

# Innovations by Faculty in Teaching Learning process

## GOALS:

In order to make the teaching-learning process more attractive to students, teachers are using various innovative tools and techniques to deliver the contents/ knowledge so that students can actively participate and grasp the ideas quickly. Faculty is attending various Faculty development programs for domain knowledge and for new trends in education technology/pedagogy which make their teaching more innovative.

The department will continuously strive to achieve the following goals:

- Enrich student learning by innovative practices.
- Develop students' comprehension and expertise of creative methods and strategies.
- Broaden students' perspective of emerging technologies and tools in academics, contemporary and social issues by innovative strategies.
- Motivate students to innovatively think, formulate and perform through different student Chapters/club activities.

### **A. Initiatives followed by the Faculty in teaching and learning process:**

The Electrical Engineering program is following practice to upload teaching material related to the allotted teaching course on Learning Management systems(LMS) and the same will be verified by the academic monitoring committee at program level and at the institute level for any suggestion and improvement. Feedback received from this committee for the improvement will be incorporated in the course material and further shared to the students. This will help the faculty members to improve the quality of the material.

Following are the various tools and techniques used by faculty to make teaching more innovative:

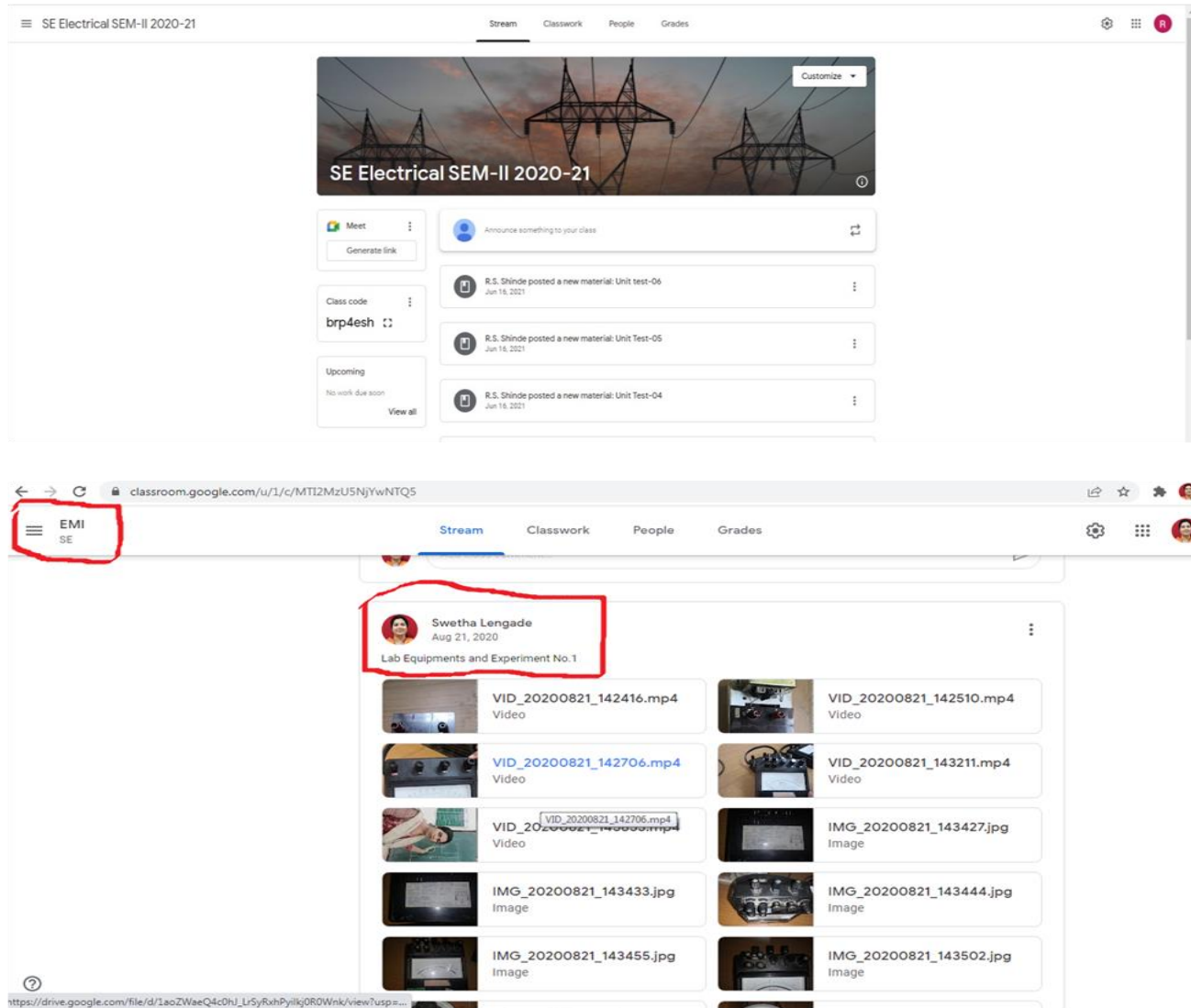
#### **1) ICT and multimedia based teaching-learning:**

Integration of ICT in teaching has very important significance on the learning attitude of students, creativity, knowledge construction, learning environment, teaching strategies, problem solving skills and understanding concepts using various tools. Multimedia will help the faculty to represent the content in a more meaningful way using different ICT tools. This significantly boosts the out-of-class learning experience of students. Following Learning Management Sources are used by faculty:

**a. Microsoft Teams:** Online teaching conduction, Course material like notes, assignments, question bank on all units, reference material (Subject related), quiz, tests, Lab manuals, Lecture videos, animated videos, etc; are shared to students through Microsoft Teams.

