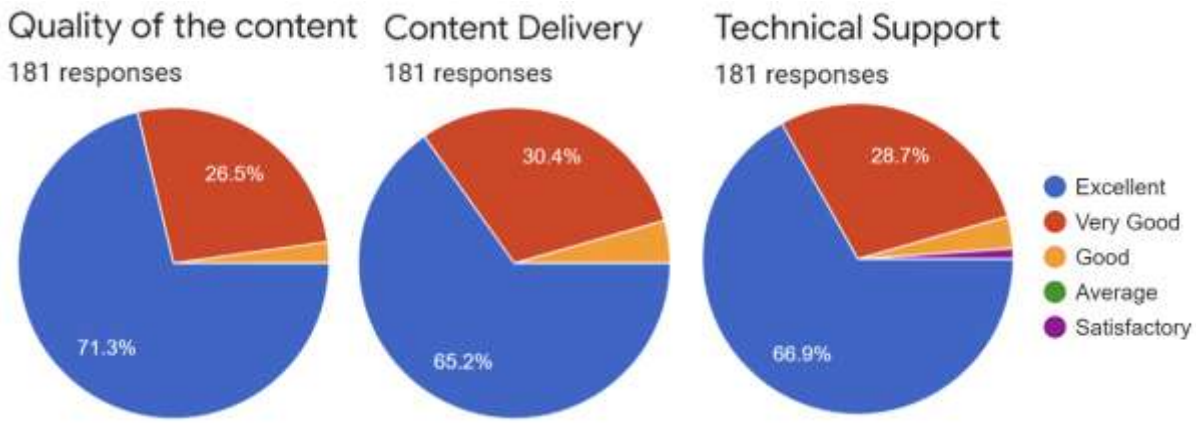
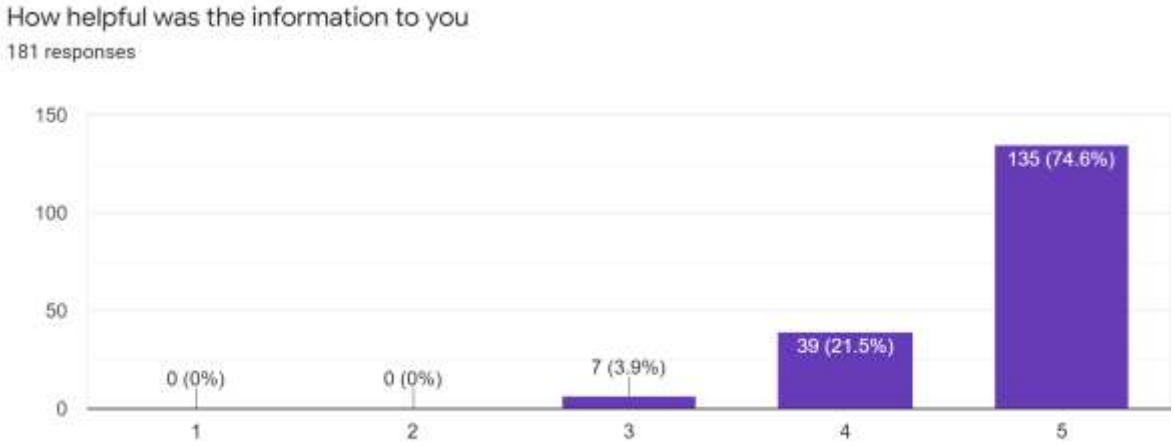




DAY3: 16-02-2022

SESSION 1: (10:00 AM TO 11:30 AM)

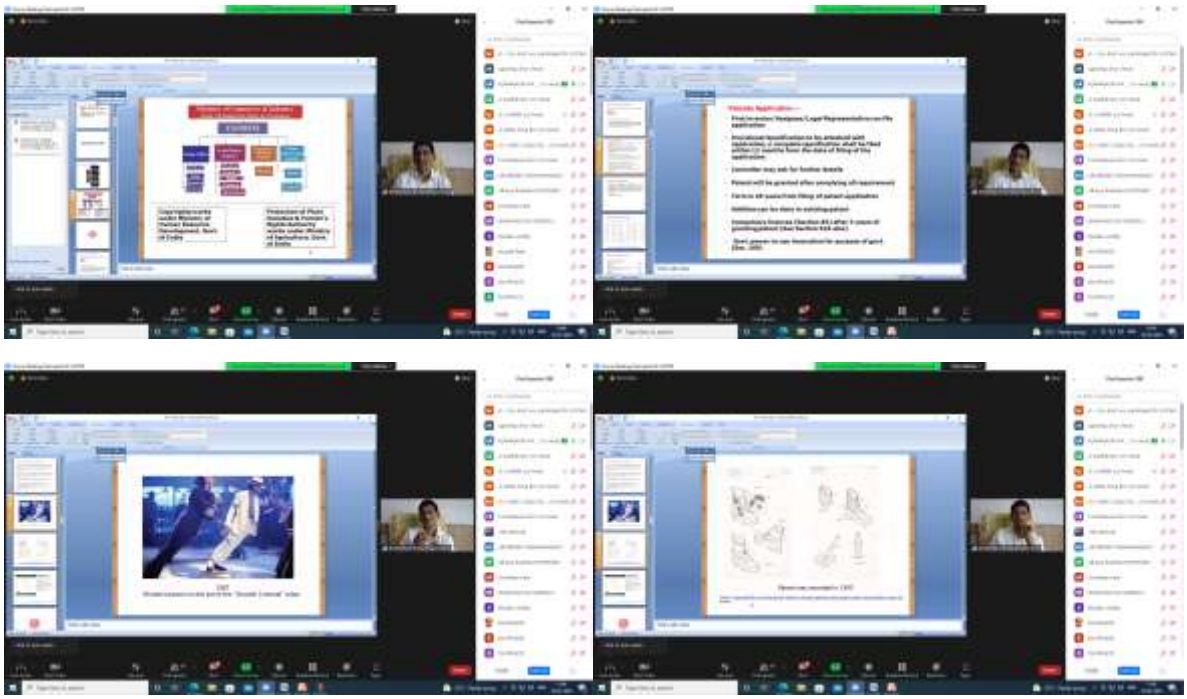
Resource person: Prof. K. Raghava Rao

Designation: Professor, Department of Electronics and Computer Engineering, Koneru Lakshmaiah Education Foundation, KL University, AP

Topic of the Session: Innovation and Intellectual property rights for the academic community

Number of Participants: 148

Report: Prof. K. Raghava Rao, Professor, Department of Electronics and Computer Engineering, Koneru Lakshmaiah Education Foundation, KL University, AP, has talked about the Innovation and Intellectual property rights for the academic community. The definition of intellectual property has been explained. The need to protect intellectual property has been discussed. Next, the agreement on trade related aspects related to intellectual property rights has been discussed. Later, several branches of intellectual property like patent, copyrights, trademarks, designs etc. have been discussed in detail. The structure of Indian patent offices under the Ministry of Commerce & Industry has been presented. The conditions for granting a patent and the procedure for filing one has been explained. Later, the patent cooperation treaty (PCT) was discussed. The statistics of patent applications from various countries and the leading recipients has been presented. Later, the Apple Inc. v/s Samsung Electronics Co. Ltd. dispute regarding the design of smartphone and tablet computers has been explained. Next, the dispute between Novartis AG and Union of India & others has been presented. The patent awarded to Michael Jackson's shoes in 1993 has been presented. Next, India's copyright act (1957), the trademark act (1999), design act (2000), geographical indication of goods (1999), traditional knowledge, trade secret/confidential information, protection of plant varieties and farmers' rights act (2001) were explained and some of the leading cases pertaining to each act have been presented.



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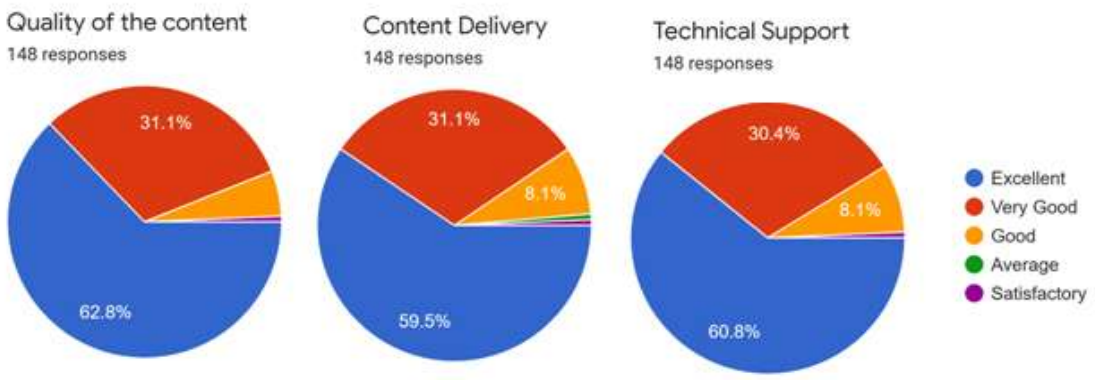
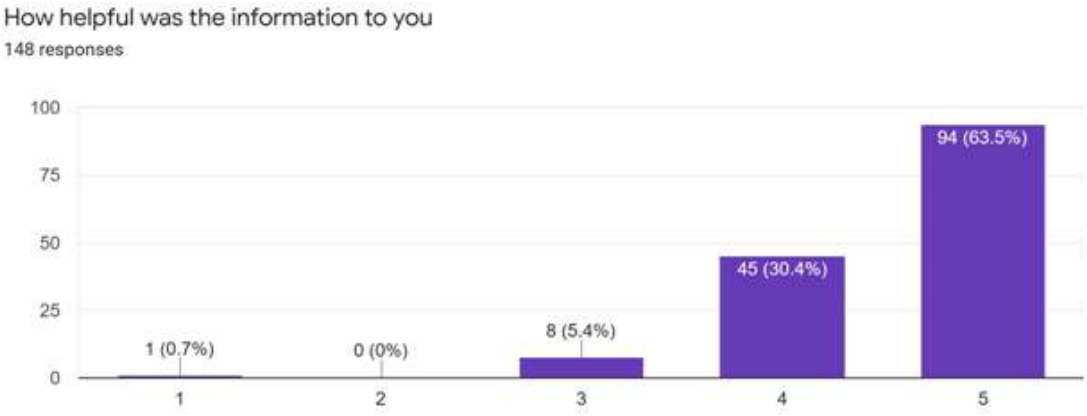




SESSION 2: (11:30 AM TO 1:00 PM)

Resource person: Prof. Natesan Srinivasan

Designation: Department of Mathematics, Indian Institute Of Technology, Guwahati.

