A

Report on

Workshop

on

"Modeling, Simulation and Optimization Tools for Electrical Engineering"

08th -10th August 2022

Organized by

Department of Electrical Engineering
Swami Keshvanand Institute of Technology,
Management & Gramothan, Jaipur

Submitted by:
Dr. Sarfaraz Nawaz, Dr. Jyotsna Singh & Dr. Tanuj Rawat
Department of EE
Event Coordinators

ACKNOWLEDGEMENT

Apart from the efforts of the coordinators of the workshop, the success of any event depends largely on the encouragement and guidelines of many others. We take this opportunity to express my gratitude to the people who have been instrumental in the successful completion of this workshop.

We believe that guidance, support and blessings are the incomparable qualities that my gratitude to our Chairman, Shri Surja Ram Meel, Director, Shri Jaipal Meel and Registrar, Smt. Rachna Meel for providing unconditional freedom and financial support to execute this workshop.

We would also like to thank Dr. S.L. Surana, Director (Academics) and Prof. (Dr.) Ramesh Kumar Pachar, Principal (SKIT) for their constant support.

We would like to show my greatest appreciation to Dr. Sarfaraz Nawaz, Head & Associate Professor, Department of Electrical Engineering. We can't say thank you enough for his tremendous support and help. We feel motivated and encouraged every time we attend his meeting. Without his encouragement and guidance this workshop would not have materialized.

The guidance and support received from all the committee members and student coordinators who contributed to this workshop, was vital for the success of the workshop. We are grateful for their constant support and help.

TABLE OF CONTENTS

1. Approval Letter

Swami Keshvanand Institute of Technology, Management &Gramothan, Jaipur
(Department of Electrical Engineering)

Proposal for

3 Days Workshop
on
Modeling, Simulation and Optimization Tools for Electrical Engineering

21/07/2022

Proposed Dates	**8-10 Aug, 2022**
Convener	**Dr. Sarfaraz Nawaz (Associate Pro., EE Dept**
Coordinators	**Dr. Jyotsna Singh,**Assistant Professor **Dr. Tanuj Rawat,** Assistant Professor

Objective: **To enhance Technical skills of department faculty members**

Target Audience: **Faculty and Research Scholars of Electrical Department**

Expert Members: **Department Faculty members having PhD Degree**

Proposed Budget

S.No	Item	Total
1	Printing of Certificates and stationary items	2000/-

Kindly approve the budget of Rs. 2000/- only

Approved 22/7/2022 Yet permitted.

21.7.22

Forwarded to Registrar for approval

Dr. Sarfaraz Nawaz
(Head-EE Dept)

2. BROCHURE OF WORKSHOP

Patrons

Shri Raja Ram Meel, Patron, SKIT
Shri Surja Ram Meel, Chairman, SKIT

Advisory Committee

Shri Jaipal Meel, Director, SKIT
Prof. S. L. Surana, Director (Academics), SKIT
Mrs. Rachna Meel, Registrar, SKIT
Prof. Ramesh Kumar Pachar, Principal, SKIT
Prof. M.L.Bhargava, Advisor, SKIT
Mrs. Abba Meel, Advisor, SKIT
Prof. R.K.Jain, Dean, SKIT
Dr. Sarfarz Nawaz, HOD (EE), SKIT
Prof. Anil Choudhary, HOD (IT), SKIT
Prof. Mukesh Gupta, HOD (CSE), SKIT
Prof. Mukesh Arora, Head (ECE & OFA), SKIT
Prof. Dheeraj Joshi, HOD (ME), SKIT
Prof. D. K. Sharma, HOD (CE), SKIT
Prof. Rohit Mukherjee, Incharge, I Year, SKIT
Prof. Amber Srivastava, Head (Math), SKIT
Dr. Sharda Soni, Head (Chemistry), SKIT
Prof. Brajraj Sharma, Head (Physics), SKIT
Prof. Neha Purohit, Head (English), SKIT
Prof. Ona Ladiwal, HOD (DMS), SKIT
Prof. Sangeeta Vyas, Head (OSA), SKIT

Faculty Members

Prof. Akash Saxena	**Mrs. Kavita Jain**
Dr. Virendra Sangtani	**Mrs. Deepti Arela**
Dr. Dhanraj Chitara	**Mr. Jinendra Rahul**
Dr. Suman Sharma	**Mr. Jitendra Singh**
Dr. Pooja Jain	**Mr. Ajay Bharadwaj**
Dr. Ankit Vijayvargiya	**Mohd. Yusuf Sharif**
Mr. Abhishek Gupta	**Mr. Vivek Sharma**
Mr. Ankush Tandon	**Mohd. Imran**
Mr. Tarun Naruka	**Mr. Akash Deo**
Mr. Bharat Modi	**Mr. Avadhesh Sharma**
Mrs. Smriti Jain	**Mr. Garvit Gupta**
Mr. Vikas Mahala	**Mr. Deepak Saini**
Mrs. Baibhav Bishal	**Mr. Mahesh Meena**

REGISTRATION

To join this workshop, you are requested to register your name by clicking the following registration link or scanning QR code:

https://forms.gle/pDVrSk5DevX6bw2f7

CONVENER

Dr. Sarfaraz Nawaz
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Email: sarfarz@skit.ac.in

COORDINATORS

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Dr. Tanuj Rawat
Assistant Professor
Phone: 9899060750
Email: tanuj.rawat@skit.ac.in

STUDENT COORDINATORS

Ms. Mumal Bhati
II Year (EE Dept., SKIT)

Ms. Kunika Khandelwal
II Year (CS Dept., SKIT)

A Workshop

on

Modeling, Simulation and Optimization Tools for Electrical Engineering

August 8-10, 2022

Organized by

Department of Electrical Engineering,

Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur- 302017

www.skit.ac.in

About SKIT, Jaipur

Swami Keshvanand Institute of Technology, Management & Gramothan (SKIT) has been Ranked No.1 Engineering Institute in Rajasthan by RTU Kota consecutively for the last five years. The institute was established in the year 2000 by a team of committed professionals and academicians. During all the past years SKIT has emerged as a premier centre of technical education not only in Rajasthan but also in Northern India, which has been realized through efficient and dedicated faculty members, innovative teaching learning methods, and core value of discipline. The various undergraduate programmes of the institute are accredited by the National Board of Accreditation (NBA). SKIT is only affiliated technical institute in Rajasthan to have earned an A++ grade by National Assessment And Accreditation Council (NAAC).

Department of Electrical Engineering

The Department of Electrical Engineering is distinctly focused towards integrating academics with cutting edge technology in the field of Electrical Engineering. The B. Tech. Program has been accredited four times in succession by NBA since 2009 Department is also conducting M. Tech. and PhD Program in Power Systems specialization. All efforts are subtly harnessed with the aim of preparing the budding engineers to face the challenging dimensions of technical excellence in areas such as Electrical Machines & Drives, Control & Automation, Power Systems Design, Power Electronics and MATLAB Applications. The department puts in consistent efforts for field exposure to students through various research-oriented projects taken up for meeting the industry demands. The department offers a perfect blend of Electrical, Electronics and Computer related courses to help students pursue a professional career or higher studies.

About the workshop

Researchers in engineering and science require platforms that let them explore and express new ideas, solve difficult problems, and create tools, leveraging a robust and flexible computational foundation. Several platforms such MATLAB ((MATrix LABoratory), PSCAD (Power Systems Computer Aided Design) Python, GAMS (General Algebraic Modeling System), PWS(Power world Simulator) and many more are widely used across industries for research and product development, so researchers can apply their research to interesting and challenging real-world examples. The workshop aims at deliberation and sharing knowledge to faculty, post graduate (PG) students and research scholars of Electrical Engineering Department about the significance of different tools and their application and present current research opportunities in the field. The discussion shall also foster inter-disciplinary collaborative research in Electrical Department. Moreover, this program provides an excellent opportunity to exchange ideas on the topics of importance along with thought provoking technical sessions.

Thrust Area

This workshop will cover in hand experience on following tools:

- MATLAB Coding
- PSCAD
- MATPOWER Toolbox
- PSAT Toolbox
- Optimization Toolbox
- PYTHON
- Power World Simulator
- GAMS

Workshop Schedule

The workshop will be conducted from 8-10 August 2022, consisting of three sessions in each day.

Date	Session-I	Session-II	Session-III
8-10 August, 2022	9:00 - 10:00 AM	10:30- 11:30 AM	12:30- 1:30 PM

3. SCHEDULE OF WORKSHOP

DAY 1 (Monday, 08.08.2022)		
Session – I (9– 10:00 AM) **Prof. Akash Saxena** **Professor, Department of EE, SKIT M&G** **Topic: Optimization Toolbox in MATLAB**	**Session II-(10:30-11:30AM)** **Dr. Tanuj Rawat** Assistant Professor, Department of EE, SKIT, M&G **Topic: MATPOWER Toolbox**	**Session – II (12:30 – 01:30PM)** **Dr. Ankit Vijayvargiya** Associate Professor, Department of EE, SKIT M&G **Topic: Introduction to Python**
DAY 2 (Tuesday, 09.08.2022)		
Session II (9– 10:00 AM) **Dr. Sarfaraz Nawaz** **Associate Professor and Head, Department of EE, SKIT M&G** **Topic: Power World Simulator and PSCAD**	**Session II (10:30-11:30AM)** **Dr. Dhanraj Chitara** Associate Professor, Department of EE SKIT M&G **Topic: Power System Analysis Toolbox (PSAT)**	**Session – II (12:30 – 01:30PM)** **Dr. Pooja Jain** Assistant Professor, Department of EE, SKIT M&G **Topic: Bidding Price Simulator**
DAY 3 (Wednesday, 10. 08.2022)		
Session I (9: 10:00 AM) **Dr. Suman Sharma** **Associate Professor, Department of EE** **SKIT M&G** **Topic: General Algebraic Modeling System (GAMS)**	**Session III (10:30 – 11:30M)** **Dr. Virendra Sangtani** Associate Professor, Department of EE SKIT M&G **Topic: MATLAB Simulation in Engineering Applications**	

4. LIST OF INVITED SPEAKERS

S. No.	Guests/Speakers Name	Affiliation
1.	Dr. Akash Saxena	**Professor** Department of Electrical Engineering, SKIT M & G, Jaipur
2.	Dr. Tanuj Rawat	**Assistant Professor** Department of Electrical Engineering, SKIT M & G, Jaipur
3.	Dr. Ankit Vijayvargiya	**Associate Professor** Department of Electrical Engineering, SKIT M & G, Jaipur
4.	Dr. Sarfaraz Nawaz	**Associate Professor and HOD** Department of Electrical Engineering, SKIT M & G, Jaipur
5.	Dr. Dhanraj Chitara	**Associate Professor** Department of Electrical Engineering, SKIT M & G, Jaipur
6.	Dr. Pooja Jain	**Assistant Professor** Department of Electrical Engineering, SKIT M & G, Jaipur
7.	Dr. Suman Sharma	**Associate Professor** Department of Electrical Engineering, SKIT M & G, Jaipur
8.	Dr. Virendra Sangtani	**Associate Professor** Department of Electrical Engineering, SKIT M & G, Jaipur