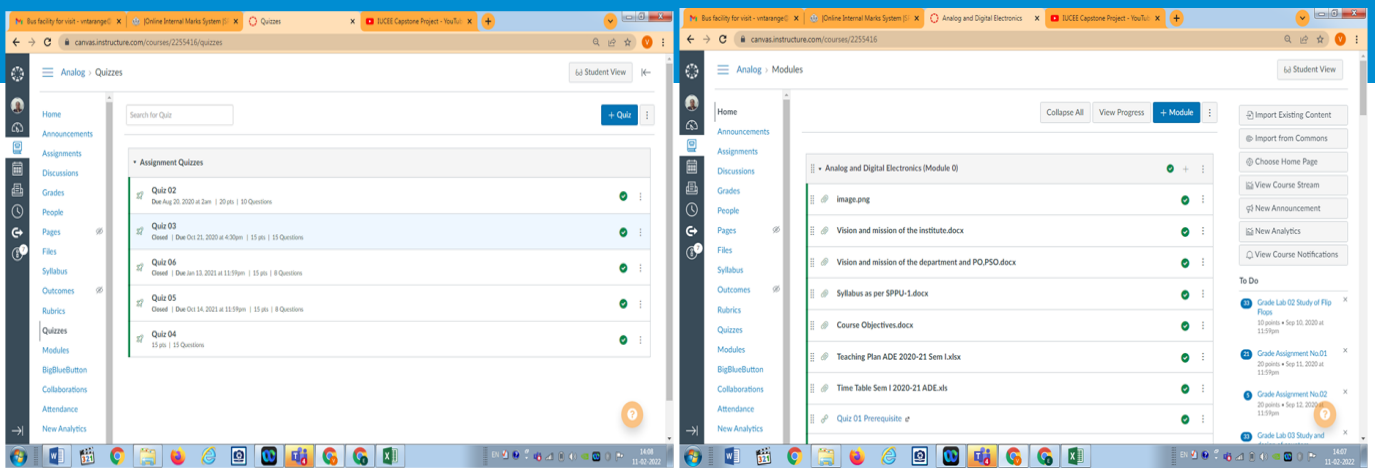
**b. ERP:** Faculty frequently upload material , presentations, assignments and test results on ERP.

**c. Google applications:** Faculty also use Google drive and classrooms to share Course material.



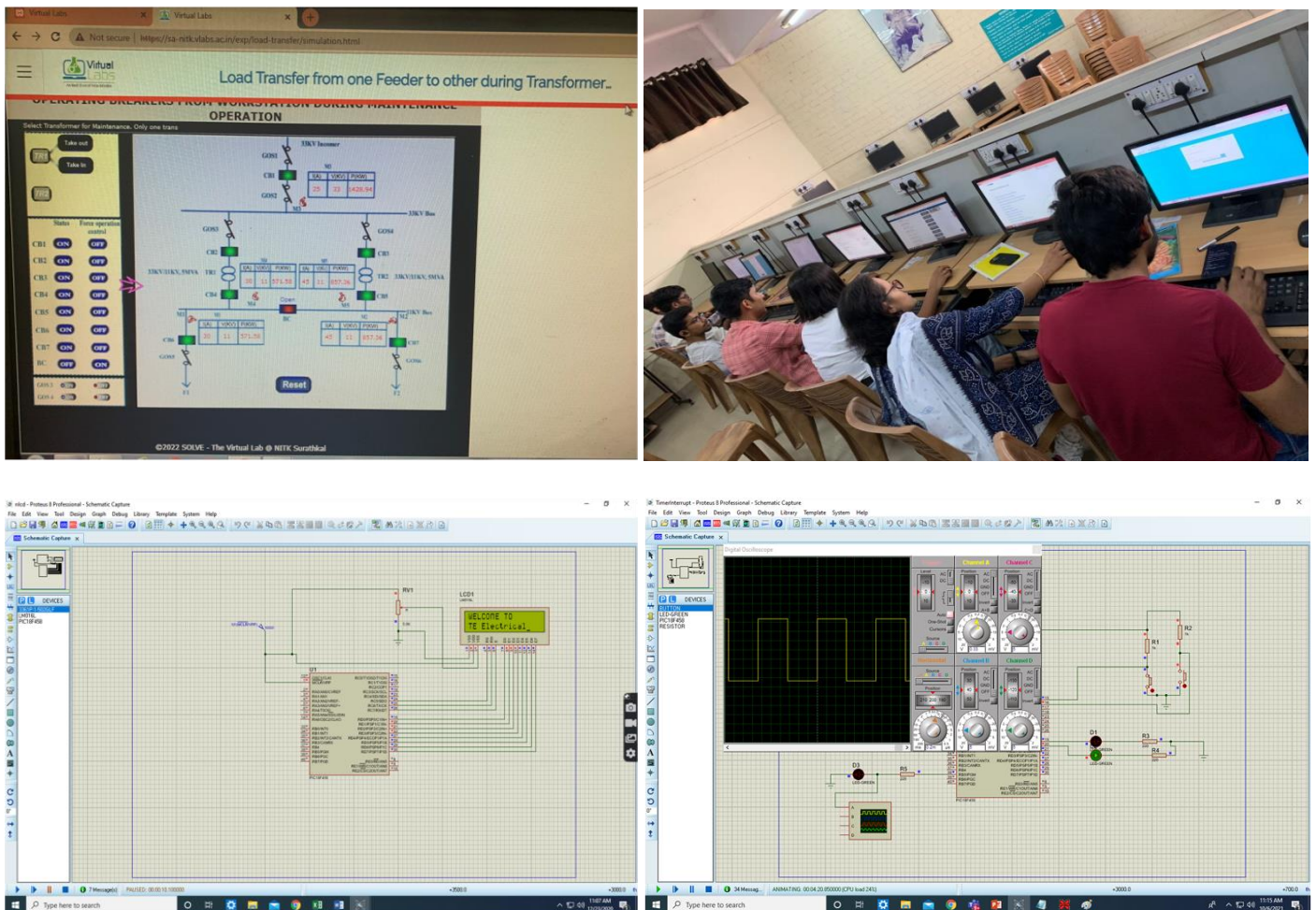
**Fig 1 Google Classrooms used by Faculty**

**d. Canvas:** Another LMS used by faculty to share course material and conduct class tests and quiz, portfolio activities, etc.