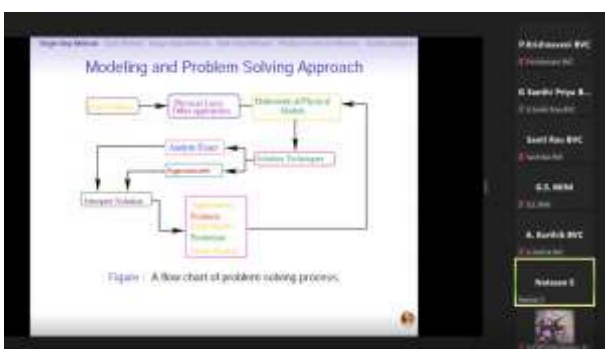
Topic of the Session: Numerical Methods for First-Order ODEs (IVPs)

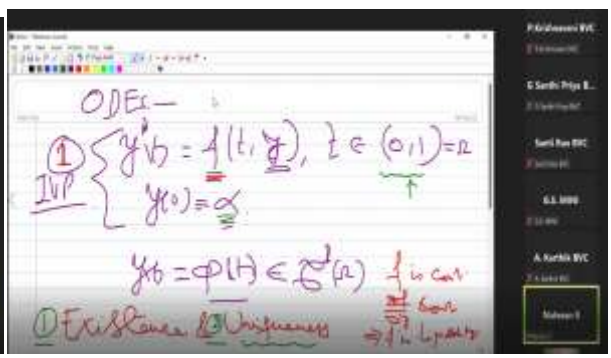
Number of Participants: **149**

Report:

Prof. Natesan Srinivasan, Department of Mathematics, Indian Institute Of Technology, Guwahati, has given a wonderful presentation on Numerical Methods for First-Order ODEs(IVPs). Sir mentioned that **Numerical methods for ordinary differential equations** are methods used to find numerical approximations to the solutions of ODE. Sir started from the basic idea of "Modelling and problem solving approach" through a flow chart of the problem solving process, highlighting the importance of "Approximation techniques" instead of "Analytic/Exact" while solving real time problems. Sir explained the first-order differential equation, an Initial value problem (IVP) of the form: $y'(t) = f(t, y(t))$, $y(t_0) = y_0$, and discussed the existence and uniqueness of the solution. The Speaker has explained about the Lipschitz condition for the function f, stability in change of the solution according to the change in the given Initial value problem. He explained the process of Discretization of the domain into partitions with grid points t_i and h_i being the length of each subinterval and integrating between each t_i to t_{i+1}. Sir explained the Numerical integration/Quadrature using rectangle rule along with error approximations. Sir has also mentioned Convergence for error to tend to 0 as h tends to 0, Rounding of errors, Minimising Taylor's expansions. Sir discussed the Theorems and Lemmas supporting Convergence of Euler's method, Geometrical point of view of Euler's method.

PHOTOS:





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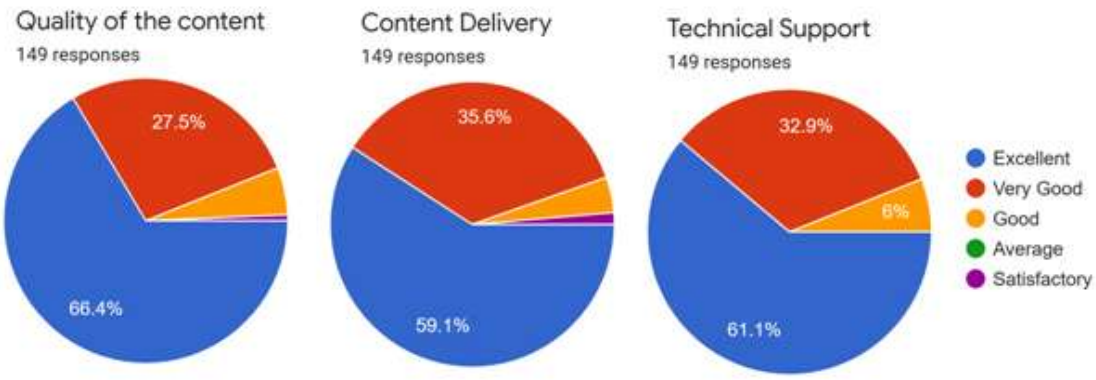
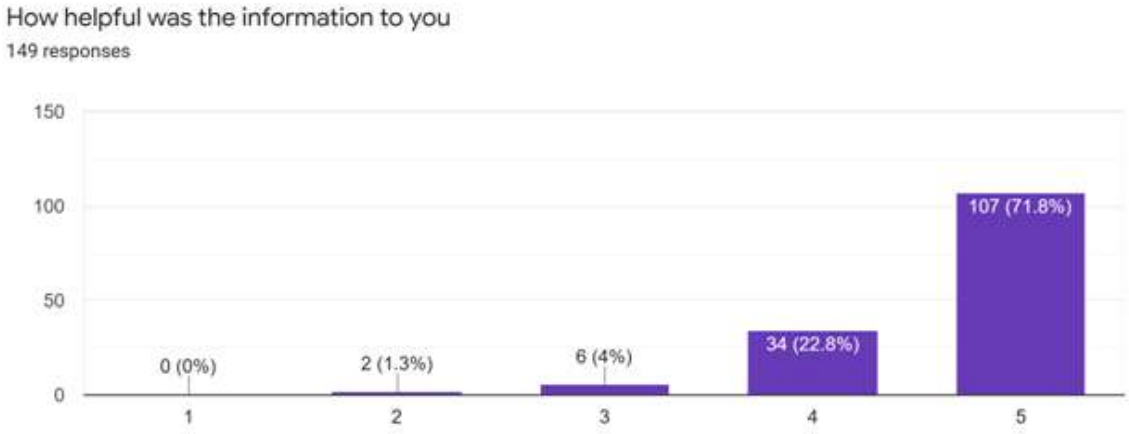




SESSION 3: (1:30 PM TO 3:00 PM)

Resource person: Mr. Srikanth Bandi (Alumni)

Designation: Director, SB Art Studio,Hyderabad, Telangana

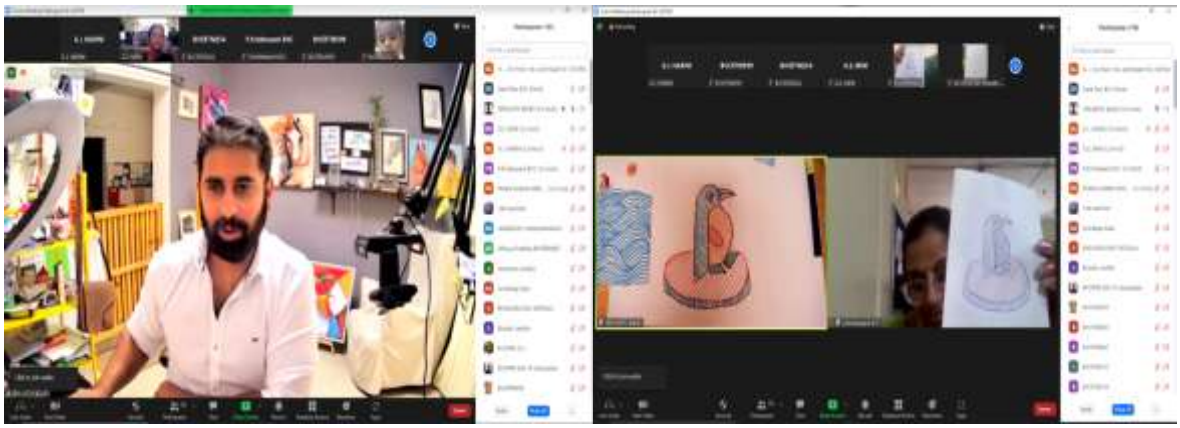
Topic of the Session: Art Fusion-Drawing a stress Reliever

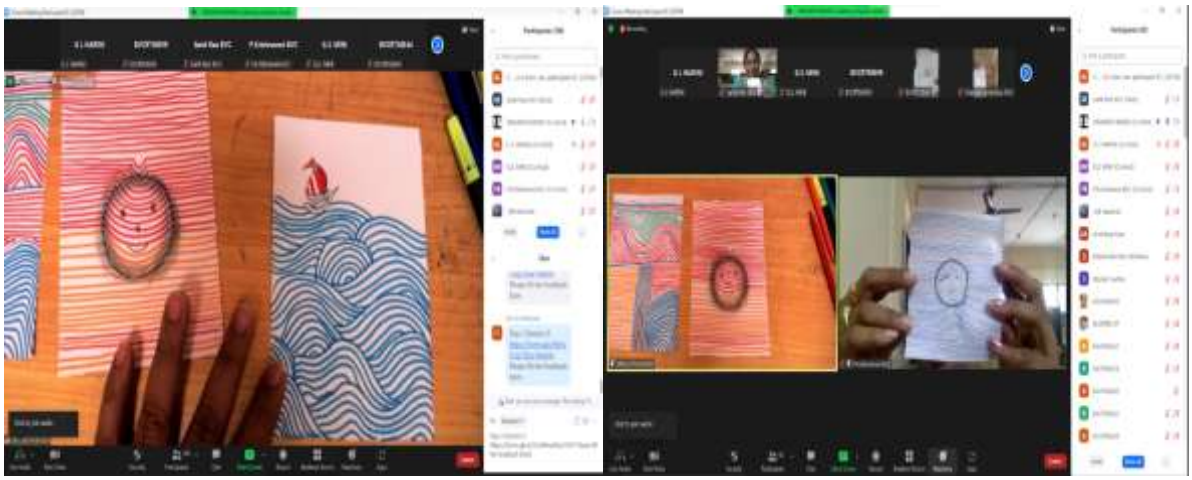
Number of Participants: 132

Report:

Mr. Srikanth Bandi , Director, SB Art Studio , Hyderabad has talked about the Art Fusion-Drawing a stress Reliever. He described his art journey as an endless learning Marathon. He mainly spoke about concentration. He said that Concentration is the ability of an individual to focus on one matter by mental effort and an undisturbed mind. He has explained that art and Mathematics have a long-standing relationship. And he made the participants draw the diagrams with the help of Rectangle shape , curves etc.