5. LIST OF REGISTERED PARTICIPANTS WITH DETAILS OF AFFILIATING INSTITUTE

S.No.	Name of Participant	Faculty/ Scholar ID	Email Address	Name of Institute/Industry
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17	Mrs. Deepti Arela	658	deeptiarelapce@gmail.com	SKIT G&M, Jaipur
18	Ms. Ananya Srivastav	20ESKPS600	ananyasrivastav7187@gmail.com	SKIT G&M, Jaipur
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21	MD Yusuf Sharif	816	yusuf.sharif@skit.ac.in	SKIT G&M, Jaipur
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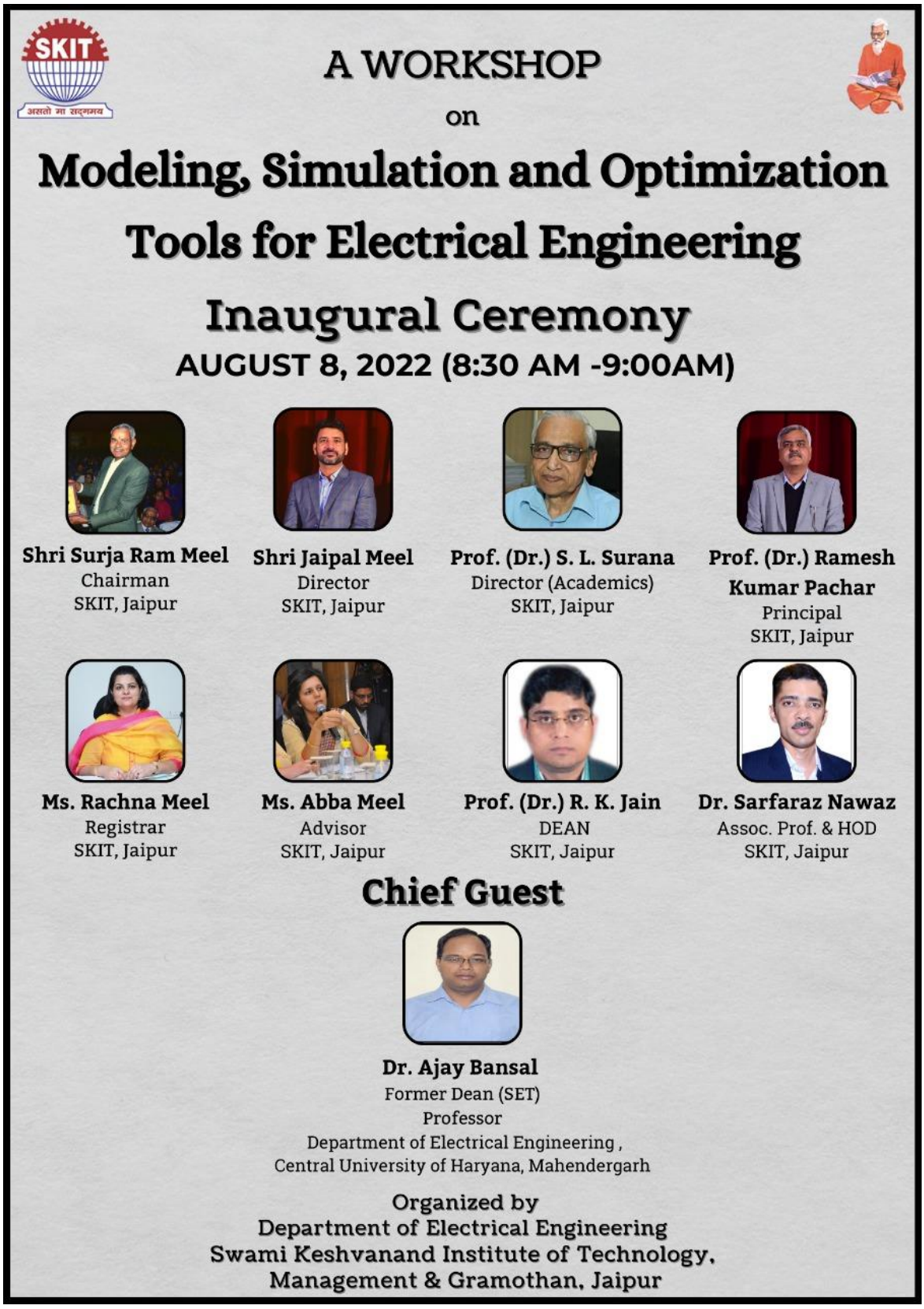
26	Mr. Tarun Naruka	192	tarun.naruka@skit.ac.in	SKIT G&M, Jaipur
27	Ms. Baibhav Bishal	687	baibhav.bishal@skit.ac.in	SKIT G&M, Jaipur
28	Mr. Deepak Saini	822	deepaksaini@skit.ac.in	SKIT G&M, Jaipur
29	Dr. Akash Saxena	711	akash@skit.ac.in	SKIT G&M, Jaipur

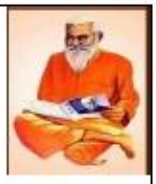
6. EVENT PHOTOGRAPHS

Inaugural Poster



Minutes of Meeting of Inaugural Session

Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur
Department of Electrical Engineering



Organizes

A
Workshop
On

Modeling, Simulation and Optimization Tools for Engineering Applications

August 8-10, 2022

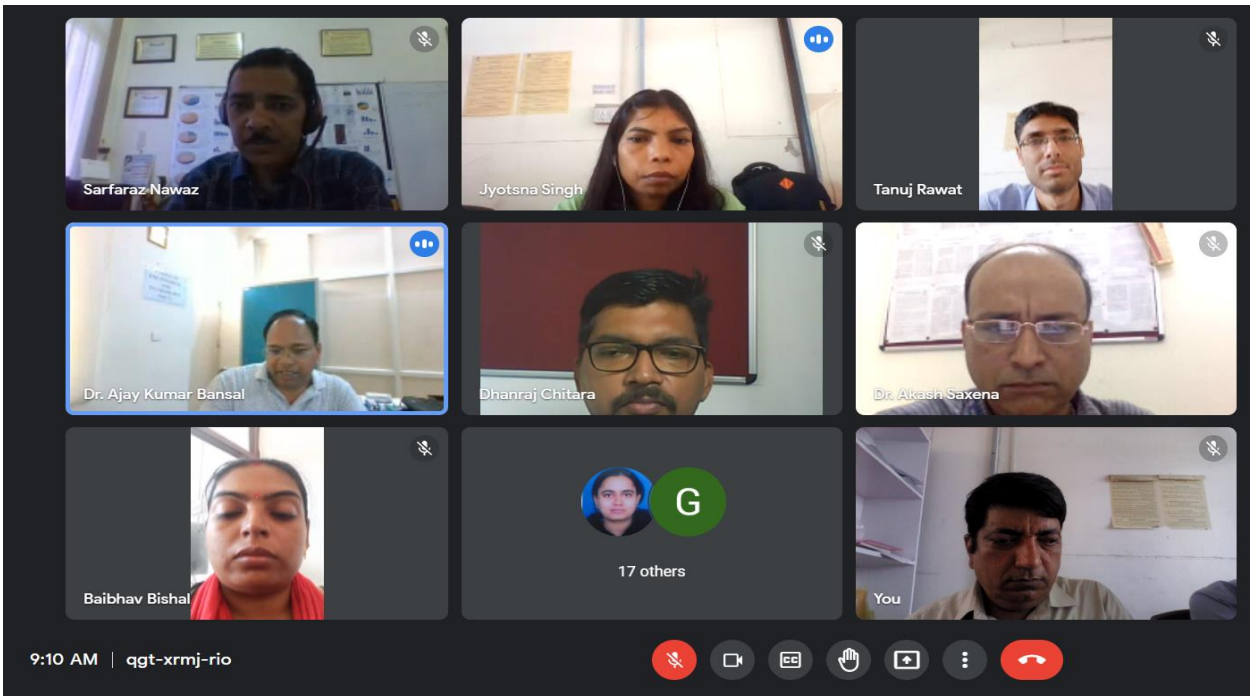
Invitation for

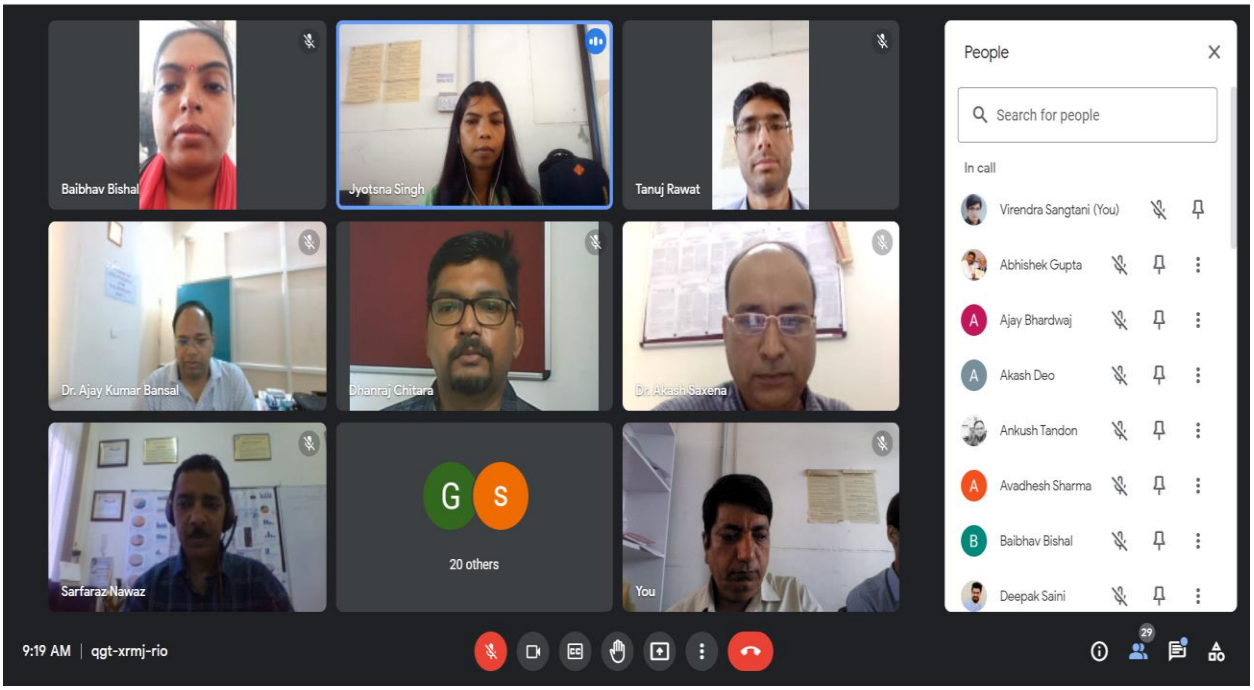
Inaugural Ceremony

(August 8, 2022 at 8:30AM onwards)
(Minute to Minute Programme)

Event Description	Duration
Welcome *(Dr. Jyotsna Singh, Asst. Prof., EE Dept., SKIT,Jaipur)*	8:30 AM– 8:35 AM
About the Department *(Dr. Sarfaraz Nawaz, Associate Professor and HOD, EE Dept., SKIT, Jaipur)*	8:35 AM–8:40 AM
About Workshop *(Dr. Jyotsna Singh, Assistant Professor, EE Dept. SKIT, Jaipur)*	8:40 AM–8:45 AM
Address by the Chief Guest *(Dr. Ajay Bansal Former Dean (SET) Professor, Department of Electrical Engineering, Central University of Haryana, Mahendergarh)*	8:45 AM–8:55 AM
Vote of Thanks *(Dr. Virendra Sangtani, Associate Prof. EE Dept., SKIT, Jaipur)*	8:55 AM–9:00 AM

Day-1 Inaugural Session (8:30-09:00 AM)





Day-1 Session-I (09:00-10:00 AM)


NOTICE

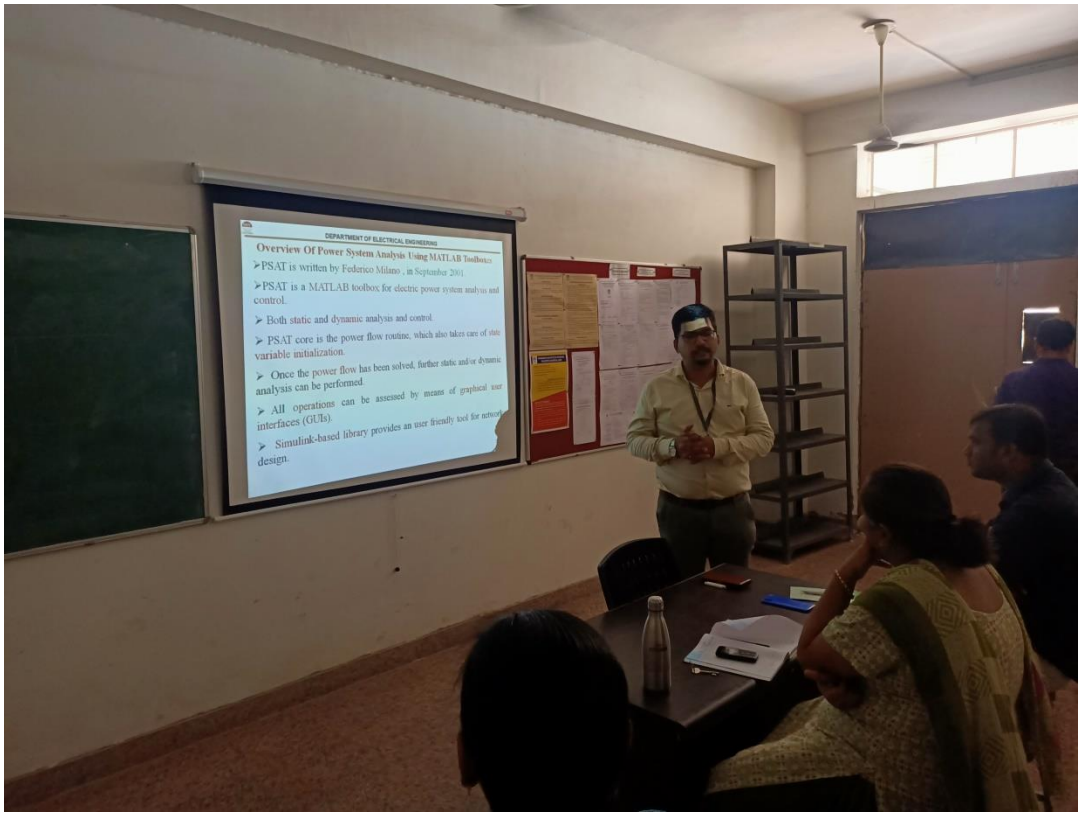
Day-1 Session-II (10:30-11:30 AM)