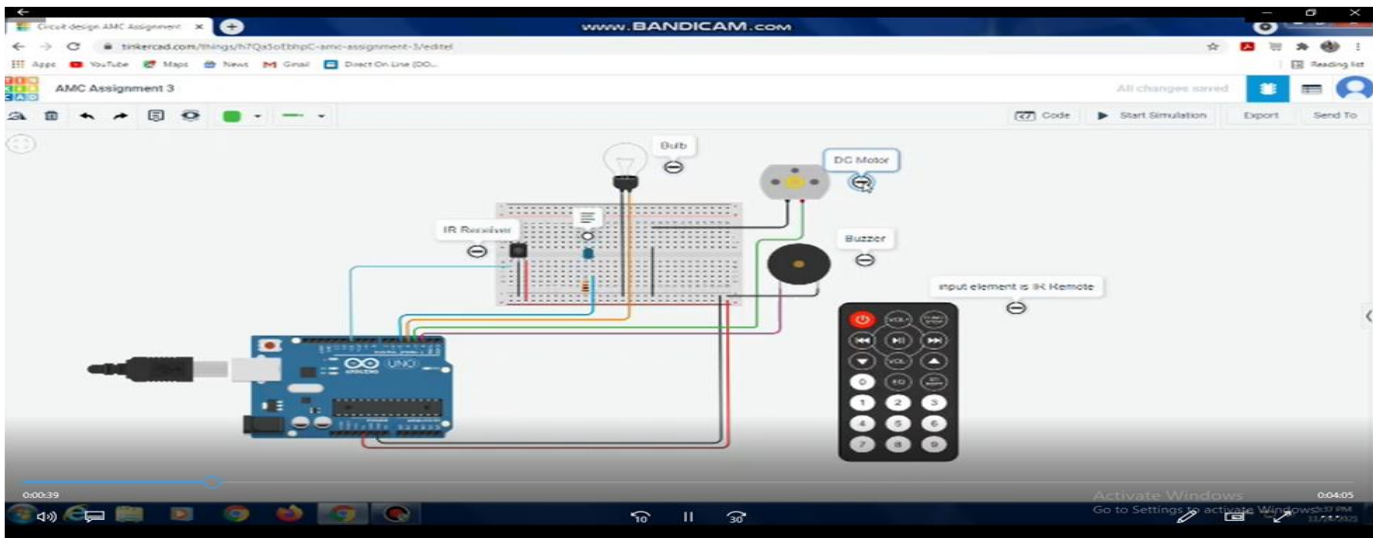
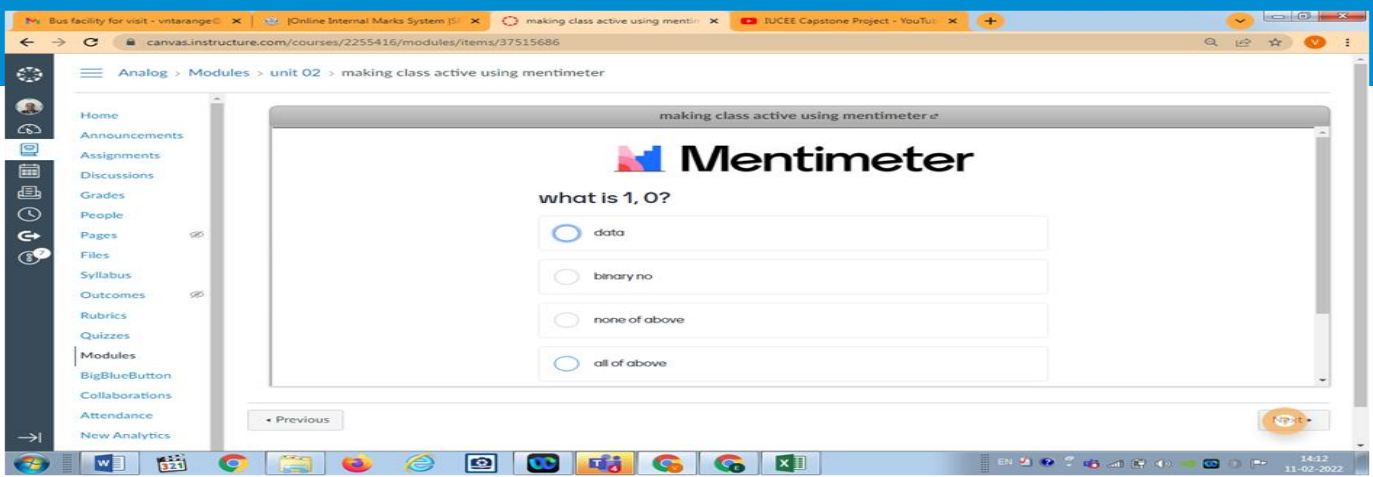
**Fig 2 Canvas used by Faculty**

**e. Virtual Labs and simulation software:** Along with laboratory experiments prescribed by university syllabus, one or more additional virtual lab experiments (from IIT web portal) are conducted for a few labs. Also different softwares like MATLAB, Proteus, PSpice, Mipower, ETAP are used to conduct lab experiments.



**Fig 3 Virtual lab conduction and simulation in Proteus**

**f. Various multimedia tools** like PowerPoint Presentations, smart boards, demonstration videos, mentimeter, spinning wheels, and Tinker cad are used for effective teaching and learning processes.



**Fig 4 Tools like Mentimeter and Tinker cad used by faculty**

**Outcomes:**

- During the pandemic period, this methodology has helped both teachers and students to interact and learn the subjects effectively.
- The platforms helped the students to get the study material, interact with the faculty, solve and submit assignments and enhance their thinking ability through the tests as well as quiz sessions conducted by almost every faculty member.
- Use of virtual labs enthruse students to conduct experiments by arousing their curiosity. This would help them in learning basic and advanced concepts through remote experimentation.
- Remote-access to simulation-based Labs in various disciplines of Science and Engineering

**2) Digital Teaching-Learning platforms:**

Faculty has also created their own YouTube Channels wherein they upload study material relevant to their own subjects. The links are shared with the students and the contents are openly accessed by all students.