PHOTOS:





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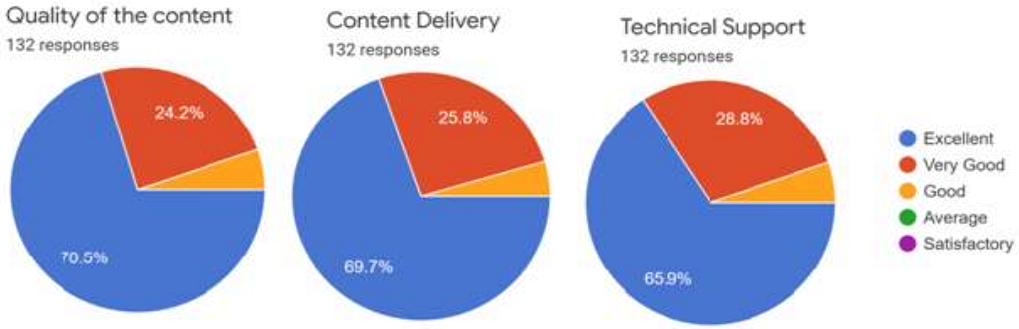
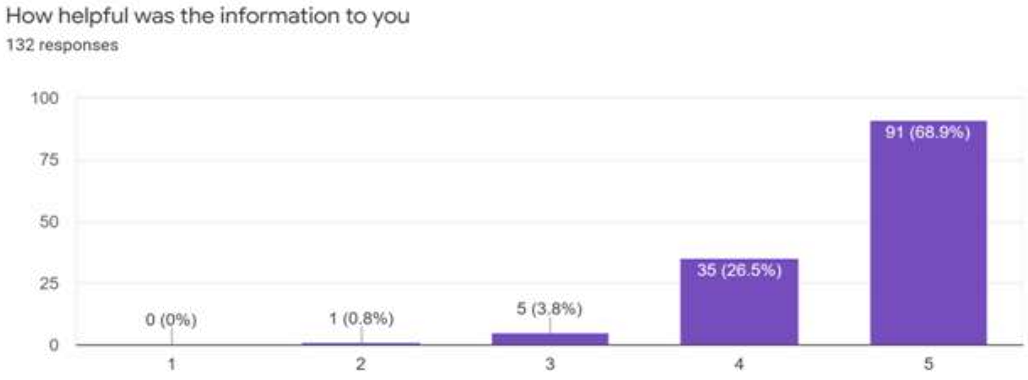




SESSION 4 (3:00 PM TO 4:30 PM)

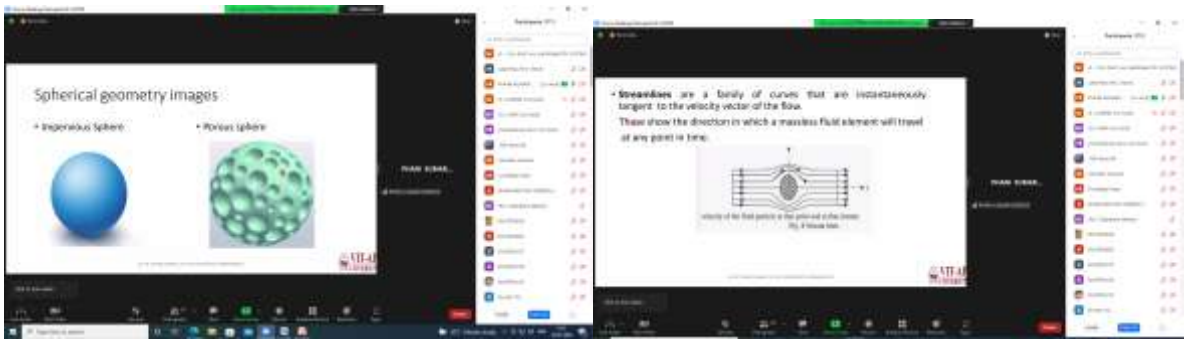
Resource person: Dr. Phani Kumar

Designation: Assistant Professor (Grade-II), VIT - AP University

Topic of the Session: **Mathematical Modelling and its applications**

Number of Participants: 146

Report: Dr. Phani Kumar, Assistant Professor (Grade-II), VIT - AP University, has talked about Mathematical Modelling and its applications. The solution methodology for a linear congruence problem has been discussed. The algorithm that a scanner uses to convert a barcode to number has been explained. The applications of linear congruence problem to Universal Product Code (UPC) and ISBN have been discussed. The methods to check whether a given UPC and ISBN is valid has also been presented. Later, the traffic flow problem, where the traffic density at various places has been solved by balancing the traffic at intersections. Next, different types of sphere, like impervious, porous, etc. have been discussed. The basic concepts of fluid dynamics like, viscosity, density, axisymmetric flows, steady state flows, Reynolds number, compressible and incompressible flows have been discussed in detail. Later, the mass and momentum conservation principles and the resultant PDEs have been discussed. The modelling of flow of a viscous fluid past sphere has been presented and the solution to the resultant equations have been discussed. For this flow, the drag coefficient and the shear stress has also been calculated. Later, a brief introduction was made to the contaminated fluid sphere as well.



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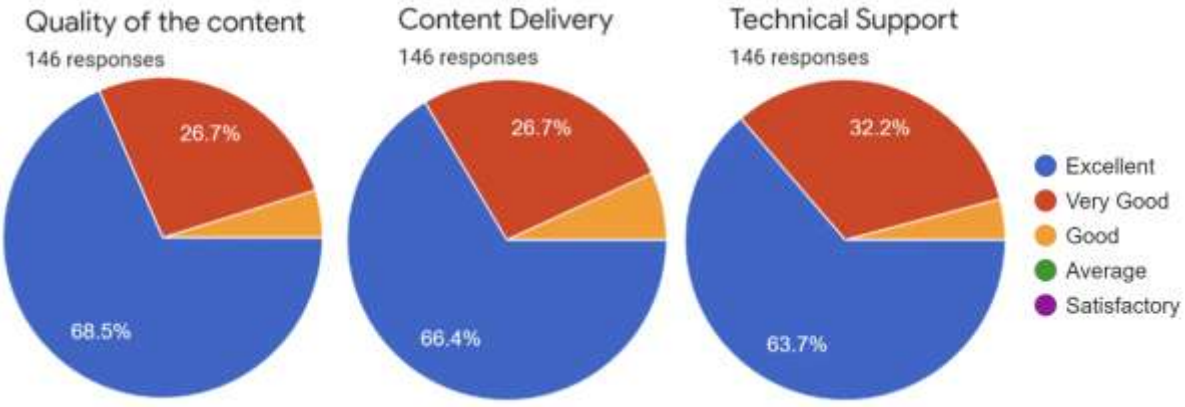
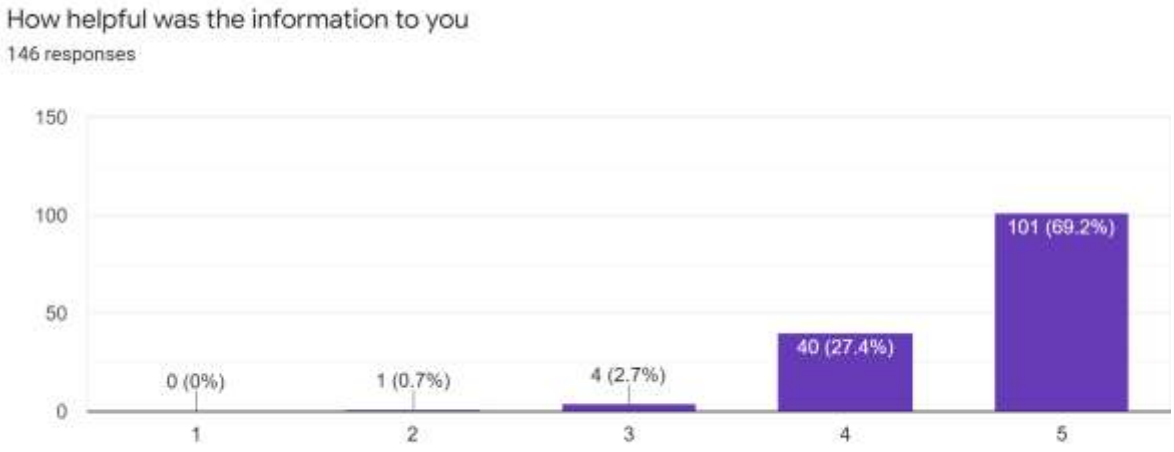