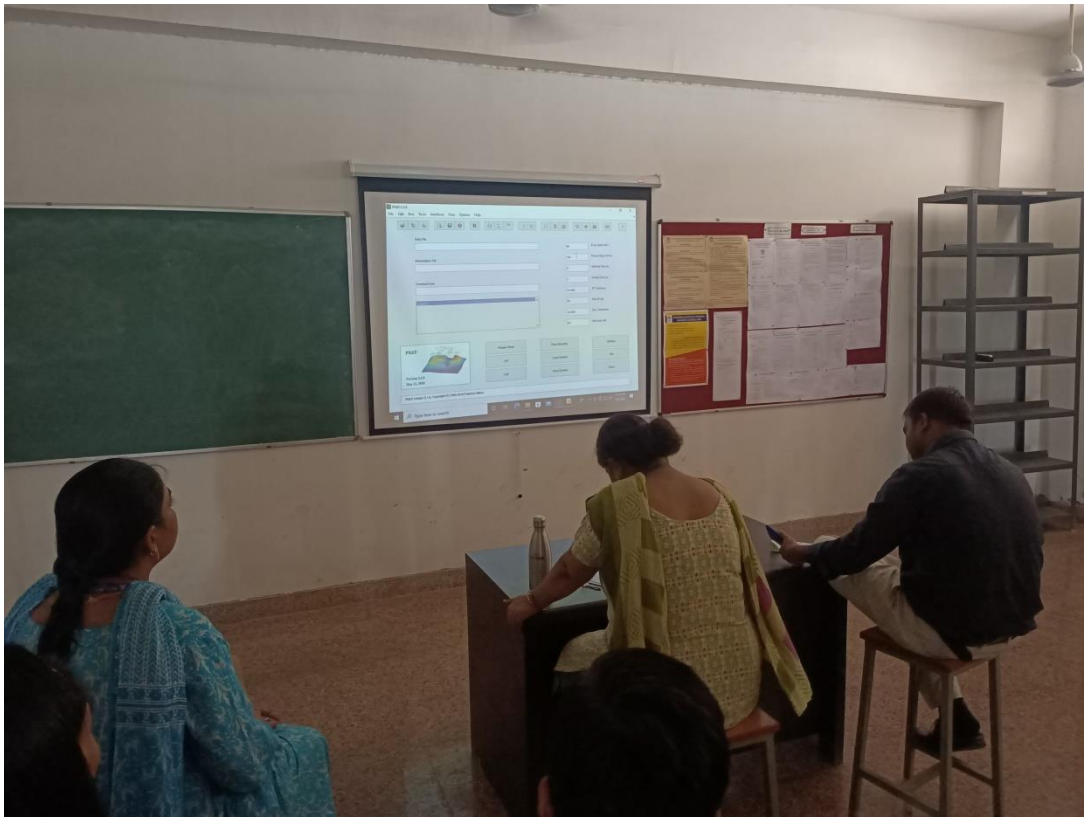
Day-1 Session-III (12:30-01:30 PM)


NOTICE

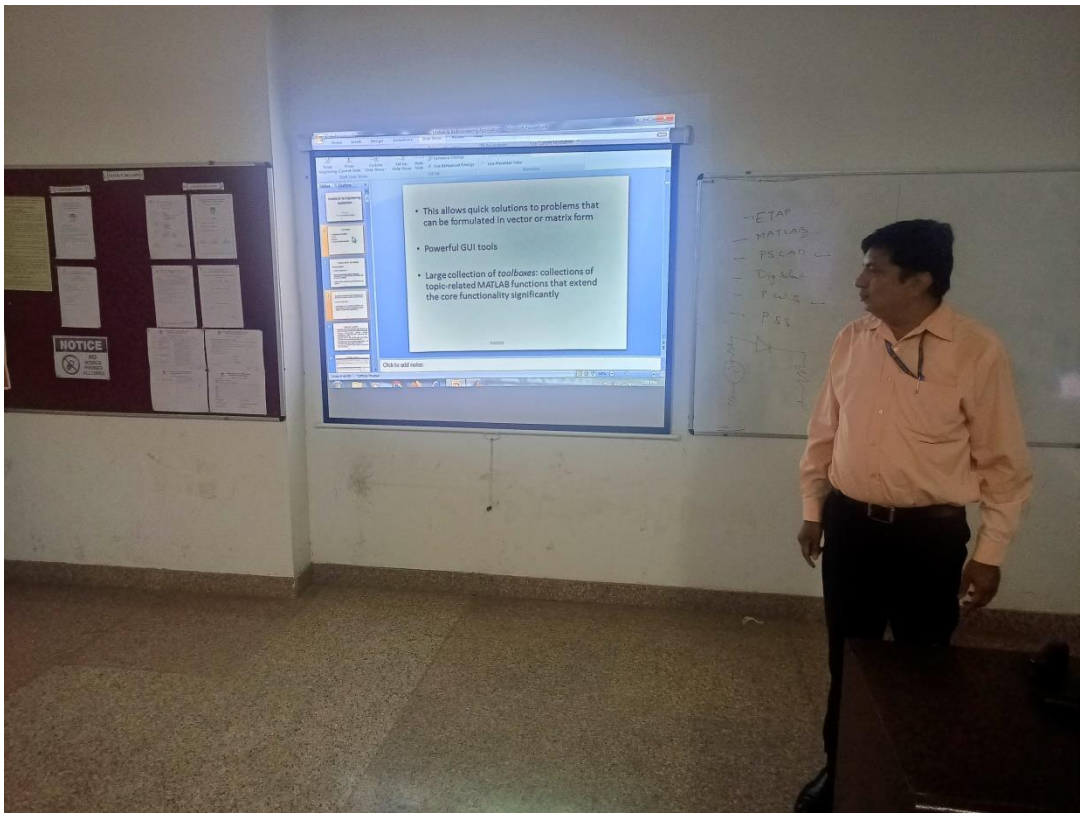
Day-2 Session-I (09:00-10:00 AM)

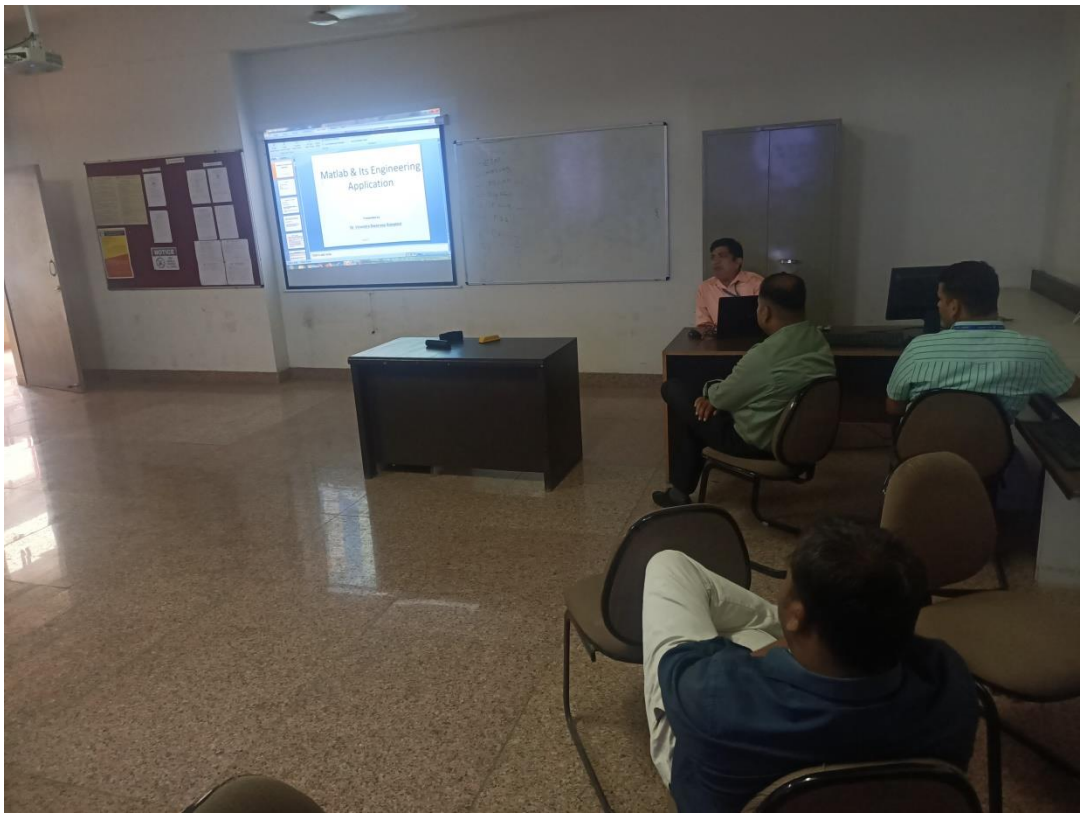
Day-2 Session-II (10:30-11:30 AM)





Day-2 Session-III (12:30-1:30 PM)





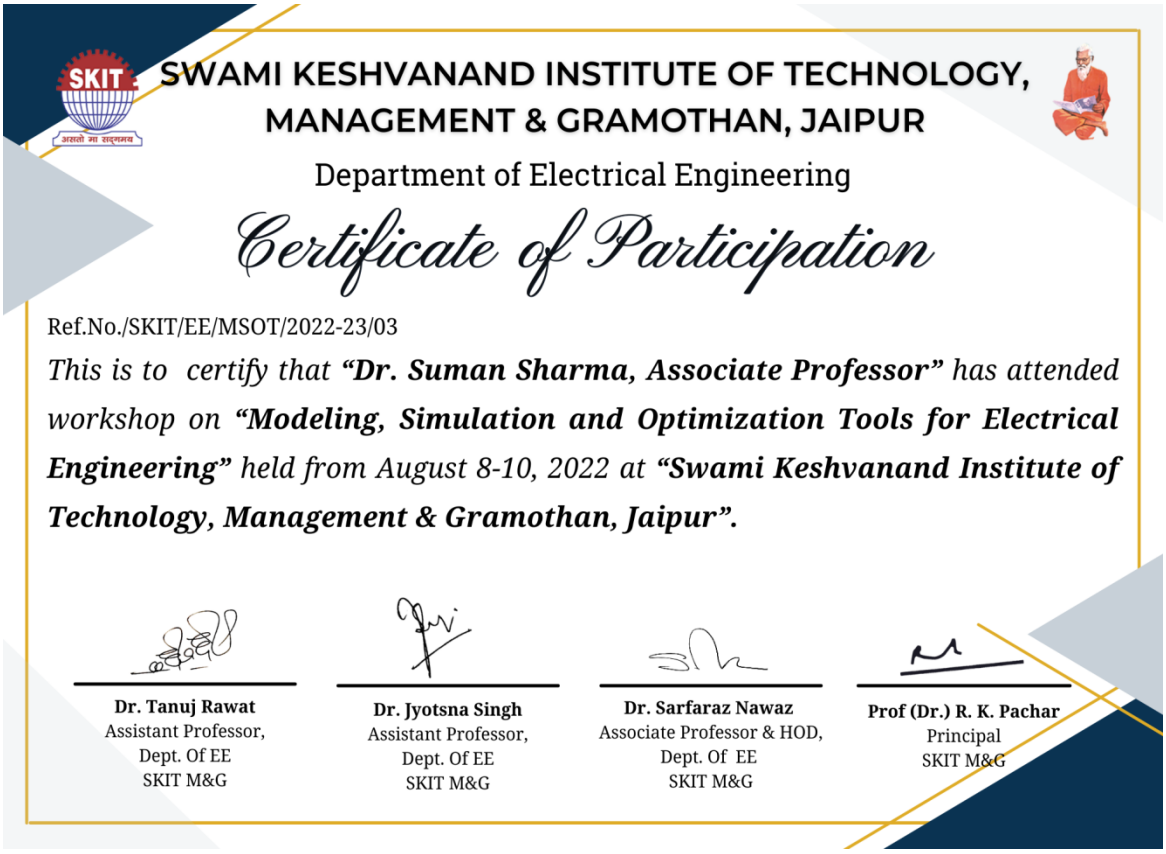

Graph


Thank you
ETAP
MATLAB
PSCAD
PSS

Day-3 Session-I (09:00-10:00 AM)

Day-3 Valedictory Function (10:30-11:00 AM)

7. SAMPLE COPY OF CERTIFICATES



SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY, MANAGEMENT & GRAMOTHAN, JAIPUR