Some sample video lectures can be accessed by using following links:

Link [https://www.youtube.com/channel/UCyCJS70\\_It-dfugTs1S0ODw](https://www.youtube.com/channel/UCyCJS70_It-dfugTs1S0ODw)

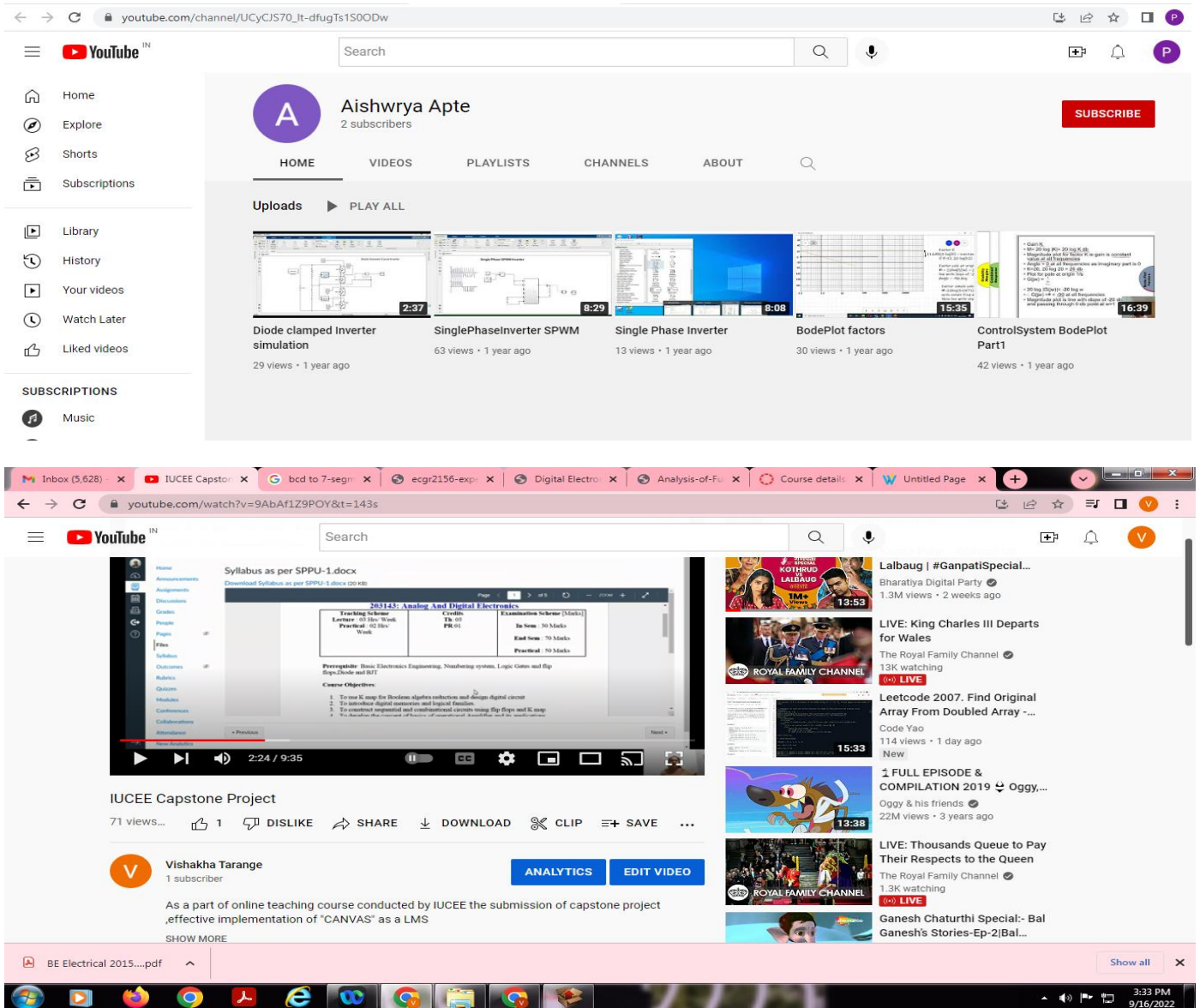


Fig 5 Youtube channels of faculty

**Outcome :**

- The students can learn at their own pace and at their own convenience apart from classroom learning. This provides students, the opportunity for self study.

**3) Instructional materials:**

Unit wise notes, question bank, assignments, lab manuals are provided to students in due course. Laboratory charts, experiment handouts, instruction manuals etc; are used to explain the working principle of experimental setups in each laboratory. Sometimes, for better understanding of complicated concepts, graphical visual aids, animation videos are used by the faculty during practical sessions.

**Outcomes:**

- These materials enable both the teachers and students to participate actively and effectively during lesson sessions.

- Instructional materials make teaching and learning interesting and easy. It makes learning more effective

#### 4) Industry- Institute Interaction:

##### a. Industry visits organized:

S No	Year	Name of the company	Date
1	2021-22	Phugewadi Metro, PCMC	06/04/2022
2		Prayog Electricals	12 04/2022
3		Mapro Food plant	07/05/2022
4		HVDC Phadge	07/05/2022
5	2020-21	No Visits conducted due to Pandemic	
6	2019-20	Hydro Power Plant Ghatghar	02/08/2019
7		PARI Automation	29/8/2019
8		Star Electricals	25/07/2019
9		Lonikand 400 KV substation, Pune	30/08/2019
10		Madhav Capacitors Pvt Ltd, Bhosari	11/09/2019
11		Science Park, PimpriChinchwad	11/09/2019
12		SLDC, Kalwa	12/10/2019
13		Mahati Electricals, Yawat	15/01/2020
14		Pune Metro Rail, PimpriChinchwad	21 & 22 /01/2020
15		Tata Power Plant khopoli	7/02/2020
16		Manisha Transformers	31/01/2020
17		Sakal Press Pune	12/03/2020
18	2018-19	Cahors Industries, Ranjangaon MIDC	04/10/2018