DAY4: 17-02-2022

SESSION 1: (10:00 AM TO 11:30 AM)

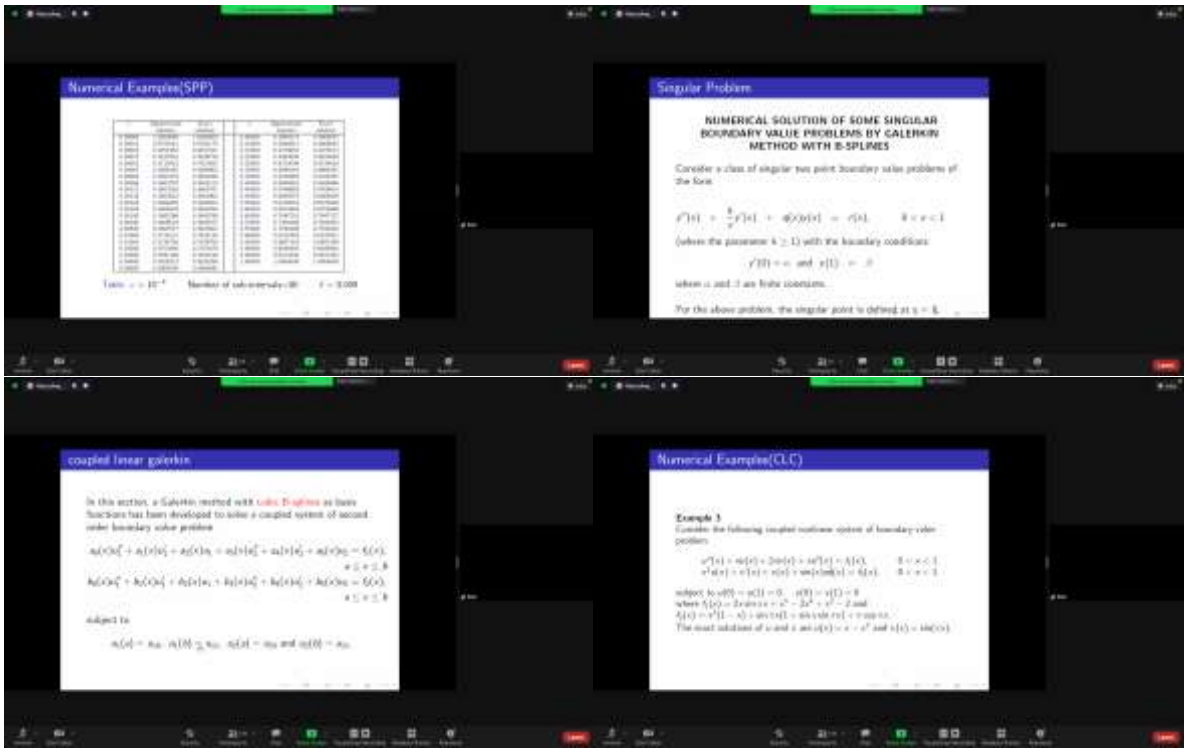
Resource person: Prof. Kasi Viswanadham

Designation: Professor, Department of Mathematics, NIT Warangal, Telangana.

Topic of the Session: Numerical solutions of some two-point Boundary value problems by finite element method with cubic splines

Number of Participants: **152**

Report: Prof. Kasi Viswanadham, Professor, Department of Mathematics, NIT Warangal, Telangana has talked about the Numerical solutions of some two-point Boundary value problems by finite element method with cubic splines. The prevalence of boundary value problems in various fields of research and the difficulty in solving them was explained. The approximate methods that are used to solve such problems like the finite difference, finite element and finite volume methods have been discussed and the advantages of finite element method over others has been explained. The variational methods that are involved while solving a problem using finite element method have been presented. Two such variational methods, namely, collocation method and Galerkin method has been explained in detail. The solution to the homogeneous singular perturbation problem, $\varepsilon y''(x) + y'(x) - y(x) = 0, 0 \le x \le 1$ with $y(0) = 1$ and $y(1) = 1$, that is solved using the collocation method, is compared with the exact solution when ε is 10^{-3} and 10^{-4}. Also, the numerical solution of the non-homogeneous singular perturbation problem, $\varepsilon y''(x) + y'(x) = 1 + 2x, 0 \le x \le 1$ with $y(0) = 1$ and $y(1) = 1$ has been compared with its exact solution. The same has been presented for the homogeneous singular perturbation problem with variable coefficients, $\varepsilon y''(x) + \left[1 - \frac{x}{2}\right] y'(x) - \frac{1}{2} y(x) = 0, 0 \le x \le 1$ with $y(0) = 0$ and $y(1) = 1$. Later, a class of singular two point boundary value problem has been presented and the difficulty in solving problems with singularity has been explained. The reason for using finite element method viz., Galerkin method for solving such problems has been stated and the method has been described. As an example, the solution of zeroth order Bessel's differential equation has been derived using this method and compared with its exact solution. A similar comparison has been made for two more boundary value problems with singularity. Next, the solution to some coupled system of boundary value problems has been presented using both collocation and Galerkin methods and the error in comparison with the exact solution has been presented. Later, the solution of the 4th order linear boundary value problems derived using both the methods has been discussed.



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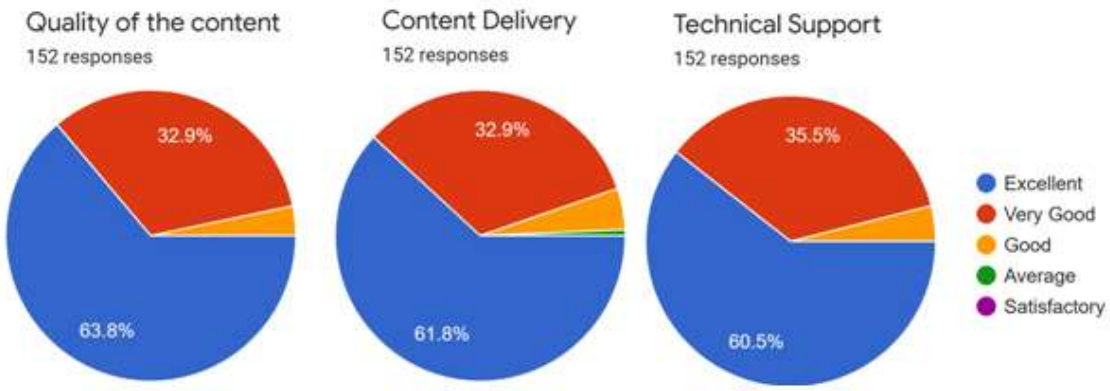
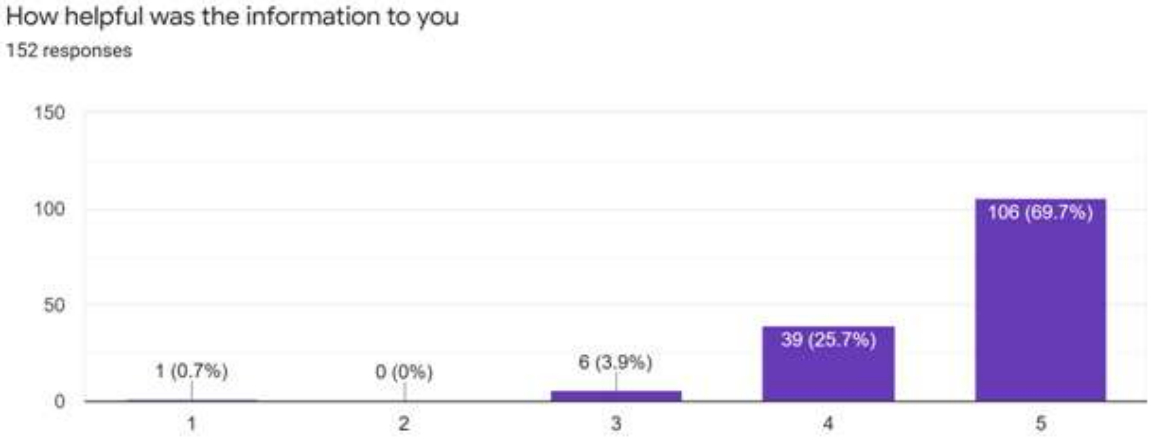




SESSION 2: (11:30 AM TO 1:00 PM)

Photo Of Resource Person:

Resource person: Prof. Natesan Srinivasan

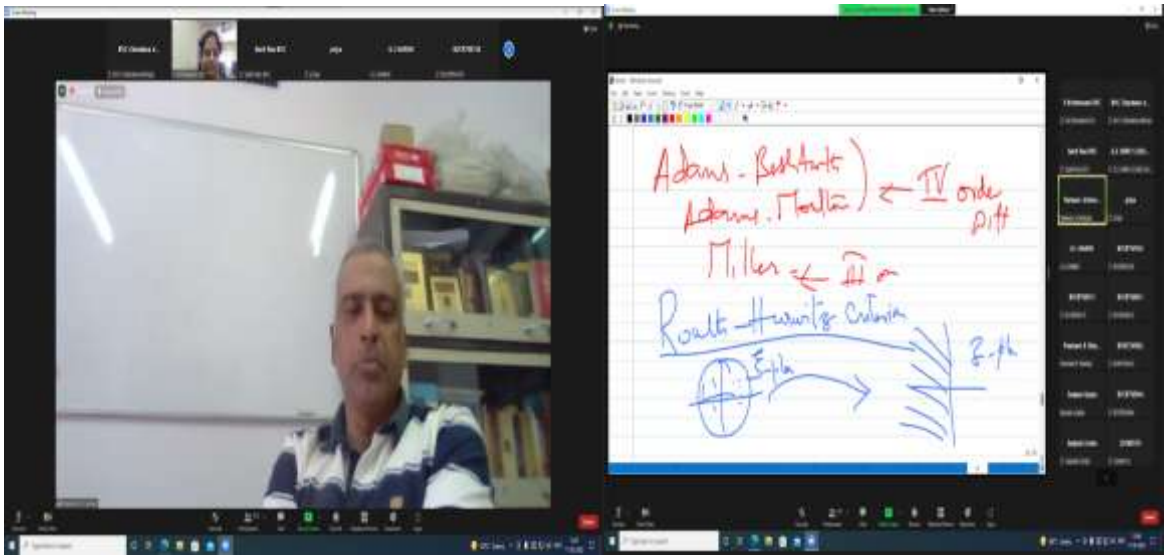
Designation: Professor , Department of Mathematics , IIT , Guwahati.