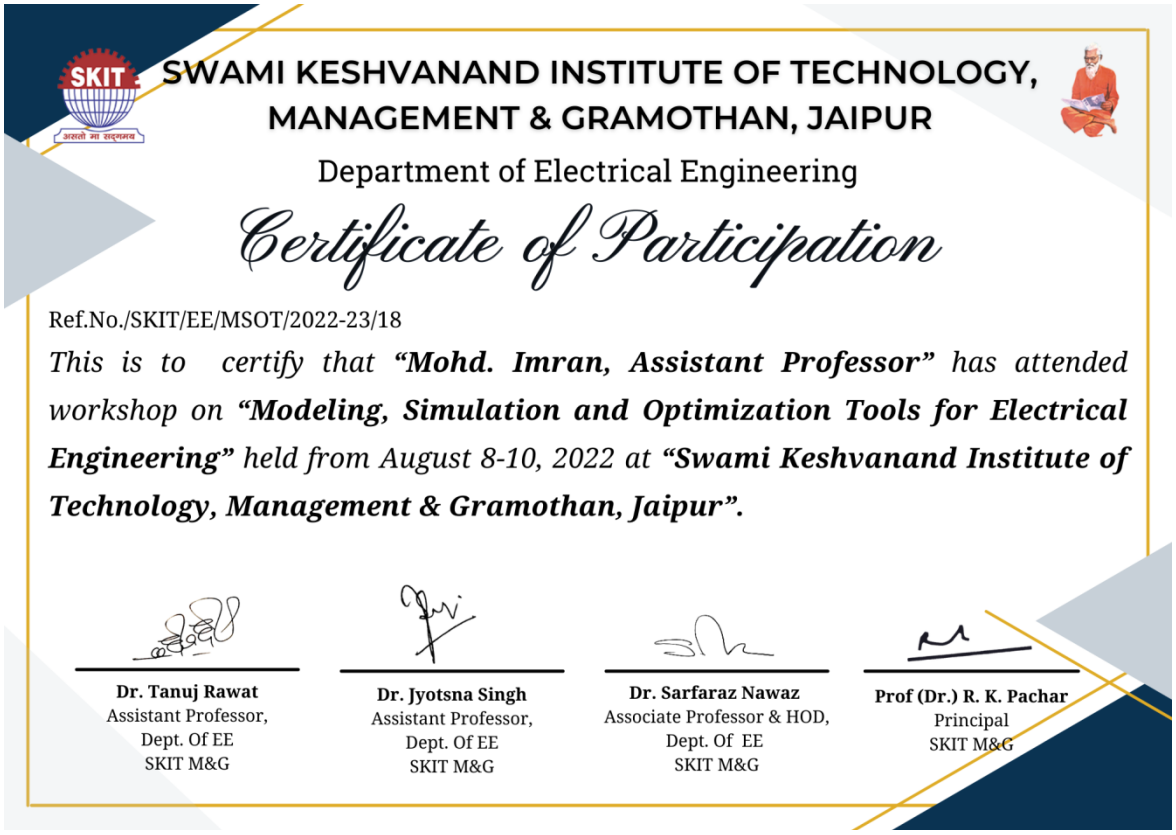
Department of Electrical Engineering

Certificate of Participation

Ref.No./SKIT/EE/MSOT/2022-23/03

This is to certify that ***"Dr. Suman Sharma, Associate Professor"*** *has attended workshop on* ***"Modeling, Simulation and Optimization Tools for Electrical Engineering"*** *held from August 8-10, 2022 at* ***"Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur".***

Dr. Tanuj Rawat	Dr. Jyotsna Singh	Dr. Sarfaraz Nawaz	Prof (Dr.) R. K. Pachar
Assistant Professor, Dept. Of EE SKIT M&G	Assistant Professor, Dept. Of EE SKIT M&G	Associate Professor & HOD, Dept. Of EE SKIT M&G	Principal SKIT M&G



SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY, MANAGEMENT & GRAMOTHAN, JAIPUR

Department of Electrical Engineering

Certificate of Participation

Ref.No./SKIT/EE/MSOT/2022-23/18

This is to certify that ***"Mohd. Imran, Assistant Professor"*** *has attended workshop on* ***"Modeling, Simulation and Optimization Tools for Electrical Engineering"*** *held from August 8-10, 2022 at* ***"Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur".***

Dr. Tanuj Rawat	Dr. Jyotsna Singh	Dr. Sarfaraz Nawaz	Prof (Dr.) R. K. Pachar
Assistant Professor, Dept. Of EE SKIT M&G	Assistant Professor, Dept. Of EE SKIT M&G	Associate Professor & HOD, Dept. Of EE SKIT M&G	Principal SKIT M&G

SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY, MANAGEMENT & GRAMOTHAN, JAIPUR

Department of Electrical Engineering

Certificate of Appreciation

Ref.No./SKIT/EE/MSOT/2022-23/04

This is to certify that ***"Dr. Tanuj Rawat, Assistant Professor"*** *has contributed as Resource Person in workshop on* ***"Modeling, Simulation and Optimization Tools for Electrical Engineering"*** *held from August 8-10, 2022 at* ***"Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur".***

Dr. Sarfaraz Nawaz
Associate Professor & HOD,
Dept. Of EE
SKIT M&G

Prof (Dr.) R. K. Pachar
Principal
SKIT M&G

SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY, MANAGEMENT & GRAMOTHAN, JAIPUR

Department of Electrical Engineering

Certificate of Appreciation

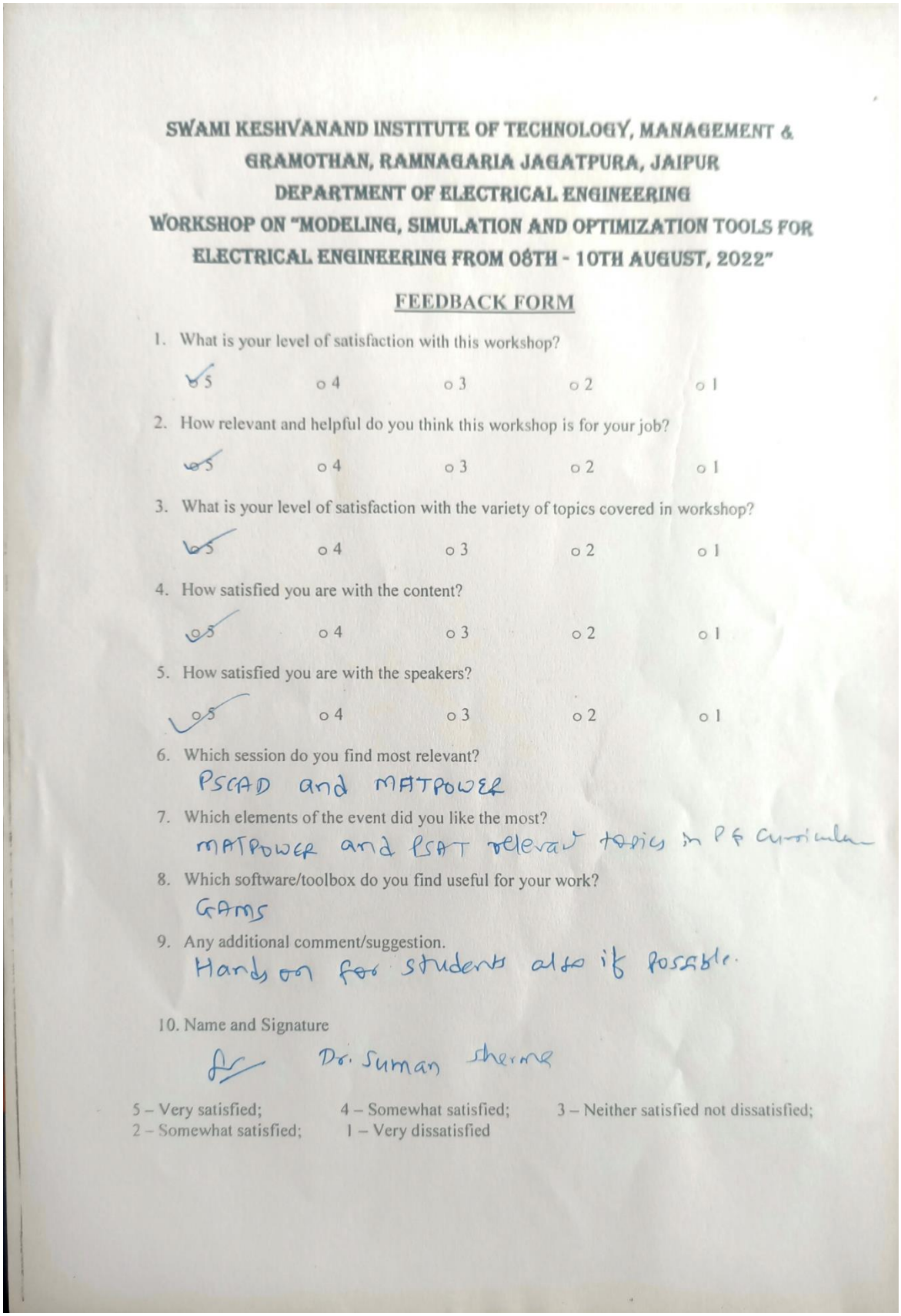
Ref.No./SKIT/EE/MSOT/2022-23/06

This is to certify that ***"Dr. Dhanraj Chitara, Associate Professor"*** *has contributed as Resource Person in workshop on* ***"Modeling, Simulation and Optimization Tools for Electrical Engineering"*** *held from August 8-10, 2022 at* ***"Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur".***

Dr. Sarfaraz Nawaz
Associate Professor & HOD,
Dept. Of EE
SKIT M&G

Prof (Dr.) R. K. Pachar
Principal
SKIT M&G

8. FEEDBACK FROM THE PARTICIPANTS



SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY, MANAGEMENT & GRAMOTHAN, RAMNAGARIA JAGATPURA, JAIPUR

DEPARTMENT OF ELECTRICAL ENGINEERING

WORKSHOP ON "MODELING, SIMULATION AND OPTIMIZATION TOOLS FOR ELECTRICAL ENGINEERING FROM 08TH - 10TH AUGUST, 2022"

FEEDBACK FORM

1. What is your level of satisfaction with this workshop?

   ✓5 o 4 o 3 o 2 o 1

2. How relevant and helpful do you think this workshop is for your job?

   ✓5 o 4 o 3 o 2 o 1

3. What is your level of satisfaction with the variety of topics covered in workshop?

   ✓5 o 4 o 3 o 2 o 1

4. How satisfied you are with the content?

   ✓5 o 4 o 3 o 2 o 1

5. How satisfied you are with the speakers?

   ✓5 o 4 o 3 o 2 o 1

6. Which session do you find most relevant?

   PSCAD and MATPOWER

7. Which elements of the event did you like the most?

   MATPOWER and PSAT relevant topics in P & Curriculum

8. Which software/toolbox do you find useful for your work?

   GAMS

9. Any additional comment/suggestion.

   Hands on for students also if possible.

10. Name and Signature

    Dr. Suman Sharma

5 – Very satisfied; 4 – Somewhat satisfied; 3 – Neither satisfied not dissatisfied;
2 – Somewhat satisfied; 1 – Very dissatisfied

SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY, MANAGEMENT & GRAMOTHAN, RAMNAGARIA JAGATPURA, JAIPUR

DEPARTMENT OF ELECTRICAL ENGINEERING

WORKSHOP ON "MODELING, SIMULATION AND OPTIMIZATION TOOLS FOR ELECTRICAL ENGINEERING FROM 08TH - 10TH AUGUST, 2022"

FEEDBACK FORM

1. What is your level of satisfaction with this workshop?

   ○ 5 ✓ 4 ○ 3 ○ 2 ○ 1

2. How relevant and helpful do you think this workshop is for your job?

   ✓ 5 ○ 4 ○ 3 ○ 2 ○ 1

3. What is your level of satisfaction with the variety of topics covered in workshop?

   ✓ 5 ○ 4 ○ 3 ○ 2 ○ 1

4. How satisfied you are with the content?

   ○ 5 ✓ 4 ○ 3 ○ 2 ○ 1

5. How satisfied you are with the speakers?

   ✓ 5 ○ 4 ○ 3 ○ 2 ○ 1

6. Which session do you find most relevant?

   Matlab & Simulink by Dr. Virendra Sangtani sir.

7. Which elements of the event did you like the most?

   Hands on session by Dr. Akash sir.

8. Which software/toolbox do you find useful for your work?

   Matlab

9. Any additional comment/suggestion.

   Workshop should be of 1 week.

10. Name and Signature Abhishek Gupta. —

5 – Very satisfied; 4 – Somewhat satisfied; 3 – Neither satisfied not dissatisfied;
2 – Somewhat satisfied; 1 – Very dissatisfied

SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY, MANAGEMENT & GRAMOTHAN, RAMNAGARIA JAGATPURA, JAIPUR

DEPARTMENT OF ELECTRICAL ENGINEERING

WORKSHOP ON "MODELING, SIMULATION AND OPTIMIZATION TOOLS FOR ELECTRICAL ENGINEERING FROM 08TH - 10TH AUGUST, 2022"

FEEDBACK FORM

1. What is your level of satisfaction with this workshop?

✓ ○ 5 ○ 4 ○ 3 ○ 2 ○ 1

2. How relevant and helpful do you think this workshop is for your job?

✓ ○ 5 ○ 4 ○ 3 ○ 2 ○ 1

3. What is your level of satisfaction with the variety of topics covered in workshop?

✓ ○ 5 ○ 4 ○ 3 ○ 2 ○ 1

4. How satisfied you are with the content?

✓ ○ 5 ○ 4 ○ 3 ○ 2 ○ 1

5. How satisfied you are with the speakers?

✓ ○ 5 ○ 4 ○ 3 ○ 2 ○ 1

6. Which session do you find most relevant?

Dr. Virendra Sangtheni Sir session. (MATLAB)

7. Which elements of the event did you like the most?

Python & MATLAB

8. Which software/toolbox do you find useful for your work?

MATLAB & Python.

9. Any additional comment/suggestion.

One more workshop is required to learn deep knowledge of softwares.