19		220KV Parvati Substation	05/10/2018
20		Mahati Industries, Yewat	30/01/2019
21		Sakal Press Uruli Devachi	1/02/2019
22		Anuraj Sugars Ltd, Yavat	22/02/2019
23		Khadki Locoshed	4/04/2019
24		Rebus Industries LLP, Chakan	10/04/2019
25		Crompton Greaves, Nashik	11/04/2019
26		Pune station Locoshed	11/04/2019





**Fig 6 Industrial visits of students at various companies**

**b. Expert lectures/workshops /training sessions organized:**

S No	Year	Topic	Details of the Expert	Date
1	2021-22	Expert Lecture on Soft skills needed in Corporate	Ms Priti Kibe, Forbes Marshall	02/9/2021
2		Expert Lecture on What competencies a core company looks for in a graduate engineer trainee	Mrs Kavita Kaushik, Quality Champion Cummins India	16/9/2021
3		Expert Lecture on NanoTechnology and its scope in Research	Dr P B Karandikar, Associate Prof, AIT Pune	22/11/ 2021
4		Workshop on Fabrication of Buck converters	Mr Mohan R Pare & Mr Utkarsh Alset,  Design & Development Engineer, R & D ,  Arthertec Innovative Solutions, Pune	23/11/2021
5		Chargers used for Battery Operated Vehicles	1. Mr Utkarsh Alset,  Design & Development Engineer, R & D ,  Arthertec Innovative Solutions, Pune	26 /11/2021



6	2020-21	Introduction to Power Electronics and its scope in Research Areas	DrKalaiselviJayaraman, IIT Ropar,Punjab	04/8/2020
7		Current trends in Electric Vehicles	Mr Ajay Pradhan	18/8/2020
8		Project Selection and management	Mr Manoj Badave,Senior manager, Plant Engineering, Tata motor, Pune & Mr Prakash Mali,Senior Manager ,John Deere,Pune	29/8/2020
9		PLC applications	MrMilindPundalik, VMS Control	18/9/2020
10		Importance on Healthy Life style	Dr V Lunkad	23/10/2020
11		Self Awareness	MsNeetu Gupta, Life Skill Coach	24/07/2020
12		Selection of motor and batteries used in Electric vehicles	MrHrishikesh Mehta, Athertec Innovative solutions	04/12/2020
13	2019-20	Audit course session II	Mr Aditya Akole	12/7/2019
14		Career in Management studies	Amar Salunke	24/7/2019
15		Project area selection and project management	Mr Ajit Jha	02/8/2019
16		Energy Audit and Conservation, BEE and case studies	Mr Pramod Daspute	28/8/2019
17		Role of PLC in Automation	Ms Nital Sarap, Technocrat	23/9/2019

18	Applications of Control Systems in Defense	Mr Jaywant Kolhe Sc 'D' R & D Engineers, DRDO	15/10/2019
19	Career Counseling	Mr Anuj Mehta, Ms Swapnaja, Global Education Pvt Ltd, Pune	06/1/2020
20	Awareness on innovative projects and Internship	Mr Mayank Arora and Mr Chinmoy Zagade, Elite Techno group	09/1/2020
21	Microcontroller applications	Mr Rajendra Khope, IO care systems	18/2/2020
22	Energy Audit & Conservation	Mr Vinay Gadikar	26/2/2020



Power Electronics Expert Lecture

12:17

Request control

Participants

UA PN KN +11

6. A.C. Charging, Plugs, socket-outlets, vehicle connectors and vehicle inlets, TYPE - 2

Type 2 (known as the "Mennekes plug") - This configuration (supports both single or three phase charging) is dedicated for operating voltages up to 400 V a.c. for three phase trip to 250 V a.c. for single phase and operating currents up to 63 A for three phase and up to 70 A for single phase. There are 5 or 7 pins and drive for this type.

- Two line phase - neutral conductor) or line (1 phase - neutral conductor) for A.C. circuit (single or three phases).
- One protective conductor;
- Control pilot (CP);
- Proximity pilot (PP).

Maximum power for its type is up to 43 kW ( $P = \sqrt{3} \cdot 400 \cdot 63 \text{ kW}$ ).

Max	Function
14.5%	AC power
3.6%	AC power
3.6%	AC power
4.0%	Neutral
5.0%	PE
6.0%	Control conductor
5.0%	Control conductor

Aethertec Innovative Solutions

Power Electronics Expert Lecture

11:10:39

Request control

Participants

UA PN KN +10

9. Electric Vehicle Battery Swap System

The EVCS (EVCS) standard developed for general operation for battery swap system, for the purpose of charging between electric and vehicles.

- According to it, the purpose of the battery swap station is to provide energy packs in a fast & efficient and standardized way through fast replacement of their respective battery packs. While charging, the EVCS typically stores a substantial long term, the battery swap process takes only a few minutes on average. This is in order to save energy and not to include them for longer duration.
- Battery swap station mainly includes one or more of the following functions:
  - Range of EVCS.
  - Inventory and pricing of EVCS.
  - Performance and safety management of EVCS.
- According to IEC 62476 there are 7 modes for conventional battery swap station:
  - Automatic swap - charging station;
  - Automatic swap - charging station;
  - Automatic swap - charging station;
- There are 7 modes for automatic swap station:
  - Automatic swap - charging station;
  - Automatic swap - charging station;
  - Automatic swap - charging station;

Aethertec Innovative Solutions

Engineer's day Guest Lecture

10:13

Participants

MR AG

Aethertec Innovative Solutions

Self Skill Required for Corporate World Expert Lecture

10:13

Participants

Aethertec Innovative Solutions





**Fig 7 Expert lectures, workshops and trainings arranged for students**

**c. Internship to students:**

Program motivates students to undergo internships to understand the industrial atmosphere and working culture. Students will undergo internship in the industry either provided by the institute or chosen by themselves. Generally the training period would be 2 weeks to 1 month during winter and summer vacation. Experience gained by students during internship will help students to get jobs in the industry.