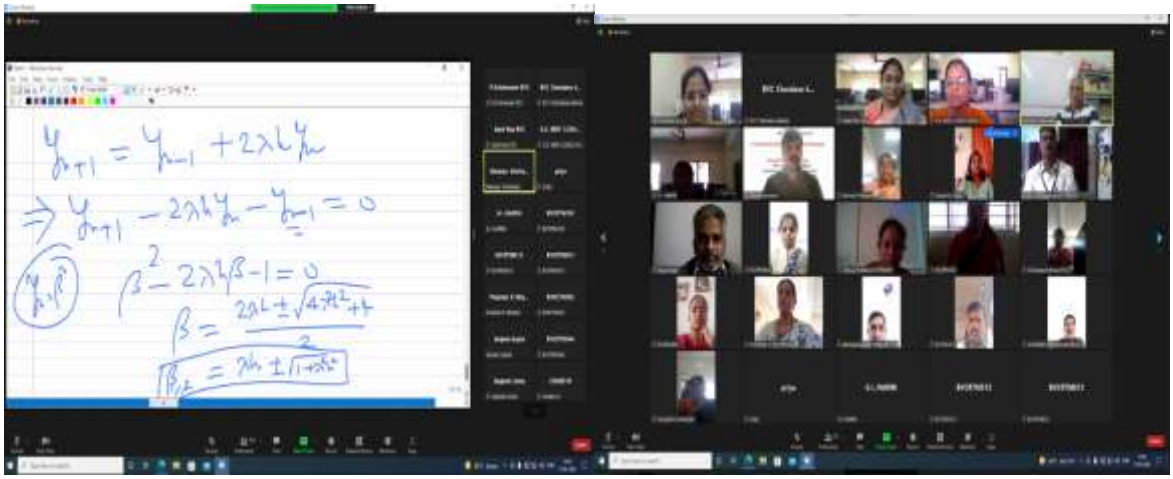
Topic of the Session: Numerical Stability and Error Analysis.

Number of Participants: 143

Report:

Prof. Natesan Srinivasan, Department of Mathematics, Indian Institute Of Technology, Guwahati, has talked about Numerical Stability and Error Analysis. He discussed the effect of round-off error in the Euler Method. He said that the effect of round-off error which is neglected in the theorem plays an important role, as h becomes smaller, more calculations are necessary and more round off error is expected. He discussed the Implicit Euler method, Explicit Euler Method. He said that Explicit Euler is conditionally stable and Implicit Error is unconditionally stable. And he added that the Multistep method provides more than one root for the difference equation because the first order difference equation is replaced by higher order difference equation and he said that in the Multistep Method, we have to study stability carefully. He discussed about Euler & related θ-method. He next discussed the Runge-Kutta Method and he said that to obtain higher order convergence, we use Runge-Kutta Method.





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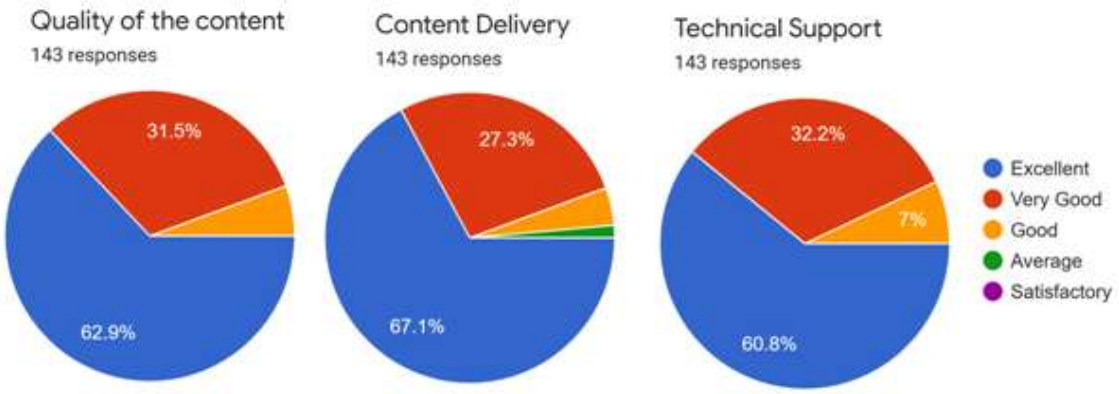
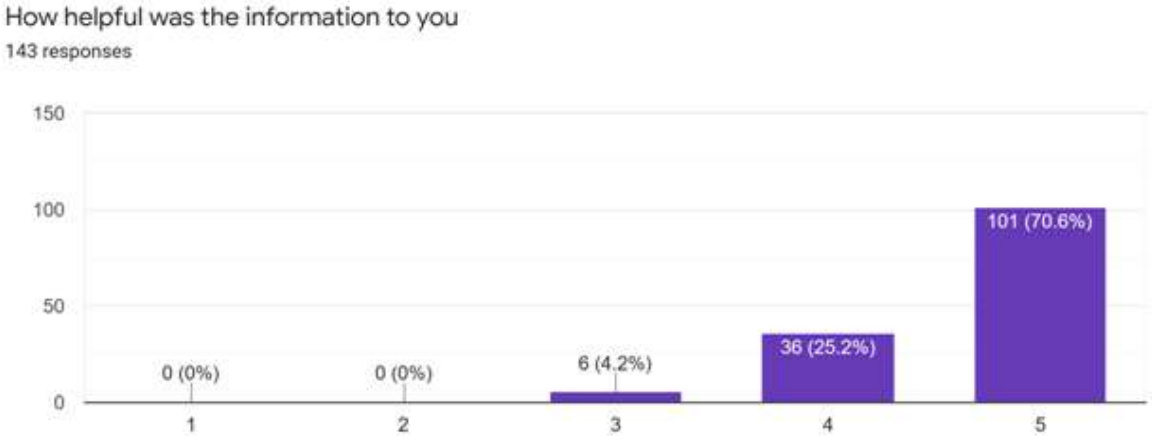




SESSION 3: (1:30 AM TO 3:00 PM)

Resource person: Dr. B S R V Prasad

Designation: Assistant Professor, VIT, Vellore, Tamilnadu

Topic of the Session: Modelling Biogeochemical Cycles of Lagoon Ecosystems

Number of Participants: 147

Report:

Dr. B.S.R.V. Prasad, Assistant Professor Senior (Grade II), Department of Mathematics, School of Advanced Sciences, Vellore Institute of Technology, has wonderfully explained a real time process about Modelling of Biogeochemical Cycles of Lagoon Ecosystems , A Case for Chilka Lake, India. Sir started with emphasising on the importance of identifying as well as handling the proper functions, parameters and data that is required not only in the areas related to Mathematics but also in various other disciplines.. He mentioned the Coastal lagoons which are transitional zones between land and sea. It was mentioned that there are increasing Nutrient loadings such as : DO Cycle, Nitrogen Cycle, Phosphorus Cycle and Silicon cycles are coming from both boundaries to Lagoon ecosystems with major impact on water quality and ecology. A holistic study and a modelling approach helps the study of physical, chemical, geological and ecological dynamics are needed to plan, implement and manage these systems effectively. Sir has explained the process affecting dissolved Oxygen concentration. He presented a Mathematical model by defining $\frac{dO}{dt}$ i.e to find the Oxygen level changes according to the change in time:

$\frac{dO}{dt}$ =±(Atmospheric-water surface exchange)+ Photosynthesis
-(Nitrification+Respiration+Mineralisation)

Sir has given the analysis of this Mathematical model by giving a formula to Equilibrium DO Level, along with regions of Under saturation and Supersaturation, Ecosystem Health and Controllability diagramatically. He has explained the Biogeochemical Model of DO for Chilka lagoon by explaining the DO Dynamics in the absence of Diatoms, Cyanonophyceans and MPB. It is also mentioned about different methods used to estimate Neo Ecosystem Metabolism (NEM) such as the light/dark bottle method and open water diel oxygen methods.