10. Name and Signature

GARVIT GUPTA (गर्वित गुप्ता) 10/8/22

5 – Very satisfied; 4 – Somewhat satisfied; 3 – Neither satisfied not dissatisfied;
2 – Somewhat satisfied; 1 – Very dissatisfied

SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY, MANAGEMENT & GRAMOTHAN, RAMNAGARIA JAGATPURA, JAIPUR

DEPARTMENT OF ELECTRICAL ENGINEERING

WORKSHOP ON "MODELING, SIMULATION AND OPTIMIZATION TOOLS FOR ELECTRICAL ENGINEERING FROM 08TH - 10TH AUGUST, 2022"

FEEDBACK FORM

1. What is your level of satisfaction with this workshop?

   ○ 5 ○ 4 ○ 3 ○ 2 ○ 1

2. How relevant and helpful do you think this workshop is for your job?

   ○ 5 ○ 4 ○ 3 ○ 2 ○ 1

3. What is your level of satisfaction with the variety of topics covered in workshop?

   ○ 5 ○ 4 ○ 3 ○ 2 ○ 1

4. How satisfied you are with the content?

   ○ 5 ○ 4 ○ 3 ○ 2 ○ 1

5. How satisfied you are with the speakers?

   ○ 5 ○ 4 ○ 3 ○ 2 ○ 1

6. Which session do you find most relevant?

   All

7. Which elements of the event did you like the most?

   All

8. Which software/toolbox do you find useful for your work?

   All

9. Any additional comment/suggestion.

   N/o

10. Name and Signature Baibhav

    BAIBHAV BISHAL

5 – Very satisfied; 4 – Somewhat satisfied; 3 – Neither satisfied not dissatisfied;
2 – Somewhat satisfied; 1 – Very dissatisfied

SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY, MANAGEMENT & GRAMOTHAN, RAMNAGARIA JAGATPURA, JAIPUR

DEPARTMENT OF ELECTRICAL ENGINEERING

WORKSHOP ON "MODELING, SIMULATION AND OPTIMIZATION TOOLS FOR ELECTRICAL ENGINEERING FROM 08TH - 10TH AUGUST, 2022"

FEEDBACK FORM

1. What is your level of satisfaction with this workshop?

   ○ 5 ✓○ 4 ○ 3 ○ 2 ○ 1

2. How relevant and helpful do you think this workshop is for your job?

   ✓○ 5 ○ 4 ○ 3 ○ 2 ○ 1

3. What is your level of satisfaction with the variety of topics covered in workshop?

   ✓○ 5 ○ 4 ○ 3 ○ 2 ○ 1

4. How satisfied you are with the content?

   ✓○ 5 ○ 4 ○ 3 ○ 2 ○ 1

5. How satisfied you are with the speakers?

   ✓○ 5 ○ 4 ○ 3 ○ 2 ○ 1

6. Which session do you find most relevant? All were relevant sessions

7. Which elements of the event did you like the most?
   All elements have its own advantages.

8. Which software/toolbox do you find useful for your work?
   All were good.

9. Any additional comment/suggestion.
   NA

10. Name and Signature
    Dr. Virender Sahgal

5 – Very satisfied; 4 – Somewhat satisfied; 3 – Neither satisfied not dissatisfied;
2 – Somewhat satisfied; 1 – Very dissatisfied

SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY, MANAGEMENT & GRAMOTHAN, RAMNAGARIA JAGATPURA, JAIPUR

DEPARTMENT OF ELECTRICAL ENGINEERING

WORKSHOP ON "MODELING, SIMULATION AND OPTIMIZATION TOOLS FOR ELECTRICAL ENGINEERING FROM 08TH - 10TH AUGUST, 2022"

FEEDBACK FORM

1. What is your level of satisfaction with this workshop?

   ○ 5 ○ 4 ○ 3 ○ 2 ○ 1

2. How relevant and helpful do you think this workshop is for your job?

   ○ 5 ○ 4 ○ 3 ○ 2 ○ 1

3. What is your level of satisfaction with the variety of topics covered in workshop?

   ○ 5 ○ 4 ○ 3 ○ 2 ○ 1

4. How satisfied you are with the content?

   ○ 5 ○ 4 ○ 3 ○ 2 ○ 1

5. How satisfied you are with the speakers?

   ○ 5 ○ 4 ○ 3 ○ 2 ○ 1

6. Which session do you find most relevant?

   PSCAD Session

7. Which elements of the event did you like the most?

   Hands on Session

8. Which software/toolbox do you find useful for your work?

   PSAT

9. Any additional comment/suggestion.

   —

10. Name and Signature Tarun Naruka

5 – Very satisfied; 4 – Somewhat satisfied; 3 – Neither satisfied not dissatisfied;
2 – Somewhat satisfied; 1 – Very dissatisfied

SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY, MANAGEMENT & GRAMOTHAN, RAMNAGARIA JAGATPURA, JAIPUR

DEPARTMENT OF ELECTRICAL ENGINEERING

WORKSHOP ON "MODELING, SIMULATION AND OPTIMIZATION TOOLS FOR ELECTRICAL ENGINEERING FROM 08TH - 10TH AUGUST, 2022"

FEEDBACK FORM

1. What is your level of satisfaction with this workshop?

   ○ 5 ✓ ○ 4 ○ 3 ○ 2 ○ 1

2. How relevant and helpful do you think this workshop is for your job?

   ○ 5 ✓ ○ 4 ○ 3 ○ 2 ○ 1

3. What is your level of satisfaction with the variety of topics covered in workshop?

   ○ 5 ✓ ○ 4 ○ 3 ○ 2 ○ 1

4. How satisfied you are with the content?

   ○ 5 ✓ ○ 4 ○ 3 ○ 2 ○ 1

5. How satisfied you are with the speakers?

   ○ 5 ✓ ○ 4 ○ 3 ○ 2 ○ 1

6. Which session do you find most relevant?

   GAMS, presented by Dr. Suman Sharma.

7. Which elements of the event did you like the most?

   Every session was based on research based software tools and very useful. But the most useful & learning session was of MATPOWER, delivered by Dr. Tanuj Rawat.

8. Which software/toolbox do you find useful for your work?

   GAMS, Python

9. Any additional comment/suggestion.

   Very useful sessions

10. Name and Signature (SMRITI JAIN)

5 – Very satisfied; 4 – Somewhat satisfied; 3 – Neither satisfied not dissatisfied;
2 – Somewhat satisfied; 1 – Very dissatisfied

9. MEDIA COVERAGE

एसकेआईटी में तीन दिवसीय वर्कशॉप शुरू

जयपुर। स्वामी केशवानंद इंस्टीट्यूट आफ टेक्नोलॉजी (एसकेआईटी) में इलेक्ट्रिकल इंजीनियरिंग डिपार्टमेंट में तीन दिवसीय वर्कशॉप सोमवार से शुरू हुई। मॉडलिंग, सिमुलेशन एंड ऑप्टिमाइजेशन टूल विषय पर आयोजित इस कार्यशाला का उद्देश्य प्रतिभागियों को विभिन्न इलेक्ट्रिकल सॉफ्टवेयर सिस्टम के क्षेत्र में उपयोग में ली जाने वाली सॉफ्टवेयर आधारित एडवांस तथा इंटेलिजेंस तकनीकों से अवगत कराना है। कार्यक्रम के दौरान तीन दिनों तक एक्सपर्ट लेक्चर के माध्यम से प्रतिभागियों को इंजीनियरिंग क्षेत्र मैं विभिन्न सॉफ्टवेयर तकनीकों के उपयोग से अवगत कवाएंगे। कार्यक्रम के पहले दिन संस्था के डॉ. आकाश सक्सेना, डॉ. तनुज रावत, डॉ. अंकित विजयवर्गीय द्वारा एक्सपर्ट लेक्चर दिए गए। कार्यक्रम का शुभारंभ मुख्य अतिथि प्रोफेसर अजय कुमार बंसल सेंट्रल यूनिवर्सिटी हरियाणा के अजय कुमार बंसल ने इलेक्ट्रिकल इंजीनियरिंग क्षेत्र में सॉफ्टवेयर की उपयोगिता को समझते हुआ किया।

एसकेआईटी में तीन दिवसीय कार्यशाला का शुभारंभ

P3 Police Public Politics

जयपुर ! स्वामी केशवानंद इंस्टीट्यूट आफ टेक्नोलॉजी मैनेजमेंट एंड ग्रामोत्थान (एसकेआईटी) जगतपुरा, जयपुर में इलेक्ट्रिकल इंजीनियरिंग डिपार्टमेंट में तीन दिवसीय कार्यशाला का शुभारंभ 8 अगस्त 2022 को हुआ । मॉडलिंग, सिमुलेशन एंड ऑप्टिमाइजेशन टूल विषय पर आयोजित इस कार्यशाला का उद्देश्य प्रतिभागियों को विभिन्न इलेक्ट्रिकल सॉफ्टवेयर सिस्टम के क्षेत्र में उपयोग में ली जाने वाली सॉफ्टवेयर आधारित एडवांस तथा इंटेलिजेंस तकनीकों से अवगत कराना है । कार्यशाला में इलेक्ट्रिकल इंजीनियरिंग क्षेत्र से संबंधित सीनियर प्रोफेसर के वक्तव्य शामिल है। कार्यक्रम के दौरान तीन दिनों तक एक्सपर्ट एक्सपर्ट लेक्चर के माध्यम से प्रतिभागियों को इंजीनियरिंग क्षेत्र मैं विभिन्न सॉफ्टवेयर तकनीकों के उपयोग से अवगत कराया जाएगा तथा इस क्षेत्र से

संबंधित विभिन्न विषयों पर व्याख्यान दिए जाएंगे।

कार्यक्रम के पहले दिन संस्था के डॉ. आकाश सक्सेना , डॉ. तनुज रावत , डॉ. अंकित विजयवर्गीय द्वारा एक्सपर्ट लेक्चर दिए गए ।

कार्यक्रम का शुभारंभ में मुख्य अतिथि प्रोफेसर (डॉ .) अजय कुमार बंसल (प्रोफेसर, सेंट्रल यूनिवर्सिटी हरियाणा) ने इलेक्ट्रिकल इंजीनियरिंग क्षेत्र में सॉफ्टवेयर की उपयोगिता को समझाया । इसी क्रम में डॉ. सरफराज नवाज (विभागाध्यक्ष,इलेक्ट्रिकल इंजीनियरिंग विभाग) ने कार्यशाला के बारे में प्रतिभागियों को तीन दिनों तक आयोजित किए जाने वाले कार्यक्रमों की जानकारी दी । कार्यक्रम का समन्वयन इलेक्ट्रिकल इंजीनियरिंग विभाग के डॉ तनुज रावत एवं डॉ ज्योत्सना सिंह द्वारा किया जा रहा है ।

तीन दिवसीय वर्कशॉप शुरू

जयपुर। स्वामी केशवानंद इंस्टीट्यूट आफ टेक्नोलॉजी (एसकेआईटी) में इलेक्ट्रिकल इंजीनियरिंग डिपार्टमेंट में तीन दिवसीय वर्कशॉप सोमवार से शुरू हुई। मॉडलिंग, सिमुलेशन एंड ऑप्टिमाइजेशन टूल विषय पर आयोजित इस कार्यशाला का उद्देश्य प्रतिभागियों को विभिन्न इलेक्ट्रिकल सॉफ्टवेयर सिस्टम के क्षेत्र में उपयोग में ली जाने वाली सॉफ्टवेयर आधारित एडवांस तथा इंटेलिजेंस तकनीकों से अवगत कराना है। कार्यक्रम के दौरान तीन दिनों तक एक्सपर्ट लेक्चर के माध्यम से प्रतिभागियों को इंजीनियरिंग क्षेत्र मैं विभिन्न सॉफ्टवेयर तकनीकों के उपयोग से अवगत कवाएंगे।

कार्यक्रम के पहले दिन संस्था के डॉ.आकाश सक्सेना,डॉ. तनुज रावत, डॉ.अंकित विजयवर्गीय द्वारा एक्सपर्ट लेक्चर दिए गए। कार्यक्रम का शुभारंभ मुख्य अतिथि प्रोफेसर अजय कुमार बंसल सेंट्रल यूनिवर्सिटी हरियाणा के अजय कुमार बंसल ने इलेक्ट्रिकल इंजीनियरिंग क्षेत्र में सॉफ्टवेयर की उपयोगिता को समझते हुआ किया। इसी क्रम में इलेक्ट्रिकल इंजीनियरिंग विभाग के एचओडी डॉ. सरफराज नवाज ने कार्यशाला के बारे में प्रतिभागियों को तीन दिनों तक आयोजित किए जाने वाले कार्यक्रमों की जानकारी दी। कार्यक्रम का समन्वयन इलेक्ट्रिकल इंजीनियरिंग विभाग के डॉ. तनुज रावत और डॉ ज्योत्सना सिंह द्वारा किया गया।