**Outcomes:**

- Industrial visits and Internship training provides the students with an opportunity to learn practically through interaction, working methods and employment practices.
- It gives the students an exposure to current work practices as opposed to theoretical knowledge being taught at their college classrooms
- Expert lectures help the students to explore particular subjects with the interaction of industry experts. Students get the benefit to relate theoretical with practical inputs of the field.

**5) Proactive teaching methods** like group discussions, role play, games in the class like treasure hunt help in creating interest by breaking monotony of regular classes while enhancing the learning experience.



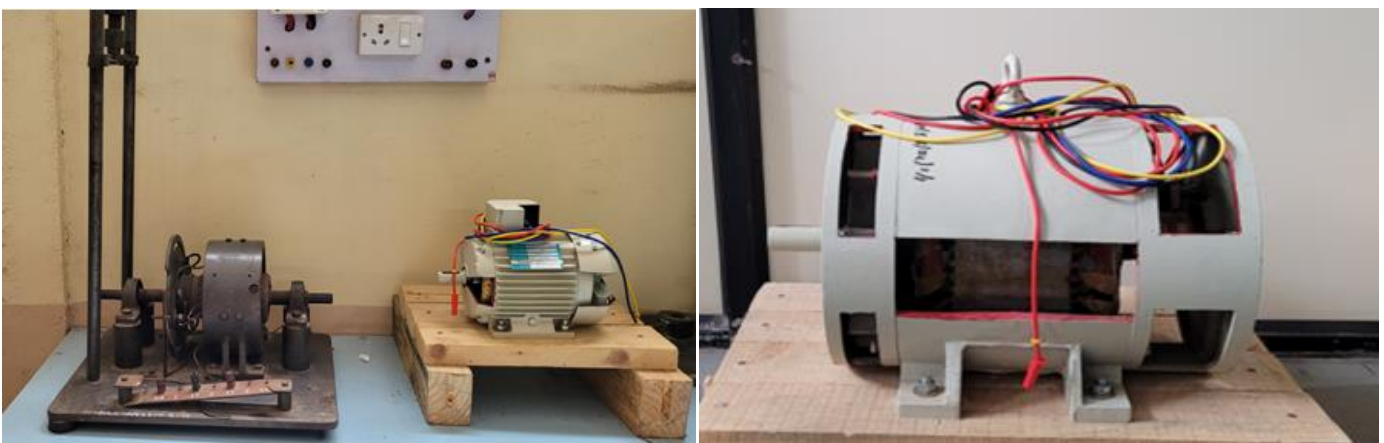
**Fig 8 Group discussions carried out for TE students**

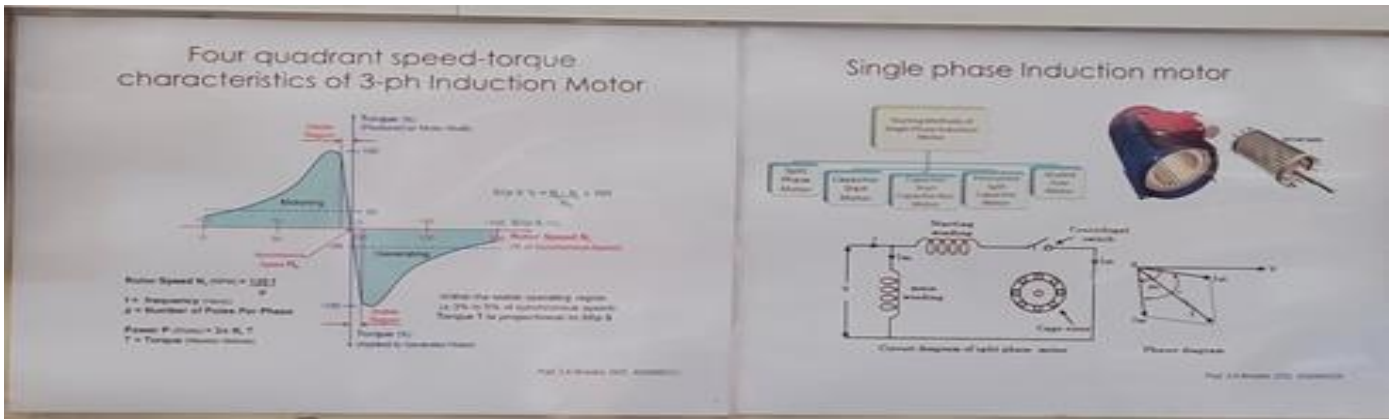
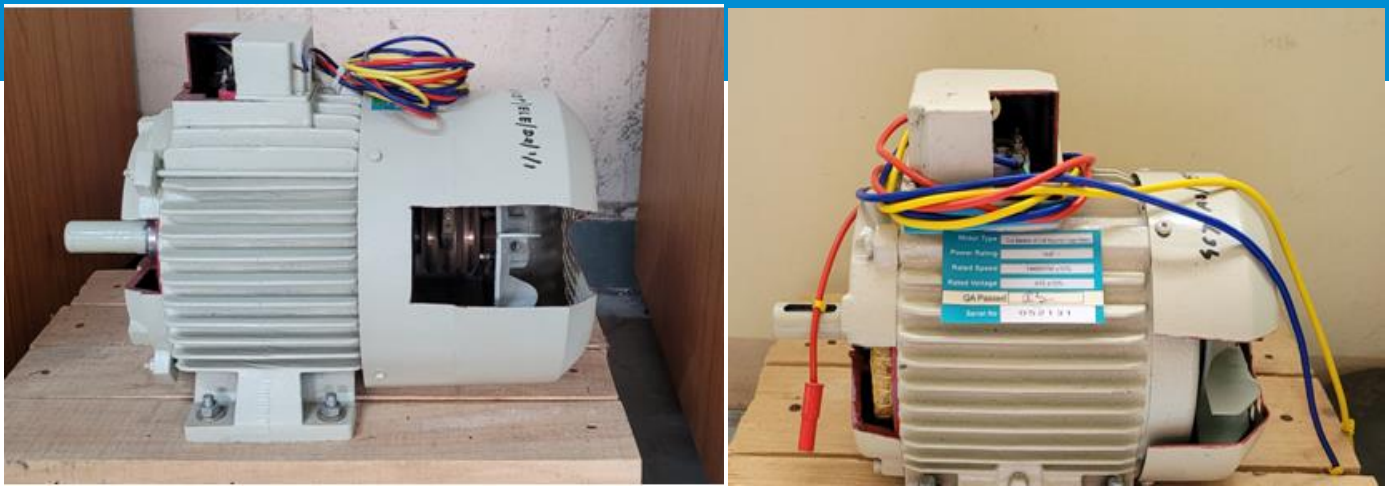
**Outcome:**