Modelling Biogeochemical Cycles of Lagoon Ecosystem: A Case for Chilka Lake, India


Dissolved Oxygen Dynamics
Surface Exchange
Algae
Respiration
Photosynthesis
Dissolved Oxygen
Nitrification
Ammonia
Loss
Other Processes
Decomposition
Organic Matter
Reaeration
Processes affecting dissolved oxygen concentration

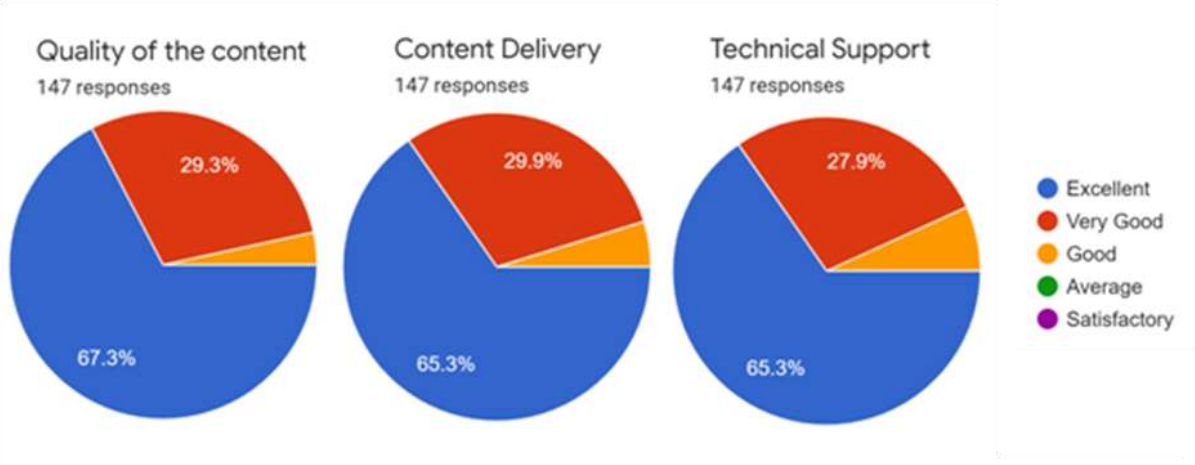

Ecosystem Health and Controllability
Controlling the Mineralization Rate

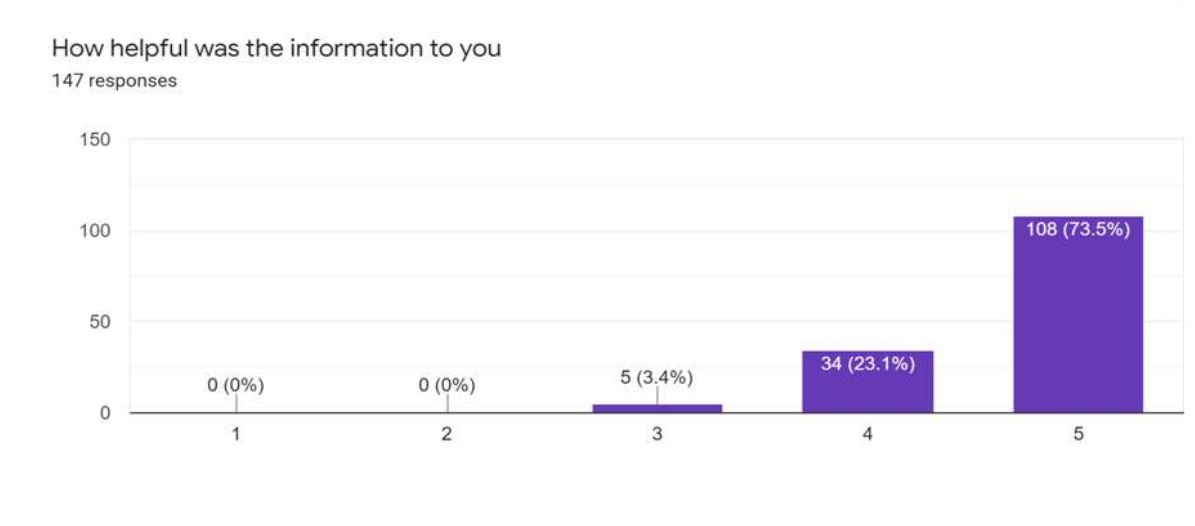

NEM Modelled Using Owl DO Observations


Model Application to Chilka Lagoon


DO Dynamics in the absence of MPB

Feedback Analysis:





DAY5: 18-02-2022

SESSION 1: (10:00 AM TO 11:30 AM)

Resource person: Prof. Srinivas Rao Ch

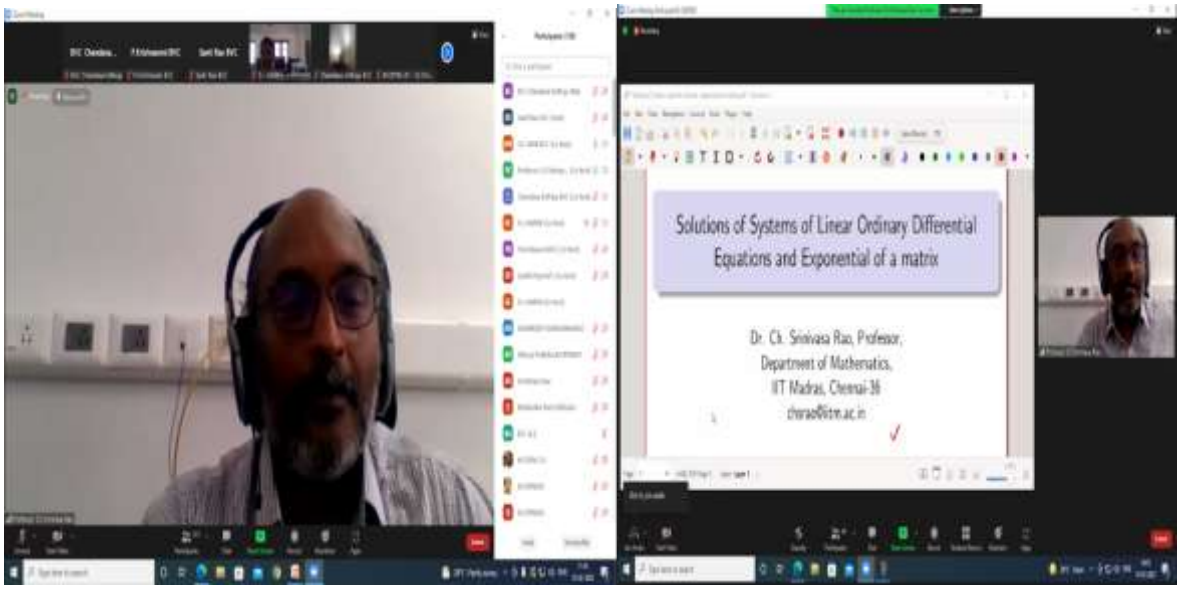
Designation: Professor, Department of Mathematics, IITM, Tamilnadu

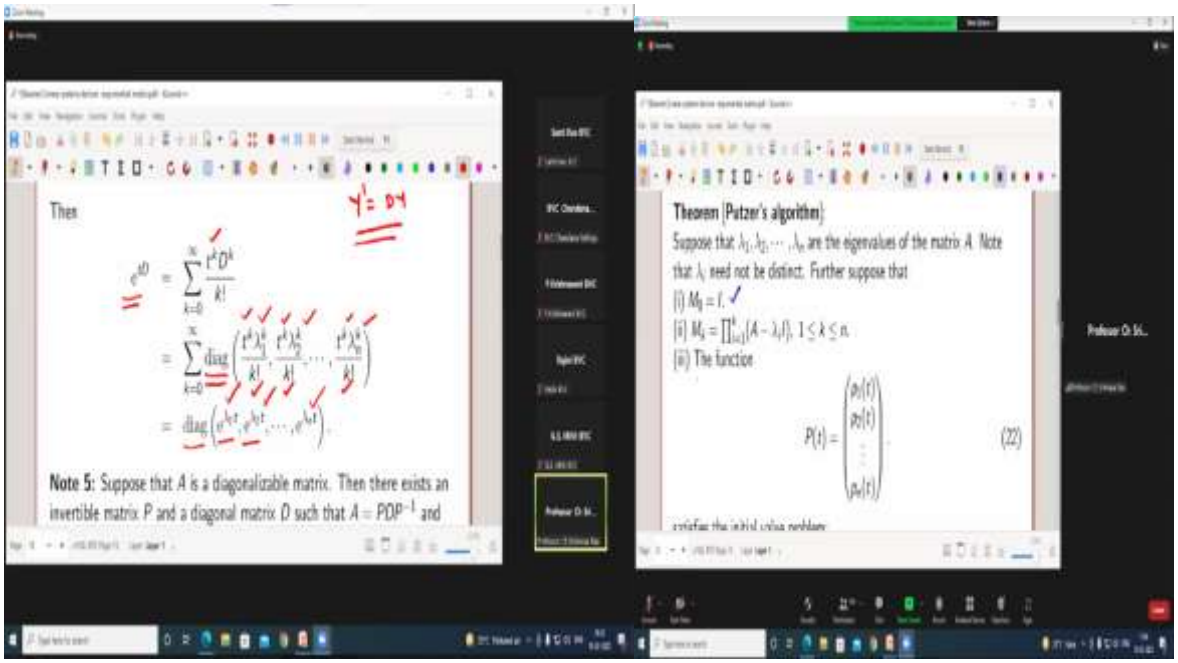
Topic of the Session: Solutions of Systems of Linear Ordinary Differential Equations and Exponential of a Matrix