वर्कशॉप में बताई इंटेलिजेंस तकनीक

जयपुर @ पत्रिका. स्वामी केशवानंद इंस्टीट्यूट ऑफ टेक्नोलॉजी में इलेक्ट्रिकल इंजीनियरिंग डिपार्टमेंट में मॉडलिंग, सिमुलेशन एंड ऑप्टिमाइजेशन टूल विषय पर तीन दिवसीय कार्यशाला आयोजित हुई। इसमें इलेक्ट्रिकल सॉफ्टवेयर सिस्टम क्षेत्र में उपयोग ली जाने वाली सॉफ्टवेयर आधारित एडवांस तथा इंटेलिजेंस तकनीक बताई। एक्सपर्ट ने प्रतिभागियों को इंजीनियरिंग क्षेत्र में सॉफ्टवेयर तकनीकों के उपयोग बताए। डॉ. आकाश सक्सेना, डॉ. तनुज रावत, डॉ. अंकित विजयवर्गीय, डॉ. वीरेंद्र संगतानी, डॉ. धनराज चितारा, डॉ. सरफराज नवाज, डॉ. सुमन शर्मा ने एक्सपर्ट लेक्चर दिए।

10. DAYWISE DETAILED REPORT OF WORKSHOP

Inaugural Session, (Monday 08/08/2022), 8:30-09:00 AM

Chief Guest: Dr. Ajay Kumar Bansal, Professor, School of Engg. & Technology, Central University of Haryana, Mahendergarh

The inaugural ceremony of the three day Workshop on "Modeling, Simulation and Optimization Tools for Electrical Engineering" organized by the Department of Electrical Engineering, Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur, was held on Monday, August 08th, 2022. The Chief Guest of the event was **Dr. Ajay Kumar Bansal, Professor, School of Engg. & Technology, Central University of Haryana, Mahendergarh.**

Dr. Jyotsna Singh, Assistant Professor, Department of Electrical Engineering, SKIT, Jaipur welcomed all the dignitaries, participants, faculties and research scholars. She shared a brief introduction of this 3-day workshop. She elaborated that the aim of this workshop is to explore various platforms such MATLAB ((MATrix LABoratory), PSCAD (Power Systems Computer Aided Design), Python, GAMS (General Algebraic Modeling System), PWS (Power world Simulator) which are widely used across industries for research and product development. She said, through the knowledge of these software's, the researchers can implement and simulate their research to interesting and challenging real-world examples. She also said that this workshop aims at deliberation, sharing knowledge to faculty and researchers in the field about the significance of different tools and their application. Furthermore, she said, that the goal of this workshop is to explore current research opportunities in the field of Electrical Engineering. The discussion shall also foster inter-disciplinary collaborative research in Electrical Department.

Dr. Sarfaraz Nawaz, HOD and Associate Professor, Department of Electrical Engineering, SKIT, Jaipur discussed a brief introduction of the Electrical Engineering Department. He mentioned that the department is a dynamic and growing community of scholars with an emphasis on research-oriented teaching and is active in most of the dimensions of electrical engineering. Apart from academics, R&D, consultancy, continuing education programmes and administrative responsibilities, the faculty participates in many interdisciplinary activities for the perpetual enhancement of teaching skills. The department faculty regularly contributes to conferences and journals at the National and International levels for the sake of upgrading

knowledge in the respective fields. The graduates of the department venture out for a wide range of organizations including reputed MNC's (Adani Power, TCS, Infosys Ltd. C&G, etc.), PSU's (PGCIL, BHEL, BARC, etc.), Armed Forces and Indian Engineering Services (IES). The students are also successfully seeking admissions in reputed universities all around the world for further studies and global exposure. He mentioned the following salient features of department.

- B. Tech. the degree programme has been accredited 4 times in succession by NBA since 2009.
- Department started Ph.D. programme (Electrical Engineering Research center, approved by RTU Kota) during session 2014-15.
- Other than routine teaching of the university curriculum, the department strives for continuous improvement by conducting project and design contests as well as preparatory test series to enhance the analytical and soft skills of its student and to strengthen their chances to achieve their goals.
- The cut-sections of various machines and transparent models of instruments have been procured to give the students a practical insight into their working
- A generalized Electrical Engineering Lab is established in the department with measuring and monitoring devices, various electrical and electronic components used in industries which enable students to work and learn practical applications of Electrical Engineering.

Chief Guest: **Dr. Ajay Bansal, Professor, Department of Electrical Engineering, Central University of Haryana, Mahendergarh** appreciated the theme of event. He also said that initiative of such workshop is potential platform to discusses various research problems and learn new software. He also discussed that learning of such software is absolutely mandatory in current scenario to pursue the research work. Such software are also a prerequisite for industrial research work. He motivated the students, research and participants from different sectors to attend series and contribute towards development of nation. Lastly, he thanked the coordinators for making him a part of this event.

In the end, **Dr. Virendra Sangtani, Associate Professor, Department of Electrical Engineering**, offered a vote of thanks to all. He thanked all the invited guests and participants for gracing the occasion with their solemn presence. He thanked college management for providing all kinds of facilities to conduct such workshops in the department. He appreciated the

coordinated and organizing committee for great initiative and wished all the best for coming sessions.

Day 1, Session I, (Monday 08/08/2022), 09:00 AM -10:00 AM

Eminent Guest: Dr. Akash Saxena, Professor, SKIT, Jaipur

The speaker for session I of day I is Dr. Akash Saxena, Professor, SKIT, Jaipur. He gave presentation on Optimization Toolbox in MATLAB. Initially, he explained what is optimization. What is it's need and its different aspects. He said, an optimization problem consists of maximizing or minimizing a real function by systematically choosing input values from within an allowed set and computing the value of the function. He said, optimization problems are often multi-modal; that is, they possess multiple good solutions. They could all be globally good (same cost function value) or there could be a mix of globally good and locally good solutions. Obtaining all (or at least some of) the multiple solutions is the goal of a multi-modal optimizer. Classical optimization techniques due to their iterative approach do not perform satisfactorily when they are used to obtain multiple solutions, since it is not guaranteed that different solutions will be obtained even with different starting points in multiple runs of the algorithm. Common approaches to global optimization problems, where multiple local extrema may be present include evolutionary algorithms, Bayesian optimization and simulated annealing.

Later on, he took one test objective function that has to be minimized while satisfying its equality and inequality constraints. The optimization problem he explained then how to solve using optimization tool box in MATLAB. Optimization Toolbox consists of functions that perform minimization (or maximization) on general nonlinear functions. Functions for nonlinear equation solving and least-squares (data-fitting) problems are also provided. He explained two different ways of writing objective function. One is making a function file and another is writing objective function directly in optimization toolbox interface.

For solving optimization in toolbox, he showed how to use genetic algorithm (GA). He solved the given objective function without any constraints, with only one constraint and with two constraints. This way, he showed how the constraints are added and how adding constraints effects the results. He said, since GA is stochastic optimization, we have to run it multiple times and later on compare the results. We have to determine parameters such as mean value, standard deviation, variance, computational time and square of error to access the quality of solution.

Day 1, Session II, (Monday 08/08/2022), 10:30 AM -11:30 AM

Eminent Guest: Dr. Tanuj Rawat, Assistant Professor, SKIT, Jaipur

The speaker for session II of day I is Dr. Tanuj Rawat, Assistant Professor, SKIT, Jaipur. He gave presentation on MATPOWER package of MATLAB. Initially he discussed about the importance of load flow. He said that load flow is used for monitoring, planning and operation of power systems. He showed the importance of power flow through IEEE-39 New England Bus System, 5-bus system and 21 bus-test systems. In these test systems, he explained how expansion planning and up gradation of network is carried out using load flow. He then explained, optimal power flow (OPF) problem which seeks to control generation/consumption to optimize certain objectives such as minimizing the generation cost or power loss in the network.

After explaining all these, Dr. Rawat showed MATPOWER. He said, MATPOWR is a package of MATLAB for solving power flow and optimal power flow problems. It is intended as a simulation tool for researchers and educators that is easy to use and modify. MATPOWER is designed to give the best performance possible while keeping the code simple to understand and modify. Later on, he showed how to run power flow, optimal power flow and continuation power flow in MATPOWER. For this purpose he took IEEE-30 bus test system. Later on, for IEEE-300 bus he compared Gauss-Siedel, Newton-Raphson and Fast Decoupled Power Flow. He also took one practical problem and explained how to solve it using MATPOWER. The practical problem is as follows:

For IEEE 30 bus system, determine the optimal location for installation of a capacitor that will minimize voltage deviation. **Assume**: Capacity of capacitor is fixed and is 50% of total reactive demand.**Hint**: (i) Capacitor can be installed only at load buses. (ii) Expression of voltage deviation is $VD = \sum_{k=1}^{n} |V^{slack} - V^{k}|$, here n is total buses, V^{slack} and V^{k} is voltage magnitude of slack bus and kth bus respectively.

Day 1, Session III, (Monday 08/08/2022), 12:30 AM -1:30 PM

Speaker: Dr. Ankit Vijayvargiya, Associate Professor, SKIT, Jaipur

The speaker for Day 1, Session III of the workshop was delivered by Dr. Ankit Vijayvargiya . He elaborated about the PYTHON language. He discussed the importance of PYTHON in research work. He discussed salient features as

- Python works on different platforms (Windows, Mac, Linux, Raspberry Pi, etc).

- Python has a simple syntax similar to the English language.
- Python has syntax that allows developers to write programs with fewer lines than some other programming languages.
- Python runs on an interpreter system, meaning that code can be executed as soon as it is written. This means that prototyping can be very quick.
- Python can be treated in a procedural way, an object-oriented way or a functional way.

Python Syntax compared to other programming languages

- Python was designed for readability, and has some similarities to the English language with influence from mathematics.
- Python uses new lines to complete a command, as opposed to other programming languages which often use semicolons or parentheses.
- Python relies on indentation, using whitespace, to define scope; such as the scope of loops, functions and classes. Other programming languages often use curly-brackets for this purpose.

He also discussed the syntax . For example he discussed following

Print ("Hello, World!")

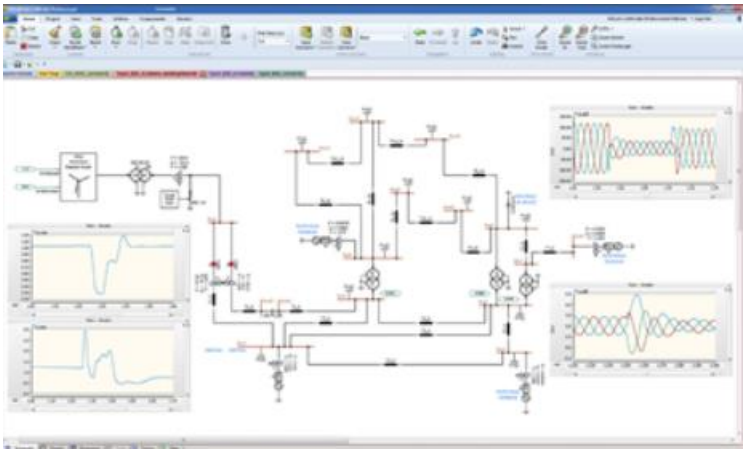
He also discuss various other basic commands. He concluded that PYTHON is an excellent alternative for research work.

Overall, it was an enlightening session

Day 2, Session I, (Tuesday 09/08/2022), 9:00 AM -10:00 AM
Speaker: Dr. Sarfarz Nawaz, Associate Professor, SKIT, Jaipur

The speaker for Day 2, Session I of the workshop was delivered by **: Dr. Sarfarz Nawaz, Associate Professor and Head of Department, EE, SKIT, Jaipur**. He elaborated about the PSCAD and POWER WORLD SIMULATOR. He said that With PSCAD you can build, simulate, and model your systems with ease, providing limitless possibilities in power system simulation. Included is a comprehensive library of system models ranging from simple passive elements and control functions to electric machines and other complex devices. He discussed the

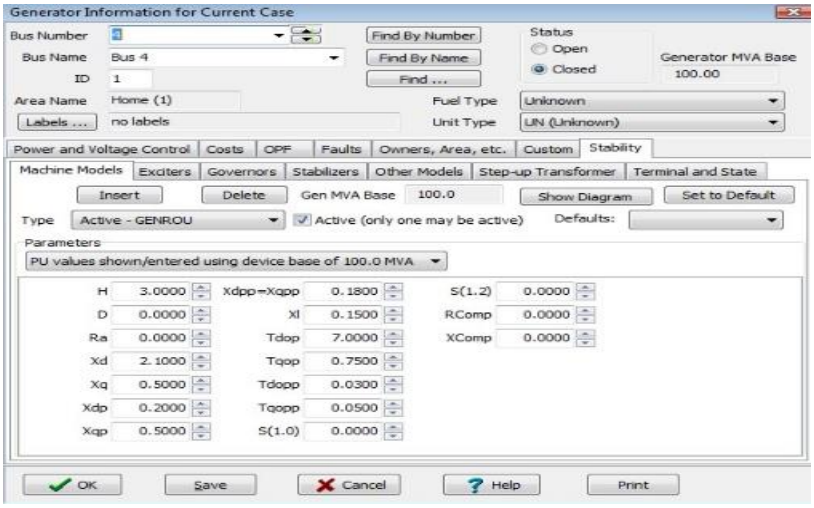
importance simulation and modelling in PSCAD software. PSCAD software is used to simulate the behaviour of power systems.