- This helps the students to have a better understanding of the subject/topic and get new innovative ideas

**6) Use of models/Animations/PPTs/CASE studies :**

- The department has cut sections of the machines, models of measuring instruments, switchgear which are used to teach core engineering courses and which helps students to understand the concept in a better way.
- Each faculty has prepared PowerPoint presentations which were extensively used in the pandemic period for online teaching and learning.
- The extensive use of charts, animations and Case studies help the students to understand the concepts in an easier way.
- All the classrooms are well-equipped with high quality projectors ready for use any time.





**Fig 9 Various working models, Charts used by faculty members**

**Outcomes :**

- Working models enhance the thinking abilities of the students.
- Animations, Charts and Case studies help students to understand and grasp the concept easily.

**8) Project based teaching-learning:**

PBL has been introduced for SE students with the goal of motivating students to learn by working cooperatively in groups to solve a problem. PBL is a student-centered pedagogy that employs a dynamic classroom approach in which students are believed to gain a deeper understanding through active exploration of real-world challenges and problems. Students gain knowledge about a subject by investigating and responding to a complex question, challenge, or problem over time. It is an inquiry-based and active learning style. Problem-based learning will also alter the role of the teacher as a mentor in the learning process.

## Outcome :

- PBL encourages students to develop a balanced, diverse approach to solving real-world problems, both on their own and in a team.

### 9) Cutting-edge initiative:

Today's education system is rapidly evolving in order to introduce new teaching techniques and strategies that promote a culture of diversity and inclusion. Similarly, each teacher has a distinct teaching style. However, all teachers have the same goal: to instill a love of learning in their students. Department have a few Cutting-edge initiatives as given below that use modern technology

- Avishkar
- Anveshan
- Startup & Innovation cell



**Fig 10 Achievements of our students in Avishkar, Anveshan**





**Fig 11 Start up: Trash to Cash by our students**

### **Outcomes :**

- Students get exposure to discover and develop their entrepreneurial skills, project ideas at national level.
- Students get the opportunity to present their research projects.

### **B. Various Learning Platforms provided to the students:**

The teaching-learning process can be made more novel/attractive to students, if it triggers their innovative instinct and inspires them to find a creative solution to complex problems. The subject knowledge should lead them to use the learning for new concepts and applications and thereby create an environment of problem solving, new designing and critical in- depth thinking. The raw ideas generated from students may initially appear as primitive. These ideas need to be bloomed, matured and experimented on appropriate platforms, so these can be refined into more fruitful end products and feasible applications. Keeping this in mind, the institute/department has provided different opportunities like :

#### **1) Students' chapters and clubs:**

The department has following professional chapters and clubs which provide a good platform for the students to take active part in the various competitions, seminars and lectures arranged by the society. These activities help the students to showcase their talents in terms of team building, communications skills, team work, target work and overall development in professional activities. One faculty advisor is associated with each student chapter for



mentoring, guidance and overall governance. Students are encouraged to take membership of these professional bodies.

Student chapters of IE(I), IETE, ISTE ,IEEE

Energy Audit Club

E-Baja



**Fig 12 Poster competition on Energy Conservation**

**2) Product design(development ) competitions :**

Various student centric activities (like BAJA, SUPRA, EFFI-Cycle) are conducted regularly at the institute level. Students from various programs (departments) participate in various technical events organized at state, national and international level. Teams formed for such events generally consist of students from all programs depending on the event. Selection of students for such events depends on the sub-system of the event to be participated in. Electrical students usually contribute in fields such as electrical operation, energy side backup in the project, green energy initiatives, electronic system designing, battery system and braking operation, etc. Following table indicates participation of electrical students in these activities:

Sr. No.	Year	No of students participated	Name of the activity
1.	2021-22	3	EFFI-cycle
2		9	E Baja
3		1	Garudashwa

4		3	M Baja
5		1	REEV
6	2020-21	3	EFFI-cycle
7		6	Project from Kone Cranes
8	2019-20	5	EFFI-cycle





**Fig 13 Student participation in various SAE competitions**

**Outcomes:**

- Students get exposure to design and build an off-road vehicle that will survive severe punishment of rough terrain and compete at national/international level under the guidance of faculty advisors.
- As in real work situations, these future engineers **work together as a team** to discover and resolve technical challenges in design, test, and manufacturing, as well as business issues.
- Enhancement of presentation skills and learning by participation in various events organized by student chapters at various levels.

**3) Students' Symposium:**

The department conducts National level Technical Symposium-Engineering Today (WATTS) in the month of September every year to encourage the students, organizing and participating in various events, to enhance their skills. The institute also conducts science exhibition, where different projects/models that are developed by SE, TE and BE students are exhibited to the students invited from nearby schools.