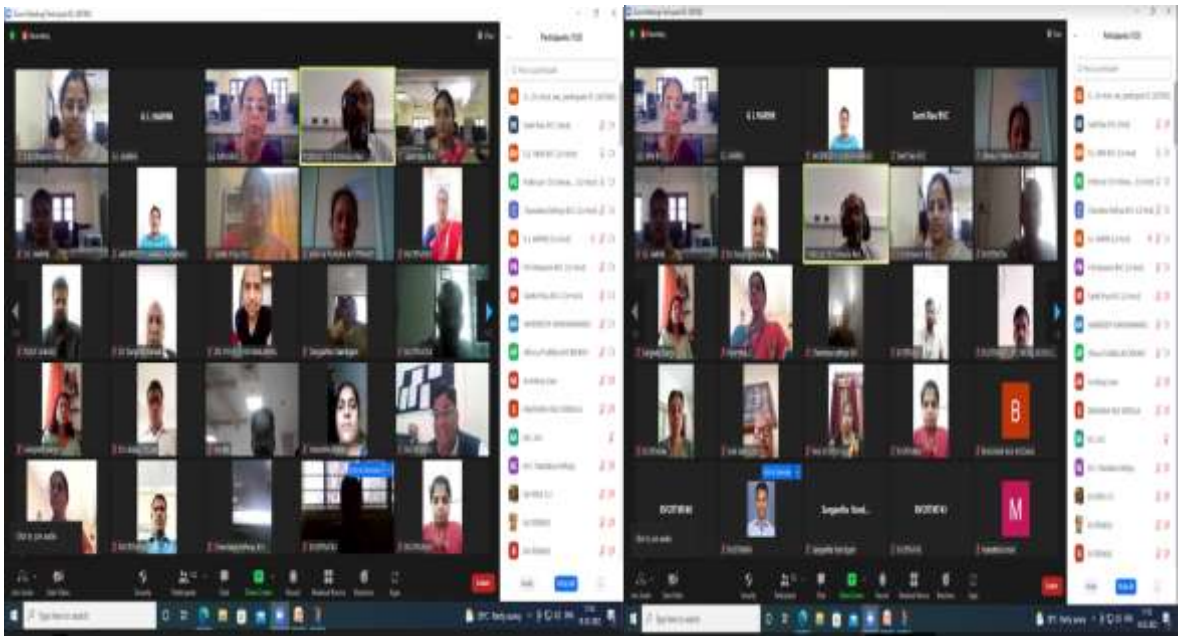
Number of Participants: 170

Report:

Prof. Ch. Srinivasa Rao , Department of Mathematics, IITM , Tamilnadu explained about the Solutions of systems of Linear Ordinary Differential equations and Exponential of a Matrix. He talked about considering one scalar equation, and the solution will be in the form of an exponential form, and he added that if we suppose a system of linear equations Y^1 = Ay assuming that A is a constant matrix then we have two solutions one is same as like the scalar equation solution and the other solution is Y= e^{At} B_1 where B_1 is a vector. He spoke about e^{At} B_1 is the solution of differential equation and how to evaluate e^{At} .He added that it can be done by using Evaluation of e^{At} . He discussed the theorems on how to evaluate e^{At} . To evaluate e^{At} we can use Jordan canonical form , Diagonalisation etc. He added that to avoid Jordan canonical form a methods are invented like Putzer's Algorithm and Leonard's method for evaluating e^{At} . He has talked about Lanchester's model and Battle of Trafalgar and a model of doctoral supervisor-supervisee relationship.







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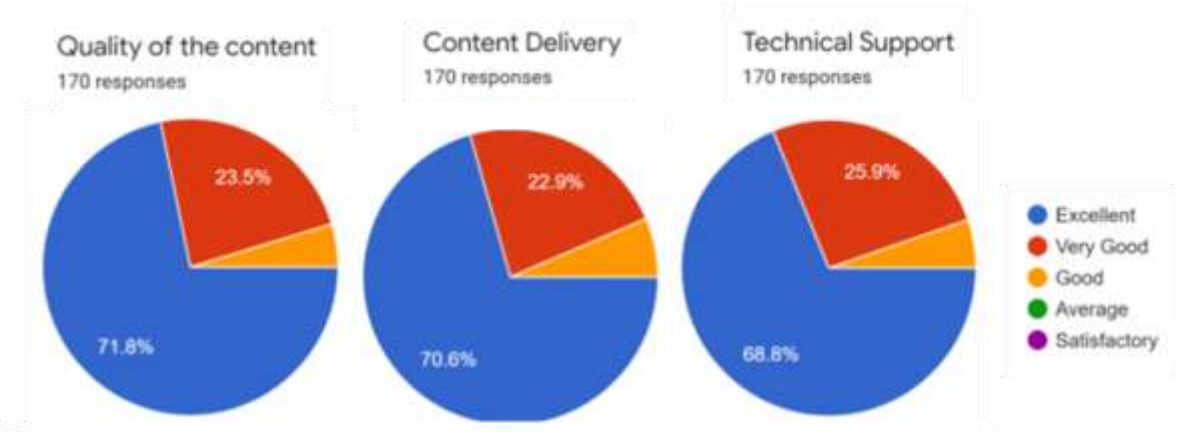
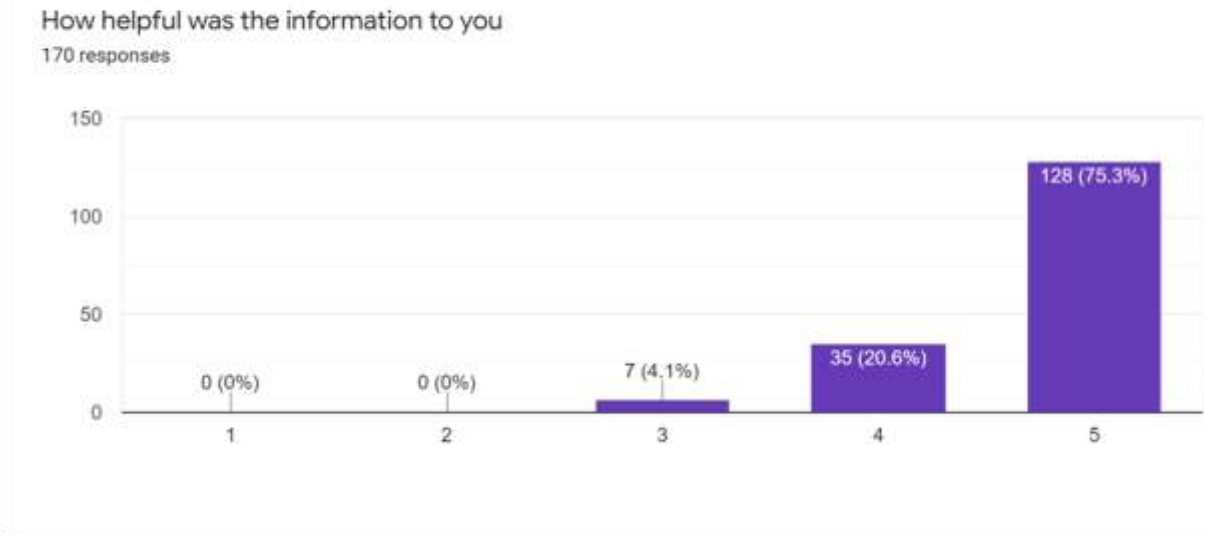
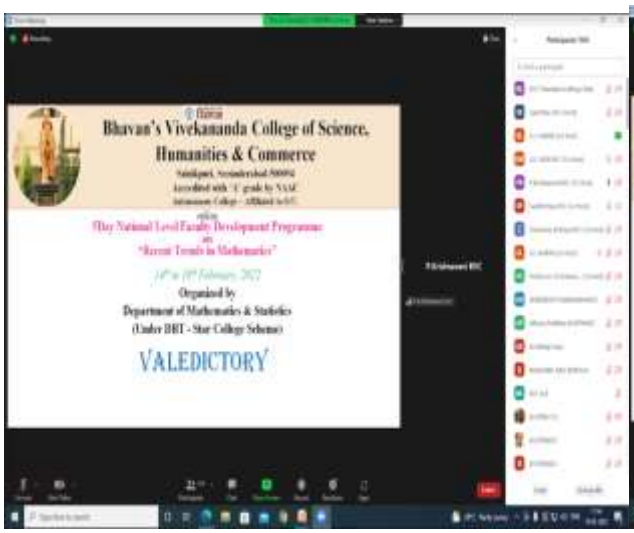
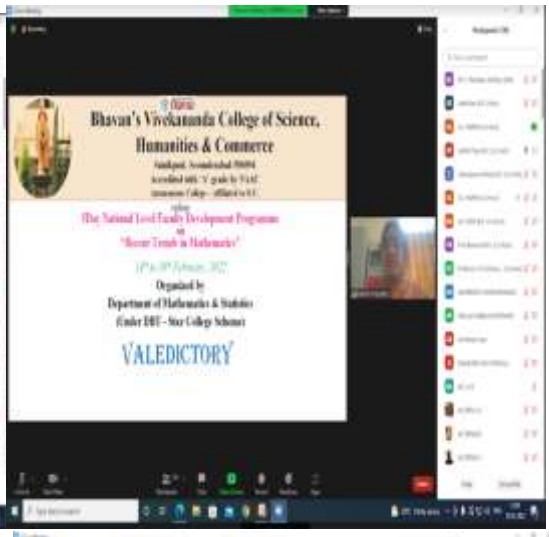




SESSION-2 (VALEDICTORY)

Receiving an overwhelming response from participants, the five-day FDP on 'RECENT TRENDS IN MATHEMATICS' came to an end with the Valedictory session. Mrs G Santhi Priya, faculty from Department of Mathematics and Statistics started the Valedictory session. Mrs P Krishnaveni, Coordinator of the FDP has given a report on FDP saying that the aim of FDP is bringing experts together to share their knowledge and ideas on different topics of Mathematics. Mrs G S Mini, Head, Department of Mathematics and Statistics addressed the gathering and thanked Prof Y Ashok, Principal, BVC, Air Commodore (Retd) J.L.N. Sastry, VSM Vice Chairman, BVB , Dr K Anuradha, Co-ordinator DBT-STAR college scheme,to Prof. V. Kannan, Head, Department of Mathematics, SRM University AP, Chief guest, Prof N Kishan, Head, Department of Mathematics, OU,Guest of honour and expressed heartfelt gratitude to all the resource persons. Vote of Thanks was delivered by Mrs. Santhi Rohit Rao. As a fitting finale, the participants are asked to share their experience and learning from the program. The participants shared their experience and they said that all the sessions were very informative. The program concluded on this happy note.