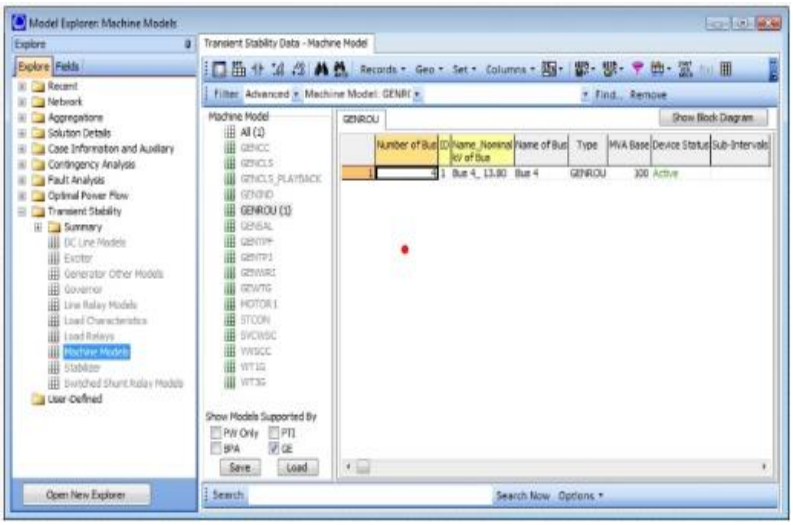


It is used by engineers to design and test new power system equipment and study the effect of changes to existing power systems. PSCAD can be used to simulate behaviour of both AC and DC power systems. Simple power systems can be simulated using PSCAD graphical user interface (GUI). Complex system can be simulated using command line interface. PSCAD can be used to simulate the behaviour of power system over wide range of time scales. PSCAD can be used to simulate the behaviour of power system over wide range of operating conditions. PSCAD can be used to simulate the behaviour of power system under both normal and abnormal operating conditions.

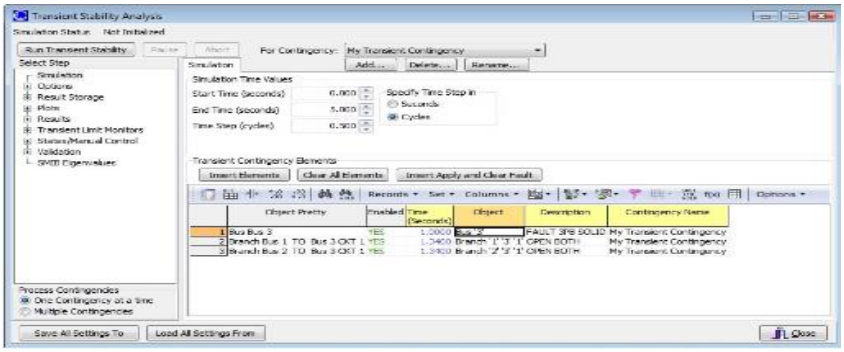
Dr. Nawaz also discussed **Power World Simulator (PWS) software**. He discussed the salient features of software along with hands on training. He discussed that this software has accessibility from within the familiar Power World Simulator interface, without the need for separate programs or scripts Its intuitive menus for assigning dynamic models to power system elements. It is designed to simulate high voltage power system operation on a time frame ranging from several minutes to several days. The software contains a highly effective power flow analysis package capable of efficiently solving systems of up to 250,000 buses. Some of the features that make it so revolutionary include:

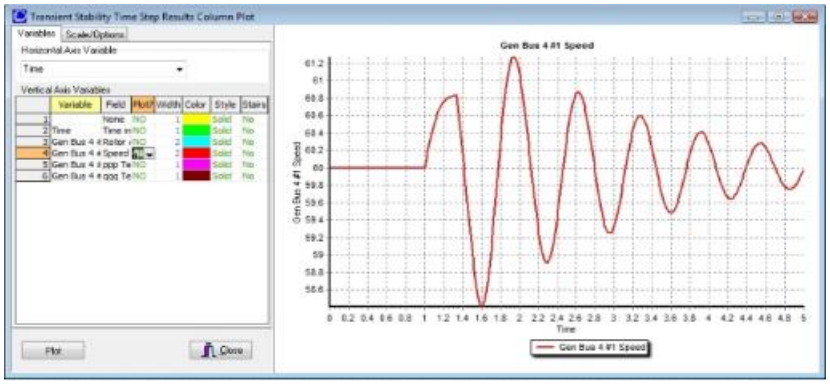
- Its **intuitive menus** for assigning dynamic models to power system elements





- Constructing fault timelines and running the simulation and plotting results



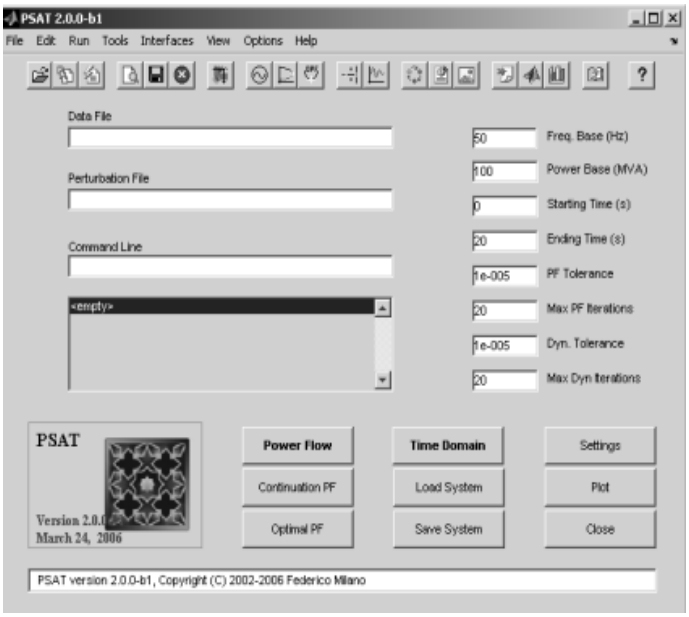


He also discuss various other basic commands. He concluded that both the software's are excellent alternative for research work.

Overall, it was an enlightening session

Day 2, Session II, (Tuesday 09/08/2022), 10:30 AM -11:30 PM
Speaker: Dr. Dhanraj Chitara, Associate Professor, SKIT, Jaipur

The speaker for Day 2, Session II of the workshop was delivered by **Dr. Dhanraj Chtara, Associate Professor, SKIT, Jaipur**. He elaborated about the Power System Analysis Toolbox (PSAT). He discussed the importance of PSAT in research work. PSAT can be used to exemplify the topics covered in the textbooks recommended for power system analysis courses. This can be done by designing computer-based lab activities. He mentioned that in lab activities stimulate the students' interest in the power system analysis. It is not uncommon that, after attending the lab, students design their own test systems and experiments with the toolbox. One of the most important topics covered in power system analysis course is power flow analysis. While students generally understand most of the mathematical derivations involved in the development of the Newton-Raphson power flow method, they often show difficulties in understanding the physical meaning and analyzing the results in a "critical" way.



However, PSAT can be a solution to this problem. PSAT includes power flow, continuation power flow, optimal power flow, small signal stability analysis and time domain simulation. All operations can be assessed by means of graphical user interfaces and a SIMULINK-based library provides a user-friendly tool for network design.

He also discussed application of PSAT for power system stability analysis. He discussed both graphical user interface and command platform for this application

Overall, it was an enlightening session

Day 2, Session III, (Tuesday 09/08/2022), 12:30 PM -01:30 PM

Eminent Guest: Dr. Virendra Sangtani, Associate Professor, SKIT, Jaipur

The speaker for session III of day 2 is Virendra Sangtani, Associate Professor, SKIT, Jaipur. He gave presentation on MATLAB simulation in Engineering Applications. In his presentation, he explained the following things on MATLAB.

- How to start MATLAB
- Using MATLAB as a calculator
- Creating MATLAB variables
- Overwriting variable
- Error messages
- Making corrections
- Controlling the hierarchy of operations or precedence

- Controlling the appearance of floating point number
- Managing the workspace
- Keeping track of your work session
- Entering multiple statements per line
- Miscellaneous commands
- Getting help
- Mathematical functions
- Basic plotting
- Creating simple plots
- Adding titles, axis labels, and annotations
- Multiple data sets in one plot
- Specifying line styles and colors
- Matrix generation
- Entering a vector
- Entering a matrix
- Matrix indexing
- Colon operator
- Linear spacing
- Colon operator in a matrix
- Creating a sub-matrix
- Deleting row or column
- Dimension
- Continuation
- Transposing a matrix
- Concatenating matrices
- Matrix generators
- Special matrices
- Array operations and Linear equations
- Array operations
- Matrix arithmetic operations
- Array arithmetic operations
- Solving linear equations
- Matrix inverse

- Matrix functions
- Introduction to programming in MATLAB
- M-File Scripts
- M-File functions
- Anatomy of a M-File function
- Input and output arguments
- Input to a script file
- Output commands
- ‘‘if...end’’ structure
- Relational and logical operators
- ‘‘for...end’’ loop
- ‘‘while...end’’ loop

Day 3, Session I, (Wednesday 10/08/2022), 09:00 AM -10:00 PM
Eminent Guest: Dr. Suman Sharma, Associate Professor, SKIT, Jaipur

The expert talk in the first session of the third day of work was delivered by Dr. Suman Sharma on General Algebraic Modeling System (GAMS). She highlighted the features of the algebraic softwares and stated their efficacy over other products. There are algebraic modelling based software tools available in present day market, some of which are GAMS (General Algebraic Modeling Systems), AMPL (A Mathematical Programming Language), Pyomo (Python, AMPL, General Algebraic Modeling System).

The algebraic programming based softwares find application in power systems for simulating many optimization problems as well as power system planning problems. Power system optimization operations which can be simulated include Unit Commitment (UC), load dispatch, power flow, scheduling, reconfiguration, energy storage, strategy, management, risk and uncertainty modelling. Power system Planning studies using simulation include construction and expansion of Generation Transmission Distribution facilities, installation of new FACTS devices or upgradation of existing ones, Distributed Generation (DG) installation and expansion, capacitor allocation, Energy Storage (ES) etc.

The solution techniques using these softwares can be many like heuristic technique (GA, PSO, SA, Quantum, Cuckoo etc.) and classic/conventional techniques. Both types of techniques offer the specific set of challenges. The challenges associated with heuristic technique include difficulties in initialization and tuning of parameters, not easy to identify optimum value, running time is consuming, iterative and gives a new solution in every iteration thus doesn't guarantee same solution every time. The challenges associated with Classic techniques include difficulties in modelling the nonlinear problems and get optimal solution.

The Generalized procedure to write any code in any such programming language comprises of the steps- problem statement definition, mathematical model formation, selection of the specific solver and optimization of the problem.

The speaker discussed the working platform of language GAMS with suitable examples. GAMS is a high-level optimization language which comes with language compiler and solvers. If the solver isn't assigned, it will be picked by default, but the solvers can be changed, in accordance to the broad range of application areas. GAMS comes with a lot of model templates, which can be referred to while developing the code.

The Installation of GAMS can be done very easily by downloading it online and getting the license file. The Demo version is free for installation but it is valid for a smaller number of constraints, a smaller number of variables etc. GAMS layout, solvers and their capability to solve the problems was discussed by the speaker.

To write a GAMS file create a collection of statements, define the variables and write the code as per the mathematical equations. The error message syntax starts with ****, $ indicates compiler found error. The comments in form of text can be written after $. The various GAMS statements- their declaration, definition and execution were discussed.

Organization of GAMS programs should be in the order- data (set, variables, scalar, parameter declaration), model(equations), solution (display, report generation). It was explained with the help of an example where the speaker demonstrated how to declare the sets, perform data entry, write equations, create model and solve the statements. The various GAMS model types were shown. The language provides specific solver for individual problem. The solution obtained for a specific problem in GAMS is defined as optimal, locally optimal, unbounded etc.

Syntax of the GAMS general optimization problem was discussed with the help of a simple Linear programming example by developing its mathematical formulation in GAMS. Even when the solver wasn't specified, GAMS automatically used LP solver (simplex).

The Conditional statements and Control statements were discussed with their definition, explanation and syntax.

The Data exchange with MS excel is also possible in GAMS. The report can be generated in excel format. The conversion takes place through GAMS Data Exchange (GDX) file. So it can be Excel file – GDX or from GDX-Excel.

Error debugging in GAMS was also briefly discussed with error numbers. Each error number is associated with particular cause.

Valedictory Ceremony (10/08/2022; 10:30 AM-11:00 AM)

After the completion of session I, Dr. Tanuj Rawat, event coordinator delivered his speech in which he summarized the event activities. The workshop was inaugurated on 08th August 2022. The Chief guests of the inaugural session was **Dr. Ajay Kumar Bansal, Professor, School of Engg. & Technology, Central University of Haryana, Mahendergarh.**

The 3-day workshop from 08th August to 10th August of 07 sessions. On Day 1, there were three sessions. The first session was by Dr. Akash Saxena, Professor, SKIT, Jaipur. He delivered his talk on Topic: Optimization Toolbox in MATLAB. The second session lecture was delivered by Dr. Tanuj Rawat, Assistant Professor, SKIT, Jaipur on Topic: MATPOWER package of MATLAB. The third session was by **Dr. Ankit Vijayvargiya, Associate Professor, SKIT, Jaipur**. He delivered his talk on Topic: Introduction to PYTHON.