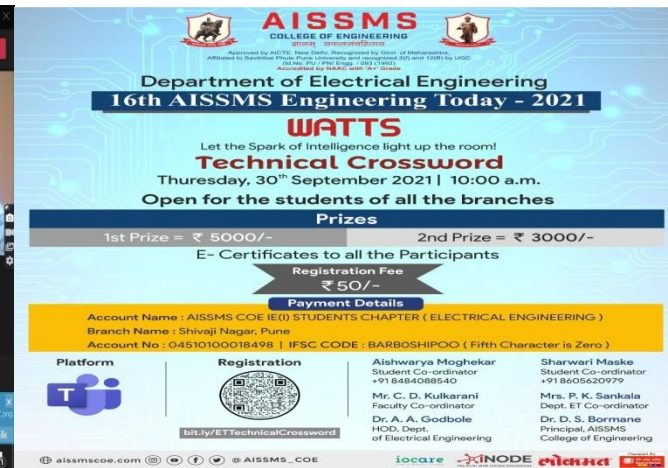
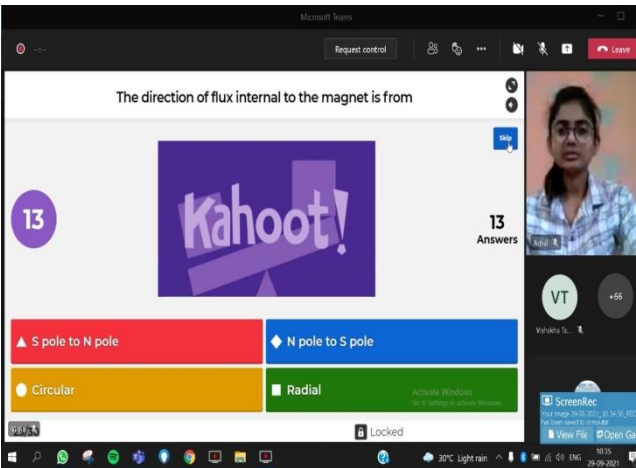
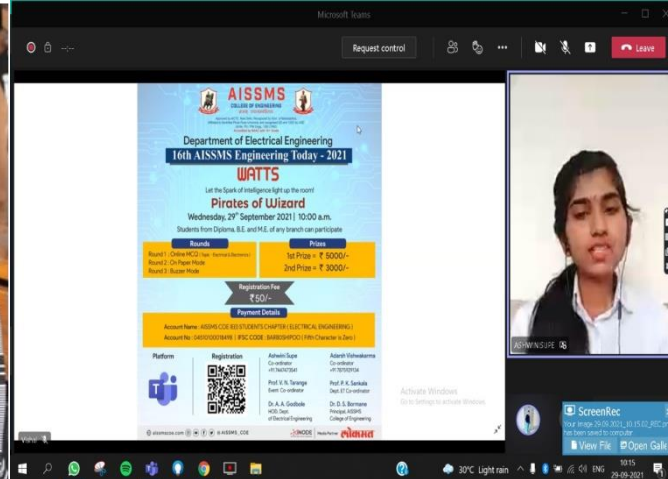
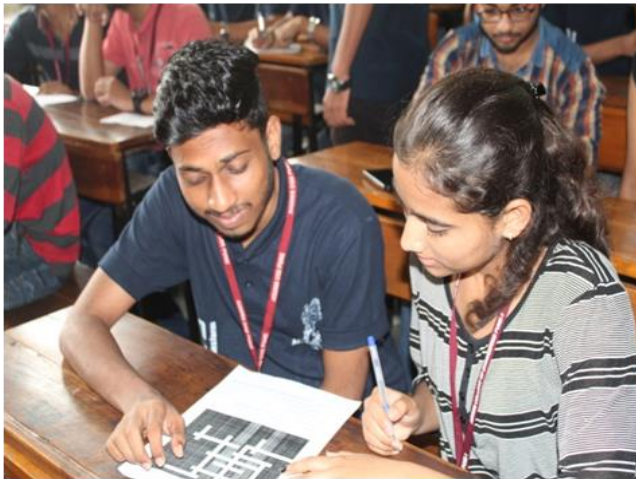


Fig 14 Engineering Today- WATTS (Offline & Online)



**Fig 15 Science Exhibition**

**Outcome :**

Students get opportunity to enhance their technical skills by participating and competing in various technical events

**4) Participation at Technical events( Co-Curricular activities) :**

Students are encouraged to participate in various technical activities like state level/national level project competitions, paper presentations, poster making events, etc;

Name of Student	Details of Participation at Various Events (State/University/ National/International Level)	Remark (Domain)
Anurag Lambhor	1. Paper presentation at VishwaParivartan 2020 organized by VIIT,Pune 2. SPPU-I-2-E ,organized by SPPU Incubation center,Pune 3. A competition for young aspiring Entrepreneurs,Bizz hour-organized by VIIT Pune 4. An intercollegiate technological innovation competition,Pragati 2020 organized by SFIT Mumbai	1. 1st prize 2. 2nd prize 3. 2nd prize 4.1st prize
Rutuja Patil	Technical paper presentation	Participation
Onkar Dahiwal	I2 E startup competition SPPU - Team:Trash to Cash	runner Up
Shraddha Pore	1. National Conference on Cyber Security organized by PVG's COET Pune 2. National level Technical event-Paper presentation organized by Universal COE Pune. 3. International level Paper presentation event organized by JSPM COE Wagholi	1.Best paper award and Best presentation appreciation 2. Winner 3. Runner Up
1.Aditya Bhople 2.Aniket Aitawade	Game of Circuits(National event) organized by AISSMS IOIT	Runner up

1.Gaurav Bhirud 2.Pranay Patil 3.Vaibhav G 4.KoliSaya li	State level Project poster competition in Electrical power systems and machine domain organized by PES's Modern COE,Pune	Second Prize
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#### 4) **Technical Courses( Certified):**

Students are encouraged to complete the courses offered by Swayam-NPTEL, Coursera, etc; and also courses offered by various industries like TATA, etc; Faculty acts as mentor and guides the students in solving the assignments of these courses.

All of the above innovations and creativity in the teaching learning process lead to improve not only the academic performance of the students but also their communication, human relations, technical and management skills which makes them industry ready.