Bhavan's Vivekananda College of Science,
Humanities & Commerce
VALEDICTORY


Bhavan's Vivekananda College of Science,
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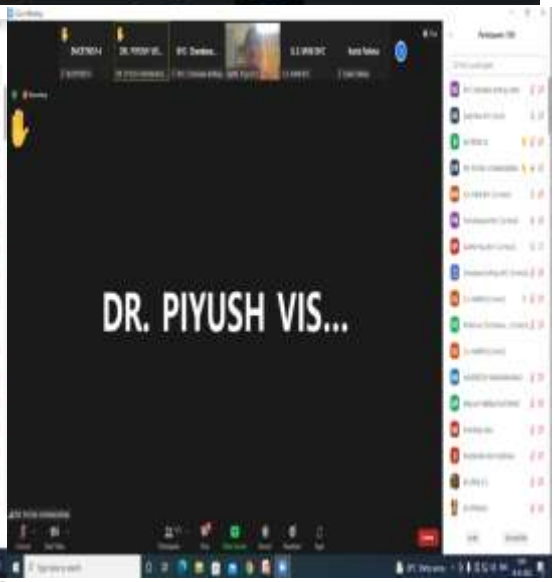
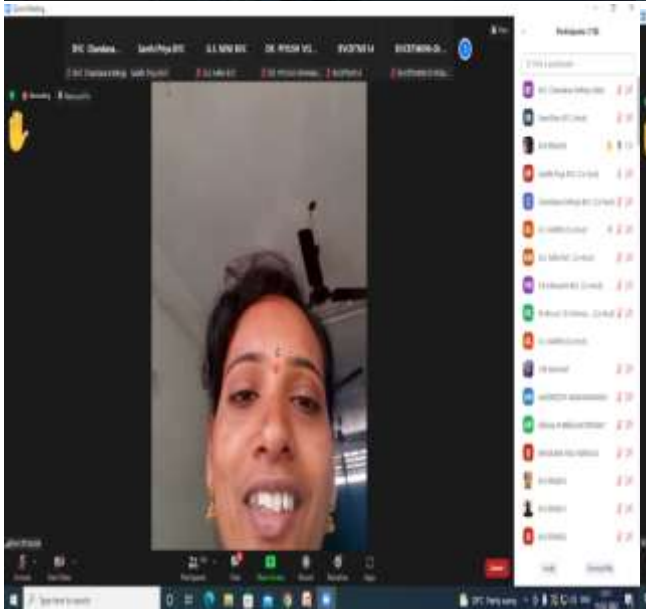
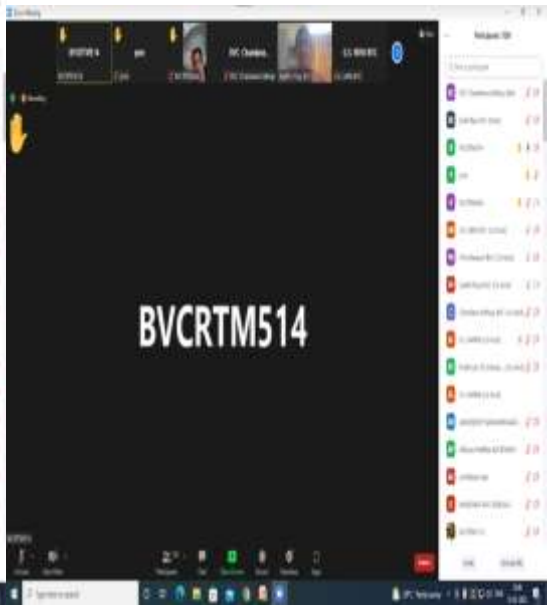
VALEDICTORY


DR. PIYUSH VIS...

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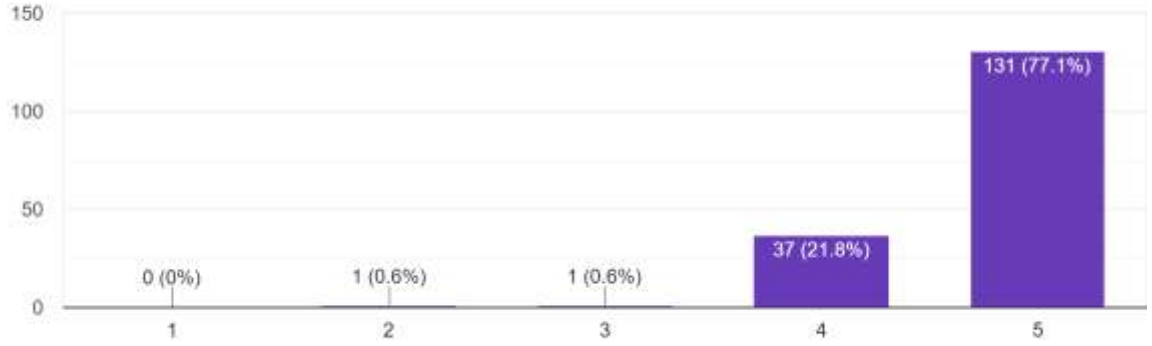
OVERALL FEEDBACK

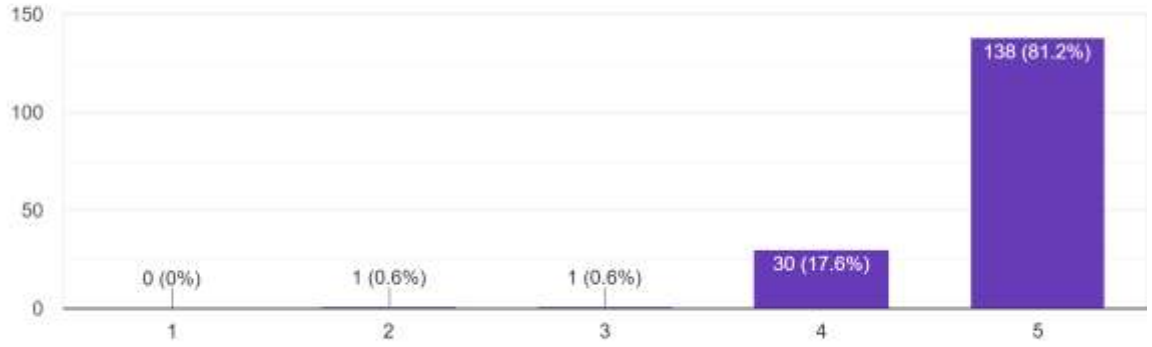
Was the FDP well organized?

170 responses



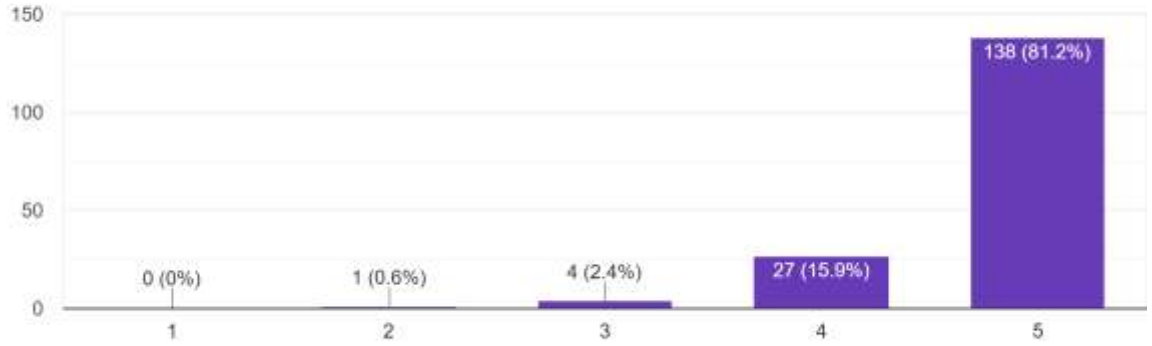
How would you rate the overall FDP experience

170 responses



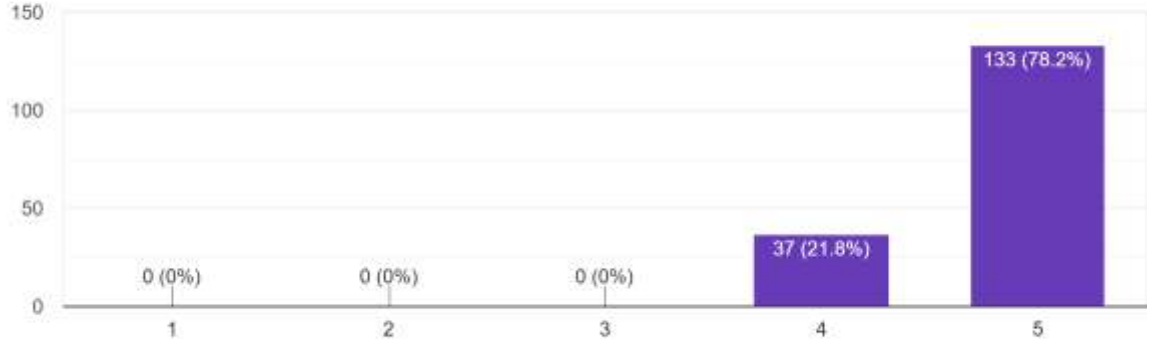
How likely would you be to recommend this FDP to a colleague/friend

170 responses



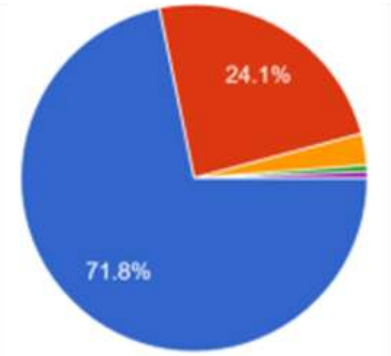
Did the FDP meet your expectations

170 responses



Technical Support

170 responses



Choice of Resource Persons

170 responses