On Day 2, the first session speaker **Dr. Sarfarz Nawaz, Associate Professor, SKIT, Jaipur** enlightened the audience on "PSCAD and Power World Simulator". Dr. Dhanraj Chitara, **Associate Professor, SKIT, Jaipur** took over the next session and spoke on Topic: Power System Analysis Toolbox (PSAT). The third session was by **Dr. Virendra Sangtani, Associate Professor, SKIT, Jaipur**. He delivered his talk on Topic: MATLAB simulation in Engineering Application.

The first session talk on Day 3 was delivered by Dr. Suman Sharma, **Associate Professor, SKIT, Jaipur** on Topic: General Algebraic Modeling Systems (GAMS). Dr. Tanuj thanked all the guests and speakers for sharing their knowledge and providing insights to participants.

Dr. Tanuj then asked the participants to provide feedback for the workshop. He also gave formal vote of thanks. He extended a note of thanks to thanks to all without whom this event wouldn't have been possible. He thanked Dr. Ramesh Kumar Pachar (Principal & Head Research Centre, SKIT), Shri Jaipal Meel (Director, SKIT Jaipur), Prof. (Dr.) S. L. Surana (Director Academics, SKIT Jaipur), Dr. Sarfaraz Nawaz (HOD, EE Department SKIT), and Dy. Head Mr. Vikas Mahala. He expressed thankfulness to the fellow members, and all participants of the programme. He thanked all the speakers for their thought-provoking sessions and assured that such seminars, workshops and conferences will be held in future for upliftment of the students, faculty and participants. He expressed gratefulness to the Institute, all guests, speakers, organizers, student volunteers for their support to conduct this virtual workshop. He requested all members to come for a group photograph. He thanked all participants and assured everyone that the certificates will be given in next couple of days. With this the workshop closure was announced.

11. SAMPLE SLIDES OF PRESENTATAION

INTRODUCTION
TO
PSCAD Software

Dr. Sarfaraz Nawaz
Associate Professor & Head,
EE Dept

PSCAD

Power System Computer Aided Design

8/31/2022

Contents:

- Access to PSCAD,
- Software Introduction,
- Environment overview,
- Create a project,
- Run simulation.

Access to PSCAD:

- Purchased by EE dept., SKIT Jaipur under MODROB Scheme of AICTE in year 2012
- Educational version (25+5 licenses)
- Network size: 200 nodes

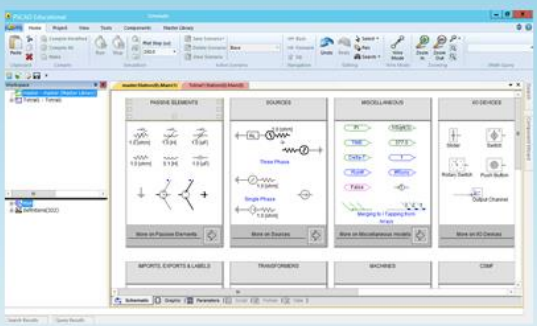
Software Introduction:

Power System Computer Aided Design

- Algorithm: EMTDC (Electro Magnetic Transient in DC System) developed by Dr. Dennis Woodford in Manitoba-HVDC Research Centre in last 70th.
- A simulator of ac power systems, low voltage power electronics systems, high voltage DC transmission (HVDC), flexible AC transmission systems (FACTS), distribution systems, and complex controllers.
- Applications

1. AC transients
2. Fault and protection
3. Transformer saturation
4. Wind power
5. Power quality
6. Design power electronic systems and controls including FACTS, active filters, series and shunt compensation devices.

Environment overview:

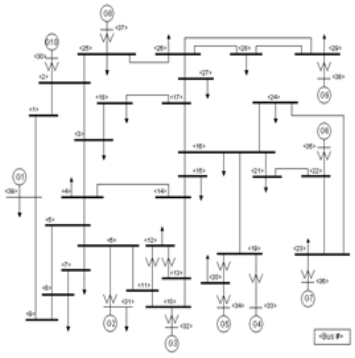


Modeling, Simulation and Optimization Tools for Electrical Engineering

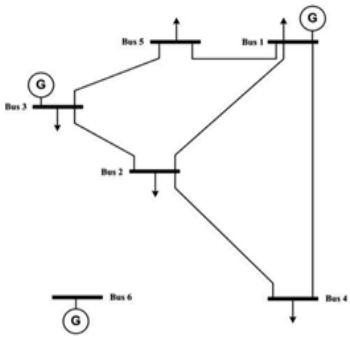
MATPOWER

Presented By
Dr. Tanuj Rawat
Assistant Professor, Electrical Engineering Department, SKIT, Jaipur

APPLICATIONS



Contd…



From bus	To Bus	Capacity, MW	Reactance, pu	Cost, M$
1	2	80	j0.05	10
1	3	50	j0.04	8
1	4	100	j0.10	14
1	5	120	j0.067	18
1	6	200	j0.20	25
2	3	80	j0.05	10
2	4	120	j0.067	18
2	5	100	j0.10	14
2	6	200	j0.20	25
3	4	80	j0.05	10
3	5	80	j0.05	10
3	6	100	j0.10	14
4	5	100	j0.10	14
4	6	50	j0.04	8
5	6	50	j0.04	8

MATPOWER

- MATPOWER is a package of MATLAB for solving power flow and optimal power flow problems.
- AC & DC power flow
- Continuation power flow
- AC & DC optimal power flow extensible formulation allowing customization via addition of user-defined variables, costs and linear constraints.

Commands

Table 4-1: Power Flow Results

name	description
results.success	success flag, 1 = succeeded, 0 = failed
results.et	computation time required for solution
results.order	see ext2int help for details on this field
results.bus(:, VM)†	bus voltage magnitudes
results.bus(:, VA)	bus voltage angles
results.gen(:, PG)	generator real power injections
results.gen(:, QG)†	generator reactive power injections
results.branch(:, PF)	real power injected into "from" end of branch
results.branch(:, PT)	real power injected into "to" end of branch
results.branch(:, QF)†	reactive power injected into "from" end of branch
results.branch(:, QT)†	reactive power injected into "to" end of branch

Introduction to programming

```
clc;
clear;

% define_constants;

%% load data of test system for any modification
mpc=loadcase('case30'); % load original file
mpc.bus(:,3:4)=1*mpc.bus(:,3:4); % make changes in file

%% run power flow/optimal power floe
results=runpf(mpc);

%% save results
Voltages=results.bus(:,8);
Power_gen=results.gen(:,1:3);
loss=get_losses(results);
loss=sum(loss);
```

A WORKSHOP
on
Modeling, Simulation and Optimization Tools for Electrical Engineering

General Algebraic Modeling System (GAMS)

Presented by-
Dr. Suman Sharma

Power System Optimization Problems

LP, QCP, NLP, DNLP, MIP, MIQCP, MINLP, RMIP

Operation	Planning
Distribution feeder reconfiguration Generation scheduling: UC Dynamic Economic Dispatch	Transmission network planning
Economic Dispatch	Generation expansion planning
Maintenance scheduling	Distribution network planning
Optimal power flow: DC/AC OPF	PMU allocation
Active power loss minimization	Capacitor allocation
Voltage profile improvement	ESS allocation
Operation of Energy Storage Systems	Facts allocation
Optimal transmission switching	Switch allocation
Electric vehicle charging	Risk and Uncertainty Modeling
Offering strategy	
Scheduling of reserve	
Loss payments minimization	
Congestion management	
Demand side management	
Risk and Uncertainty Modeling	

Equations

- The implementation of an equation uses a specific syntax:

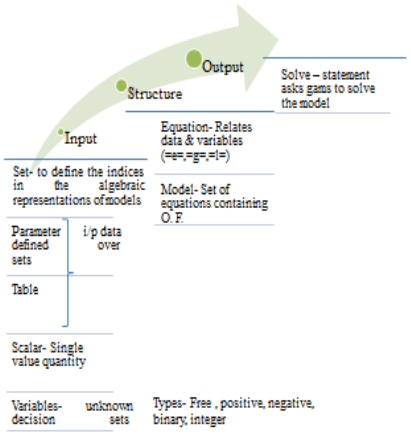
```
objective..
gamma  =E= Sum(J, c(j) * x(j) );
capacity ..
        Sum(J, b(j) * x(j) ) =L= q;
demand(K)..
        Sum(J, P(j,k)*x(j) ) =G= d(k);
```

Separates Eq. name from its implementation

don't forget it

∀k∈K

General GAMS code structure &elements



Example 1 LP with Gams Code

A factory produces 3 types of products $P_{1,2,3}$.Each product should be processed on two different machines. Available machine hours per day and the time required for each product are considered as input data. Profits/kg of each item is also known. How many kg of each product should be produced to optimize total profits?

Table 1.1 Data for eg.1

Required time for task completion (h)			
Machine	*P1*	*P2*	*P3*
M1	2	5	2
M2	3	4	1
Profit per kg ($/kg)			
Machine availability (h)			
P1	10	*M1*	16
P2	12	*M2*	12
P3	13.5		

```
Sets
M /m1*m2/ , P / p1*p3 / ;
Variables OFX( p) ;
Parameter profit(p)
/
P1 10
P2 12
P3 13.5 / ;
Parameter availability(M)
/
M1 16
M2 12
/ ;
Table task(m,p)
     P1  p2  p3
M1    2   5   2
M2    3   4   1 ;
Equations eq1 , eq2 ;
*eq1 indexed eqn & eq2 scalar eqn
Eq1  (m).. sum( p  ,  task(m,p)*  x(p))=l=
availability(M) ;
Eq2.. of =l= sum(p , profit(p) * x(p)) ;
X.Lo(p)=1;
Model example / all / ;
Solve example  us LP max OF;
Display X.L , of.l ;
Execute_unload "example.gdx", X.L, of.l;
```

Example 2 LP with Gams Code

$$\min_x OF = x_1 + 3x_2 + 3x_3$$

$$x_1 + 2x_2 \geq 3$$

$$x_3 + x_2 \geq 5$$

$$x_1 + x_3 = 4$$

```
variables x1 , x2 , x3 , of ;
Equations
eq1
eq2
eq3
eq4 ;
eq1 .. x1+2*x2=g= 3;
eq2 .. x3+x2 =g= 5;
eq3 .. x1+x3 =e= 4;
eq4 .. x1+3*x2+3*x3 =e= OF;
model LP1 /all/ ;
Solve LP1 US LP min of ;
display x1.l, x2.l,x3.l, of .l;
```

```
EXECUTION TIME       =        0.078 SECONDS      3 Mb  WIN234-234 May 21
GAMS Rev 234  WIN-VS8 23.4.3 x86/MS Windows          02/16/18 14:33:4
General Algebraic Modeling System
Solution Report     SOLVE LP1 Using LP From line 12


               S O L V E      S U M M A R Y

     MODEL   LP1                 OBJECTIVE  of
     TYPE    LP                  DIRECTION  MINIMIZE
     SOLVER  CPLEX               FROM LINE  12

**** SOLVER STATUS     1 Normal Completion
**** MODEL STATUS      1 Optimal
**** OBJECTIVE VALUE                15.3333

 RESOURCE USAGE, LIMIT          0.029      1000.000
 ITERATION COUNT, LIMIT             2    2000000000

IBM ILOG CPLEX   May 24, 2010 23.4.3 WIN 17710.17719 VS8 x86/MS Windows
Cplex 12.1.0, GAMS Link 34

LP status(1): optimal
Optimal solution found.
Objective :          15.333333


                           LOWER     LEVEL     UPPER    MARGINAL

---- EQU eq1                3.000     3.000      +INF     0.333
---- EQU eq2                5.000     5.000      +INF     2.333
---- EQU eq3                4.000     4.000     4.000     0.667
---- EQU eq4                  .         .         .      -1.000

                           LOWER     LEVEL     UPPER    MARGINAL

---- VAR x1                 -INF     0.333      +INF       .
---- VAR x2                 -INF     1.333      +INF       .
---- VAR x3                 -INF     3.667      +INF       .
---- VAR of                 -INF    15.333      +INF       .
```

12.1 Objective of STTP

- To understand about importance of simulation and modelling.
- To provide details about various software used in research and engineering.
- To provide hands-on-experience of various software
- To provide coding skills of different software used in engineering applications

12.2 Outcome of STTP

- Introduction to Optimization toolbox in MATLAB.
- Introduction to MATPOWER package in MATLAB.
- Understanding and Hands on experience on PSAT.
- Introduction to General Algebraic Modelling Systems (GAMS).
- Introduction and Demonstration Power world simulator.
- Understanding and Hands on experience on PSCAD.

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Prof. Neha Purohit, Head (English), SKIT

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Dr. Sangeeta Vyas, Head, Head (OSA), SKIT

Event Convener

Dr. Sarfaraz Nawaz

Associate Professor, EE Dept., SKIT, Jaipur

Event Coordinator (s)

Dr. Jyotsna Singh

Assistant Professor EE Dept., SKIT, Jaipur

Dr. Tanuj Rawat

Assistant Professor EE Dept., SKIT, Jaipur

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